85

Community performance in technology policy arenas: a political economy approach to evaluation

Paper presented to the ECSA Second International Conference

George Mason University
Fairfax, Virginia
May 1991

by

Claire Shearman
IT Institute
University of Salford, UK

Science and technology inevitably influence the ways in which our political, economic, social and cultural systems develop. To date, industrialised countries have sought to harness science and technology primarily to the pursuit of economic goals in the belief that once competitive performance had been enhanced through technological innovation, greater wealth and a better quality of life would automatically follow. The pressures of technological change however have important social consequences - not least in terms of the pattern of employment and regional distribution of wealth and economic opportunity and the development of technology policies (whether at the European national or regional level) - inevitably raises issues of a broadly political, social and cultural nature. The challenge for the European Community in terms of its technology policy therefore is to find a means not only of improving Europe's overall competitive performance but also of ensuring that the benefits thus derived are socially, politically and morally acceptable.

This paper is based on the premise that in the process of industrial development politics and economics are intimately entwined. Building on some of the concepts outlined by David Marquand in his recent book 'The Unprincipled Society: New Demands and Old Politics', we argue that conventional assessments of technology policies based on economic analyses or broad innovation policy themes fail to capture the essence of economic adjustment. Just as European developments in science and technology are embedded in their political, economic and social contexts, so too is their evaluation. Economic growth depends not so much on the specific policy approaches adopted as on the capacity of a particular country (or group of countries) to accommodate and respond to the need for adaptation. Specifically it is the cultural, institutional and political factors which shape the responses to readjustment. Marquand argues that decisive factors in this context include the capacity of the governing body to exercise a 'developmental' approach, the degree of consensus within a society and culture and the extent to which economic and technological goals are woven into the fabric of that society, the ability to negotiate rather than to impose government, the depth of public accountability and the existence of a 'community' or collective identity and spirit. If this is so, then it is the institutional, political and wider cultural aspects of the Community's policies and aspirations that will ultimately prove crucial in determining the longer term effectiveness and success of these initiatives.

As it stands, this is an exploratory paper - still in the process of revision. It begins with an examination of the incentives underlying technology policies in general and uses this to explore Community activities in two 'case study' type themes: the marriage of technological opportunity with user demand and the role of small firms and private financing in technology transfer. It goes on to develop some of the wider themes outlined above which are more pertinent to a political economy framework of analysis and seeks to suggest some of the steps towards future developments.

Setting the scene: factors underlying the development of technology policies

A useful way to begin this analysis of the Community's performance is by examining the underlying incentives for developing technology policies in the first place. In response to increasing global competition and a desire to attain sustained economic growth, all western industrialised nations have sought to influence technological development in one way or another. Part of the motivation to do so has derived from the perceived link between technological capacity on the one hand and the potential for political influence and power on the other. Shifts in international economic and political power derive to a large extent from differential access to, and facility with, technological developments.[1] The development and exploitation of technology tends to alter the nature of power relationships. Such political considerations have been inherent in the development of technology policies within Western Europe at both the national and European level. The belief has taken root that the successful exploitation of the opportunities intrinsic to the so-called information technology revolution holds the key to a nation's future growth and prosperity and politicians and industrialists alike have ascribed to theories of these technologies' strategic significance.

Political and economic considerations aside however, the need for technology policies or strategies has arisen too from the demands of science itself. Developments in science and technology are seen as the key to acquiring skills in industrial innovation, accelerating growth in productivity and gaining a firm foothold in the key industries of the future and the new technologies underlying such industries are seen to derive specifically from scientific research. The 1980s have seen an explosion of scientific opportunities in a whole range of fields. Much biological research is being transformed by new ways of analysing living organisms at the molecular level; developments in genetic engineering have opened up previously inconceivable options; new mathematical tools are improving our understanding of such complex systems as the earth's atmosphere and work on developing silicon based microelectronics and systems integration have profound implications for the future of many of Europe's industries. International rivalry has intensified as nations have committed themselves ever more deeply to the global contest over innovation with the result that science has come to be viewed as a major commodity.

It is not only the management of science that is important but also the understanding of technological innovation. Innovation can be viewed as the total process from the inception of an idea to the production of a product and its ultimate sale. It thus includes invention and the many stages of implementation such as research, development, production and marketing. The aim of a technology policy is to foster the process of technological innovation. Innovation however is a complex phenomenon and identification of different types of innovation is only the first step in

---

[1] For elaboration of this point, see R Williams: The International Political Economy of Technology, in S. Strange (ed): International Political Economy, Allen and Unwin, London, 1984

developing a technology policy.[2] The question then is - how does technological innovation come about? What are the processes involved and are there generalisable patterns recognisable in different cases and across sectors? Is there one simple universal model of the innovation process which can inform policy and direct future developments? It would seem not. Technological innovation is a process requiring scientific and technology knowledge on the one hand and an awareness of demands and/or needs in the economy on the other. The success or effectiveness of it depends on marrying technological opportunity with actual (or potential) market demand. This in turn involves a range of activities, the relationship between which is neither constant over time nor between and within sectors. Thus recognition of technological opportunity is combined with research and development, design, market research, prototype manufacture, testing, production engineering and so on. The process as a whole is uncertain and volatile, steered by individual entrepreneurs in some cases and large corporate R&D laboratories and/or the dynamics of small companies in others.

The management of innovation through technology policies thus requires a certain amount of assessment - both in terms of setting priorities for sectoral developments and determining the relationship between R&D expenditure and competitive performance. Debate continues over the relative merits of pursuing 'basic' or 'applied' research and the implications of expenditure being predominantly driven by the civil or defence sector. Choices have to be made as to the most appropriate mechanisms through which to promote technological innovation. Should attention be focused, for example, on the nature of university-industry interaction, the promotion of new sources of private financing or the encouragement of small firms in new industries? Where resources are limited, pursuit of the right kind of approach becomes ever more imperative.

Technological policies therefore serve to inform selectivity and to foster economic growth, but it is the <u>quality</u> of such growth that is as important as the quantity. The notion of innovation to meet social needs for which there is little 'demand' in strict economic terms is frequently omitted from discussions of technological innovation, yet the 'social economy' is crucially important. Not only do the beneficial effects of technological growth need to be equitably distributed, but economic expansion needs to be achieved at minimal cost to the environment and global eco-system. This inevitably raises the question of the extent to which management of technological development implies or demands state intervention. Yet, as in other policy areas, ensuring adequate growth of the 'right' kind is a matter neither of simple demand management nor of 'leaving it to the market'. European expansion over the next few years will take place in the context of the internal market and the process of major internal (a united Germany) and external (Eastern Europe and the emergence of the so-called 'New International Order') political transition. Structural and social policies will be needed to redress existing and future regional imbalances. Ideally, technological policies at the European level should serve not only to improve Europe's overall

---

[2] See, for example, Freeman (1986)

level of competitiveness but also reflect a commitment to a more even spread of material well-being and wealth both within individual member states and between the core and periphery, to promote environmentally safe industrial development and effect the proper use of Europe's educational and intellectual potential to meet the scientific and cultural challenges of our time.

Responses to the policy incentives

The incentives underlying the development of technology policies offer a number of themes for the assessment of Community initiatives. The extent to which the perceived technology gap vis a vis the US and Japan has been redressed could be one area for examination alongside, for example, the promotion of basic science and the nature of the university - industry interaction. Reiterating the emphasis on the fact that the success or effectiveness of technological innovation (in the view of the economist and policy analyst) depends on marrying technological opportunity with market demand, we use the theme of 'user needs' here to explore the efficacy of the Community's approach and to examine in more detail two of the policy instruments associated with technology transfer - small and medium enterprises (SMEs) and venture capital.

User needs

High definition television is an example of a European collaboration initiative aimed at the mass consumer market which demonstrates the way in which European corporate perceptions of the market tend to be influenced by technological potential rather than user demand. Despite the efforts of the participants in the Eureka project and the European Commission, the market for HDTV is not yet assured. The European standard HD-MAC only has a future for domestic use if European viewers install MAC equipment in their homes. This is beginning to look increasingly unlikely and for the moment at least it is the PAL rather than HD-MAC standard that is dominating the European high street. To a certain extent this can be attributed to historical factors and intra-European disagreements over which variants of MAC should be adopted. The current or potential availability of appropriate technologies, standards and infrastructure for HDTV (or any other product/service) though is not in itself a sufficient guarantee of development and uptake. Prices have to be reasonable and more importantly users have to <u>want</u> them. So even if HD-MAC were to become the standard of the European high street, the HDTV industry would not necessarily take off. Questions are being asked as to whether people will actually want HDTV in their living rooms since the advantage of doubling the number of lines only becomes apparent on a screen so large that few homes could accommodate one. In both Japan and Europe moreover research has demonstrated that existing television systems can be substantially improved to offer the type of picture and sound quality which will satisfy most domestic viewers. Even in Japan the development of Clear Vision as an alternative is threatening to undermine the potential HDTV market especially when initial prices for Clear Vision are in the £1600 range by contrast to £5000 for HDTV.

This propensity to respond to technology push rather than user pull in European science and technology initiatives is not confined to HDTV. Indeed it permeates the majority of European activities in IT related

sectors. The development of home systems is a case in point and, targeted specifically at the domestic consumer, demonstrates the need for companies to take into account social, psychological and behavioural as well as technological dimensions in their assessments of market potential. Given the all-pervasive nature of potential home systems applications, the links to high profile industrial sectors such as IT, telecommunications and broadcasting and its perceived significance to the future of the European consumer electronics industry, it is worth examining the concepts of user demand and uptake in this area more closely.

The European Commission is currently supporting a major project within Esprit to promote the development of a European standard in home systems. The development of home automation and 'intelligent buildings' is widely viewed as critical market for European companies and preliminary proposals for standards to support such a development are already underway in the US and Japan. The objective of the Esprit project on Home Systems is to develop the appropriate standards for introducing products into the market which can be used in multi-brand and multi-application home systems. The partners' remit is to analyse the wiring infrastructure and installation requirements, to validate and demonstrate the results and to provide draft home and building specifications to relevant parties. The work then is of crucial infrastructural importance and will open up opportunities for a whole range of companies in different market sectors (education, entertainment, consumer electronics, tele-communications, energy management and so on) across Europe. Mindful of the fact that, as in the case of HDTV, development of the appropriate technologies, standards and infrastructures per se does not constitute a successful marketing strategy, the crucial issue at stake is the extent to which European companies will then effectively respond to consumer rather than corporate perceptions of need.

Consumers' perceptions of 'want' may not be the same as manufacturers' perceptions of 'need'. Recent surveys suggest that for British consumers at least it is the advantages of the general features offered by home systems that are of interest rather than the specific products and/or services.[3] The concept of easier, more comprehensive and sensitive control of the domestic environment proved popular as did an emphasis on reliability. In terms of actual products, energy management systems and household security rated highest. But in general there was a mis-match between the kind of functions a consumer expected (including 'automatic removal of dust and dirt') and what was likely to be on offer. Many of the ideas for home system products from companies inside and outside of the Esprit programme utilise the idea of integrated remote control but interestingly enough, not only were these consumers not particularly interested in remote control within the house but they also failed to display any particular preference for integrated systems. The peculiarities of the British consumer may not be typical of Europe but they do serve to show the importance of identifying actual user wants in developing European home system markets.

---

[3] RMDP (1989): Home automation: will the public buy it?, RMDP Ltd and the UK National Economic Development Office, Brighton

The crucial question however is how do these devices and services get into the home? What shapes the way that people use them? Since home systems technology is located in a domestic context, it is important to examine that context. Domestic arrangements vary across cultures and time periods. Currently, the established pattern is for people to live together in small families within the same household though this of course is in the process of changing. Nevertheless, decisions about the purchase and use of home systems will be made within the family or household group. This may look like a simple decision on the surface but in practice is likely to be complicated by a whole range of different (and often) conflicting interests and expectations. Home computers, for example, may be bought as a result of parental interest, child enthusiasm or peer group pressure for educational and/or recreational purposes but lead to concerns about computer game addictions or monopoly by particular members of the family. The purchase of each item of technology within the home then is influenced not just by technological discoveries or market availability but is linked to a whole range of somewhat hidden expectations about, say, the role of teenagers, the organisation of the household into separate living areas and unspoken rules about family living.

The development of home systems though will not just be a matter of buying the technology or acquiring access to new services. To be of relevance to people - and therefore a longterm demand - it has to be used. Speculation abounds on the 'home of the future' but little research has been done on the actual usage of novel IT-related devices in the home. It is important to remember that compared to the office and factory, the incidence of IT in the home is actually relatively low. As recently as 1986, for example, only 15% of American homes had a personal computer. Not all home systems technology is IT-based, of course, but where technologies are already well-established in the home, the question then is - does the consumer want more? How many television screens - one essential component of many proposed systems - will the average family tolerate within their house? How far is this culturally defined? Do people actually want integrated and/or interactive systems within their home? Or do they prefer 'stand-alone' products - if only for the perception of greater autonomy over activities within their house that this might afford them?

How people will actually use home systems is not self-evident. Usage will not depend on the technologies or even the products and services per se, but on individuals' perceptions and understanding of and interest in the systems with which they are confronted. These in turn are likely to be crucially affected by the assumptions people bring with them such as the attitudes to technology acquired in childhood or shaped by experiences of previously unreliable products and their expectations relating to 'quality of life'. Ultimately, it is the people using the products and services who will give meaning to the concept of 'home systems' - meanings which may or may not be shared by the developers of such systems. The technology merely sets the possibilities and constraints. It cannot determine how, or indeed even whether, such systems will in reality be used. The fortunes of technologies within the home have been mixed. Products like the television and telephone have proved enormously

popular; services such as home-banking and tele-shopping have fared less well while cultural differences between the US and Europe may go a long way towards explaining while cable TV has proved more successful in the former.

This is not to question the efficacy of devoting a substantial proportion of Esprit funds to a project relating to home systems. The development of a European home system standard and appropriate technologies is, in the context of global consumer electronics markets, obviously crucial but ultimately these are merely tools rather than market solutions. The extent to which the efforts under Esprit are deemed retrospectively to have been valuable depends on the use European companies make of the opportunities afforded them. What will count in the end is a real understanding of how people perceive their homes - both in terms of the physical entity and the lifestyle and values associated with it - and a knowledge of the subtleties and intricacies of social organisation underlying family life in Europe and elsewhere.

It is in this respect that European companies and policymakers in IT and telecommunications fields in particular tend to be constrained by their somewhat deterministic perceptions of what the notion of the 'information society' actually constitutes. While IT and communications have permeated our economies and societies on a wide-ranging basis (and indeed continue to do so), the arrival of the so-called 'information society' as promulgated by the likes of Toffler and others has yet to be heralded. The debate will no doubt continue as to whether the impact of IT-related innovations on society will be of a qualitative and essentially 'revolutionary' nature or merely represent ad hoc and incremental changes to the existing status quo. What is currently clear though is that industrialists and policymakers are not always fully aware of the process of change that has been effected to date. The impact of IT on work is one example. Forecasts for the 'information society' predicted a proliferation of teleworking and homeworking. IT and telecommunications have impacted on established patterns of work but not uniformly or in the way that had been initially anticipated. It is factors like these that European industrialists need to become more aware of for they have major longterm implications for such markets as office systems, telecommunications, education and entertainment and should be underlying some of the research in, for example, human-machine interaction. More research needs to be done on the actual usage of technology and in order to be successful, corporate marketing strategies require industrialists to have a firmer grasp of real rather than perceived trends in socio-economic development. Otherwise the danger is that many expensively produced European IT telecommunications and consumer electronics products will find themselves redundant in the market place.

Role of small firms

Small firms are considered by many to play a major role in the diffusion of technology and it is this perception that has underlined the integration of SMEs into virtually every aspect of Community industrial and technology policy. The Community enterprise policy, for example, seeks to improve the business environment and promote the development of SMEs within the Community. Activities to improve the SME business

environment are underway in a number of areas ranging from the control of administrative and legal constraints on business to matters relating to the internal market, competition policy, company law and taxation while services for SMEs have been developed in relation to information business cooperation, training and employment, research and development, exporting, finance and innovation.[4]

Within the context of the Brite/Euram programme, a pilot scheme of feasibility awards for SMEs has been initiated. The philosophy underlying the scheme is that while SMEs have much to contribute to the development of innovative areas (presumably because of their reputations for flexibility and creativity), the investigation of potential new applications of scientific principles or testing of new instruments and processes - basic key points of any applied research project -frequently represents a major financial investment for them. The feasibility awards offer SMEs financial assistance and the opportunity to demonstrate their abilities to potential partners in future collaborative research projects while testing innovative ideas. Over 600 applications for the awards were received in 1989, of which only 60 could be selected for funding - their range covering new developments in classical industrial sectors as well as applications relating to medicine, biotechnology and the environment.[5]

The Sprint programme also aims to encourage small firms to be more innovative and to participate more actively in the process of technology transfer. Activities undertaken under the umbrella of this programme have been wide ranging. Examples include the development of a transnational network of specialised technology transfer brokers, the provision of technical assistance to industries and the establishment of TII - the European Association for the Transfer of Technologies and Industrial Information.

Sprint is considered by some to be at the core of the technological transformation process in the European economy.[6] Like many Community initiatives targeted specifically at small companies, it adopts the approach of developing appropriate contact and support networks. TII (Technology, Innovation, Information), for example, is essentially an network of innovation support professionals with areas of members' expertise ranging from innovation and technology management to contract research, policy expertise, venture capital, regional development and intellectual property advisors. Training seminars are run on such subjects as technology auditing, marketing techniques for innovative products, venture capital, marketing of information services and the negotiation and legal protection of technology transfer. Another example

---

[4] See, for example, CEC, Third Report of the Realisation of the Objectives of the Community Action Programme for SMEs, Con (89) 38 final.

[5] See CEC: Brite/Euram Feasibility Awards for Small and Medium-Sized Enterprises 1989: Synopsis of Supported Projects.

[6] DG13: Innovation and Technology Transfer Newsletter, Vol.9/4 November 1988, p3.

within Sprint is the creation of transnational 'mini-networks' typically comprising three or four agencies providing services to SMEs with the specific aim of bringing about technological collaboration between firms of different countries. The creation of over fifty such groupings had by the end of 1987 led to some 100 interfirm agreements.

It is too early as yet to properly assess the effectiveness and value of such networks. The small groupings encouraged in TII's training seminars do seem to provide a useful learning environment but it is open to question in some of the activities as to whether the most appropriate audience is being reached. In the October 1989 TII conference on enterprise, innovation and 1992, for example, while the quality of the presented papers and debate was good, the audience itself was notable for its general absence of SMEs. TII was in effect preaching to the already converted. This in turn brings us back to some of the underlying issues relating to SMEs. Small firms undoubtedly do play an important role in the types of innovation environments, but the precise nature of that role is much more difficult to determine. Analysis of small firms moreover has suffered from definitional imprecision. Contrary to popular perceptions they vary in size, nature and function. An important consideration in determining the role of small firms may well be the context within which they are operating since their effectivness as a mechanism of technology transfer can depend as much on a region's history and stage of industrial development as on any inherent capacity for creativity within the firms themselves.

Some aspects of the Community's policy on SMEs in relation to technology transfer may well benefit from considerations of these issues. The Commission's blanket definition of an SME as an entity comprising less than 500 employees is somewhat inappropriate in the context of technology transfer since it fails to capture and exploit the particular nuances evident interfirm relationships at different points in an industry's development. Some types of small firms are better suited to particular forms of technology transfer than others and this needs to be acknowledged both in relation to programmes like Sprint and in assessing the effectiveness of small firm participation in initiatives such as Esprit and Brite/Euram.

European venture capital financing

The role of financing small firms in their innovative capacity is frequently attributed to venture capital. Relatively speaking, the European venture capital industry is still in a state of immaturity. Britain represents the most advanced venture capital market in Europe and by 1988 accounted for 56 per cent of the European total while France has established itself in second place. In total, the venture capital industries of 16 European countries raised a total of 3.48 billion ecu in 1988. Countries with young venture capital industries showed the greatest increases in capital raised between 1987 and 1988 and banks and pension funds were the largest providers of funds. Cross border investment within Europe increased by 75 per cent. A breakdown of investments by industry sector shows that the proportion of investments made in companies in the consumer related sector increased by five per cent to 25 per cent in 1988. Overall, investment in high technology sectors declined slightly

between 1987 and 1988. Companies in the communications, computer related, other electronics related, biotechnology, medical/health related and industrial automated sectors received 23 per cent of the 1988 total investment compared to 26 per cent in 1987. The average size of investments on companies in high technology sectors was nearly half of the average investment size for companies in the remaining, mainly low technology, sectors.[7]

Contrary to conventional expectations however, a large proportion of this venture capital activity is not finding its way to innovative small firms. Indeed much of the investment is risk averse, relying not so much on the capital growth of the investment itself as on the steady interest and dividends secured against existing assets. Investment in start-up companies in 1988 increased to represent 26.6 per cent of all investment made in terms of numbers but only 12 per cent in terms of finance. Management buyouts (the least risky of ventures) in 1988 represented 17.8 per cent of all deals but accounted for 38 per cent of the funds invested. Investments at the 'seed' stage meanwhile fell back from 1.1 per cent in 1987 to 0.3 per cent in 1988. Seed financing clearly remains at an embryonic stage of development.

The European venture capital industry faces a number of difficulties. There is little geographical dispersion within countries as national financial centres tend to act as a magnet. Even in Britain - the most developed venture capital market in Europe - the majority of all types of venture capital funds are located in London and most of the funds are invested in the South East of England. Regional venture funding is in the process of emerging but the amounts available remain very small. Europe-wide there is a paucity of venture capitalists with sufficient experience and/or training to manage large numbers of transnational ventures effectively. Good quality projects from young companies moreover are not always forthcoming.

Clearly more effort needs to be focused on the provision of short to medium term venture capital financing for European companies and on the development of a stronger pool of longer term seedcorn financing. The recent Community initiatives - Eurotech Capital and Seed Capital - may be a step in the right direction but with the amount of money involved and the number of companies likely to benefit, the impact on the European innovation scene is not going to be substantial.

It may be that the traditional stereotypes associated with venture capital financing need to be reassessed. In many cases venture capital plays a limited role in the early stages of the technology transfer process.[8] Rather it is the later stage of financing which attracts the

---

[7] EVCA (1989): Venture capital in Europe, 1989 EVCA Yearbook, EVCA/Peat Marwick McLintock, London

[8] See, for example, Chapter 5 in P. Blackburn and R Sharpe (eds) (1988): Britain's industrial renaissance? The development, manufacture and use of information technology, Comedia, Routledge, London and Segal Quince Wickstead (1985): The Cambridge Phenomenon: The growth of high

venture capitalist. It has been noted that '..the technical entrepreneur may have had little exposure to commercial and management worlds and may even downgrade these functions in the demand for the company's financial resources. These companies are operating in market segments where the product lifecycle can be as short as three years and where the need for an international market is essential.... To survive, companies need to reach a size and profitability which ensures adequate research finance ...This is a critical stage in a company's development that could well explain why companies sell out to larger, often American, groups.'[9] This ties in with research on the role of new technology based firms in emerging industries which indicated that the technological entrepreneur's perception of 'success' is frequently that of 'buy-out' rather than expansion since such an option allows the company to continue in relative security while freeing the entrepreneur to pursue new technological avenues in search of exploitable ideas.[10]

It would seem then that the concept of private financing of small firms needs to extend beyond that of venture capital. The availability of appropriate financing at an early stage is obviously crucial but it does not have to come in the form of venture capital. Firmer sectoral commitments may be needed, guided by the need to maintain the different different roles of small firms in the various stages of industrial development. Just as particular components of salient R&D sectors have been highlighted for support in Europe's strategy to meet its competitive challenges, so too aspects of financing to enhance technology transfer can be picked out for particular attention. Greater integration, for example, is needed between Europe-wide initiatives designed to promote regional development and those to increase the availability of private financing. Then there is the European venture capital industry's 'skills shortage' - that is, a dearth of suitably trained professionals - to be considered. The development of appropriate training programmes could be a viable area for future Community policy initiatives.

Finally, there is the need to move away from the association of venture capital funding primarily with so-called 'new' technology sectors. Many of the traditional sectors require finance and expertise to enable them successfully to transfer newer technologies to their products and production processes. While such companies can offer substantial employment opportunities, their growth potential is not as attractive to the private sector and they are consequently often starved of restructuring capital.[11] The result can be unemployment, skill losses and factory closure. There is a need to move away from the diurnal metaphor of 'sunrise' and 'sunset' industries and to promote instead the

---

technology industry in a university town, Segal Quince Wickstead, Cambridge.

[9] P Blackburn and R Sharpe (eds) (1988): op cit, Chapter 5, p139

[10] See C Shearman and G Burrell (1988): New technology based firms and the emergence of new industries: some employment implications, New Technology, Work and Employment, Vol 3, No 2, Autumn.

[11] P Blackburn and R Sharpe (eds) (1988): op cit

development of technologies and industries at every stage of their maturity.[12] Technological innovation must be seen to be serving the whole and not just particular sections of society. It is those industries at the height of their maturity that commonly generate the greatest levels of employment. European society may well be in the process of transition from a predominantly manufacturing to service economy but the speed and inherent costs of such a transition inevitably require some form of regulation and pacing. Private financing therefore may well have an important role to play in helping to maintain the fabric of European social cohesion.

Policy evaluation: reclaiming the political, social and cultural arena

Evaluating the effectiveness of policies is always a difficult task, raising as it does the question of what to evaluate and how to go about it. As we have seen above, the need for and implementation of technology policies revolves around a mixture of political, economic, scientific, managerial and social imperatives. It would seem logical therefore to undertake an evaluation of technology policies in terms of their success in utilising such policy instruments as the promotion of basic science, the support of small firms and the use of university-industry interaction in technology transfer to achieve not only a greater degree of economic competitiveness but a commensurate level of political and social readjustment and integration. Such an approach based on individual themes or policy instruments however is akin to undertaking a series of case studies. It provides you with a wealth of material and insights into particular facets of the processes underlying technological innovation but no overall framework with which to measure the whole.

Weaknesses of the quantitative approach

The problem of course lies in identifying the most appropriate framework and tools for such an analysis. For many observers, the primary focus of any economic policy analysis is economic with 'performance' being measured in such quantitative terms as market share but as we shall see this addresses only part of the story. In the first place there is the question of the timescale under consideration - the experience of Airbus, for example, shows that the longer the initiaitve has been going and the more opportunities that have been engendered for improving on market performance, the more favourable the pronouncement on effectiveness is likely to be. Secondly, the measures by which a policy initiative might be assessed can depend on the maturity of the market and industry in question. Emerging industries are not immediately apparent in terms of their participants, products and emerging boundaries while more mature industries may be in the process of adaptation and redefinition. Conventional market indicators in these cases offer an inadequate guide as manifested, for example, in the fact that many of the emerging applications in IT and telecommunications do not fall neatly into the

---

[12] see C Shearman and G Burrell: 'The structures of industrial Development, Journal of Management Studies, Vol 24, 4, July 1987 and 'New Technology Based Firms and the Emergence of New Industries', New Technology, Work and Employment, 3,2,1988

standard industry classifications. Moreover, new approaches to the study of industrial development are emerging which, while not denying the relevance of economic issues and relationships, highlight what might be broadly termed the 'social' aspects of industrial development. [13] Thirdly, market performance indicators fail to take the less tangible benefits of policy initiatives into account as in, for example, the learning curves evident in the cases of both Airbus Industrie and Ariane. Nor do they acknowledge the forging of links leading to activities outside of the formal frameworks - the activities in standards as a spin-off from Esprit are a case in point - or the cumulative sense of 'European' consciousness engendered by many of the Community programmes. Finally, of course, market performance is of little direct relevance to the social implications and environmental impact of European technology. There is an assumption that if the market operates effectively, then the rest will automatically follow though experience clearly suggests otherwise.

The Community's technology policies therefore cannot be evaluated solely in terms of their contribution to economic competitiveness. Just as European developments in science and technology are embedded in their political, economic and social contexts, so too is their evaluation. Technological and economic development within the context of Europe is in essence a process of adaptation and readjustment. The end goals are relatively clear but the means by which to pursue them remain lost in a myriad of differing national experiences, ideologies and expectations. As David Marquand in his recent analysis of Britain's economic decline has put it, 'the governments of the industrial world are adrift, unable to steer with the instruments they used in the past, but uncertain what instruments to use instead'.[14]

'Developmental' government

Strategies for economic and technological development which clearly work in some countries apparently fail in others. Analysis of such trends is frequently divorced from the cultural context -that is the 'community' or society - within which such strategies are in the process of being implemented. Yet it is not the policies per se that are ultimately important but the capacity of a particular country to accomodate and

---

[13] See, for example, A. H. Van de Ven and R Garud: 'A Framework for Understanding the Emergence of New Industries' in S. Rosenbloom and R Burgelmen (eds): 'Research on Technological Innovation, Management and Policy', Vol 4, Greenwich, Connecticut, JAI Press, 1987 (in which they outline the need for a wider framework in the treatment of 'industries' and suggest the model of an 'emerging social system') and C. Shearman and G. Burrell: 'The Structures of Industrial Development', Journal of Management Studies, Vol 24, 4, July 1987 and 'New Technology Based Firms and the Emergence of New Industries: Some Employment Implications', New Technology, Work and Employment, Vol 3, No2, 1988 (in which we outline a 'social' model of industrial development).

[14] David Marquand: 'The Unprincipled Society: New Demands and Old Politics', Fontana, London, 1988, p2.

respond to the need for adaptation. Specifically, it is the cultural, institutional and political factors which shape the abilities of some societies (and the groups within them) to be more receptive to the imperatives of economic change which is a key determinant of market performance. Thus, 'adaptation depends on innovation; and innovation is not an autonomous force, working in a cultural vacuum. Innovations are sterile unless they are applied, and the men and women who decide whether and how to apply them are shaped by the inherited values, assumptions and institutions of the societies within which they live. These values, assumptions and institutions are not all equally hospitable to innovation.' The same is true of the international sphere. 'Only innovative and adaptable societies can take full advantage of technological revolutions; sluggish and unadaptable ones fall behind'.[15]

The question then is how does a country - or in this case a political and economic grouping such as the European Community - develop its capacity to accomodate and implement effective economic change? Marquand's analysis of the web of historical, political, intellectual and cultural strands underlying Britain's economic decline outlined in his book 'The Unprincipled Society' provides a useful starting point for an evaluative framework with which to examine this issue. Much of the rhetoric surrounding Community technology initiatives and the Single Market in particular has focused attention on the efficacy of free market approaches but the reality at both the national and European level is of course the mixed economy. As Marquand remarks, no better way than state intervention has been found for mobilising a society's resources in pursuit of great collective purposes nor has the market been superceded as a means of coordinating the multifarious private purposes of a heterogeneous peacetime society.[16] The question therefore is not <u>if</u> there should be some form of state intervention within the economy but rather the <u>extent</u> and <u>form</u> such activity should take.

It is in this context that Marquand points to the significance of Dore's concept of the '<u>developmental</u>' state - a form of intervention designed 'explicitly to promote the competitiveness of the nation seen as one actor in a cut-throat world economy'[17]. He sees it as a form of thinking reminiscent of the nineteenth century economic philosopher Friedrich List and predicated on the belief that the factors which determined a nation's economic performance are its 'productive powers' - above all, the skill and culture of its people. Weak and backward nations are so because they have failed to develop their productive powers. The achievement of genuine progress requires that they move into the kinds of production likely to enhance their productive powers and in which, by definition, their strong and advanced neighbours were currently more competitive than

---

[15] Ibid, pp4 and 5

[16] D. Marquand, ibid, p6

[17] Ronald Dore: 'Industrial Policy and How the Japanese Do It', Catalyst, Spring 1986

they were. Inevitably, List had suggested, this would involve the exercise of protectionism.[18]

These days international comparative advantage is primarily a matter of accumulated capital - physical and human - or put another way, 'the cumulative effect of firm capacities and government policy choices'[19] which can be deliberately created. Japan of course is the prime example. Chalmer Johnson lists the 'panalopy' of devices which have constituted part of Japan's 'developmental' approach:

> 'the extensive use, narrow targeting and timely revision of tax incentives; the use of indicative plans to set goals and guidelines for the entire economy; the creation of numerous, formal and continuously operating forums for exchanging views, reviewing policies, obtaining feedback and resolving differences; the assignment of some governmental functions to various private and sem-private associations...; an extensive reliance on public corporations, particularly of the mixed public-private variety, to implement policy in high-risk or otherwise refractory areas; the creation and use by the government of an unconsolidated 'investment budget' separate from and not funded by the general account budget; the orientation of anti-trust policy to developmental and international competitive goals rather than strictly to the maintenance of domestic competition; government-conducted or government-sponsored research and development..; and the use of the government's licensing and approval authority to achieve developmental goals'.[20]

Aspects of 'developmental' government can be discerned in the economic approaches of France, West Germany, Sweden and, indeed, the industrial and technology policies of the European Community. What is more, they reflect a fundamental divergence from traditional Anglo-American economic thinking. While the latter views the global market in terms of a vast array of individual economic agents competing across national boundaries, the perception of these 'developmental' governments has been one of a collection of national trading units competing with each other.[21] In

---

[18] See D Marquand, op cit, pp 108/9 and Friedrich List: 'The Natioanl System of Political Economy'(trans. Sampson S. Lloyd), Longmans Green, London, 1909

[19] John Zysman: 'Governments, Markets and Growth: Financial Systems and the Politics of Industrial Change', Cornell University Press, Ithaca and London, 1983, p 40

[20] Chalmers Johnson: 'MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925-1975, Stanford Universsity Press, Stanford, California, 1982, p 318 quoted in D.Marquand, op cit, p106

[21] D Marquand, op cit, p110

Marquand's words, 'the developmental state has not suppressed or dictated to the market: it has acted as a sort of conductor, trying to direct and harmonise the efforts of market actors whom it can influence, but not command...it has drawn (or re-drawn) the boundaries within which competition takes place.'[22] How effective therefore has the European Community been in exercising 'developmental' government?

The Community and 'developmental' government

The European Community has played an important role during the 1980s not only in sponsoring a number of major R&D initiatives within Europe but also in recognising the importance of infrastructural support in terms of the development of education and training policies and the promotion of the internal market. Broadly speaking, the European Commission's approach to technology policy can be characterised into four components - the promotion of basic scientific and applied research and development initiatives; the longterm planning, monitoring and evaluation of Community activities; development of a European-level science and technology infrastructure and the establishment of a new set of relationships with other international organisations.

The Commission has established a number of industrially-oriented pre-competitive programmes, the spin-off effects of which have been evident in the emergence of a European sense of industrial 'community', the increasing momentum in favour of the internal market and company initiated activities in the arena of standards. In more general terms, Community activities have helped to increase the amount of R&D being undertaken within Europe, improve the intra-European flow of information, counter the US extra-territorial stance and generate a more sophisticated understanding of what cooperative R&D entails.[23] This collective action has widened the range of technological expertise available in key sectors and is encouraging the development of a technological 'critical mass' within Europe. Initiatives such as the Framework Programme and Eureka have stimulated collaboration between companies by providing an opportunity for them to address longer term basic research issues on a basis which not only shares the risks but also ensures the transfer of knowhow across a much wider spectrum. This has enabled more ambitious research projects to be instituted and, in the case of some smaller companies and academic institutions, ensured that funds were available for projects which otherwise could not have been afforded.[24] European collaboration moreover is increasingly being considered as an important element in corporate strategies. In addition to the extra financial support provided, it is seen by participants to stimulate creativity, broaden individual companies' research programmes, provide opportunities

---

[22] D Marquand, op cit, p107

[23] M Sharp and C Shearman (1987): European technological collaboration, Routledge and Kegan Paul, london

[24] See Esprit: the first phase: progress and results, COM (86) 687, Brussels

for the acquisition of new knowhow and, in some cases, to accelerate the overall pace of technological development.[25]

The Commission's move away from its earlier focus on an all-embracing type of 'European' science and technology policy to the 'framework programme' approach characteristic of the 1980s enabled it to develop a more flexible and task-oriented element to its organisational structure. Policies were devised with, rather than for, industries and this careful process of consensus-building initiated under the auspices of Davignon and Esprit has become the predominant 'model' for Community policymaking. Not only has this approach served to secure a more effective policy implementation but the resulting alliances between industrialists and the European Commission helped facilitate the acceptance of Community programmes.[26] The Community has also contributed to the development of new ways of working in European science and technology. One important tool for transnational multidisciplinary pre-competitive research is the European Laboratory Without Walls (ELWW) - a concept that evolved out of the Commission's Biotechnology Action Programme and allows members of one or several industries to pursue target-oriented research areas of common interest.[27] The informality of the ELWWs make it possible to select transnational projects on the basis of current scientific collaborations while keeping open the possibility that unexpected collaborations could develop in the future.

The Community's role however has extended beyond the promotion of particular policy tools and it has played a significant and at times innovative role in shaping the development of European science and technology. What is undoubtedly demonstrated by these and many other initiatives however is that European policymakers, whether in government or industry, share certain perceptions in relation not only to the problems facing Europe but also to their possible solutions. The focus of the latter is on a policy mix of state intervention and market-oriented growth. On the one hand, emulation of the Japanese model of state coordinated and state funded R&D collaboration between firms has been strongly advocated across Europe's political spectrum and is evident in the mechanism and ethos underlying such initiatives as Esprit and the British Alvey programme.[28] On the other hand, moves to improve the availability of European venture capital (in, for example, a number of Community initiatives and Eureka) and to place more emphasis on

---

[25] as in footnote 5

[26] Initial responses of the West German government to the Brite programme, for example, were lukewarm but pressure from the German companies involved resulted in a more enthusiastic approach

[27] For details,see E.Magnien et al: A new tool for biotechnology R&D in the Community, Biofutur, November 1989

[28] D Webster, M Rhodes, J J Richardson and J Moon (1986): Information Technology and Economic Recovery in Western Europe: The Role of the British, French and West German Governments. Paper presented to the PSA panel, April).

university/industry technology transfer (Esprit and Comett) and market-oriented industrial collaboration (Eureka) reflect an attempt to capture something of the US Silicon Valley type of industrial interplay and to place the notion of private financing more firmly on the European collaborative agenda.[29]

Such an approach raises a number of longer term issues. First there is the question of what precisely constitutes a successful innovation environment. The relative priority of the factors influencing technological development remains unclear. Secondly, it does not mean that they are necessarily culturally transferable - what works for the Japanese may not work the French and vice versa. Finally such consensus building may have serious implications for scientific and technological development on a more global level. Technology strategies in the Western world are notable for their lack of debate with regard to perceived priorities. Assumptions about future directions for development remain largely unchallenged. Technology policies within EEC member states are striking in their similarities rather than their contrasts. Yet in the past, it has been creative dissent which has so often provided the seeds for fundamental breakthroughs. Even the consensus-seeking Japanese seek to encourage conceptual pluralism - their Basic Technology for Future Industries Programme, for example, emphasises structured competition among different scientific and technological approaches. Policymakers within Western Europe to date however have failed to address the longterm implications of strategic targeting of research. The result has consequently been a high degree of uniformity in national priorities across countries with information technology, biotechnology and new materials invariably the targeted sectors. It may now be time for the development of some parallel or 'open' initiatives to ensure some support, however limited, for work outside of the mainstream research and development areas. This is a theme underlined in the European Parliament's 1989 Poniatowski Report which highlighted Europe's need to find its own technological role - that is, to move beyond the stage of 'reaction' to 'action'.[30]

The Community has also exercised a degree of 'developmental' government on a more political level. Recalling the nature of the links between facility with and access to technological competence on the one hand and political and economic influence on the other, the main issue for Europe has been the need to lessen the degree of its dependence on the United States and/or Japan for technological knowhow and resources. Technology within Europe has assumed a political salience for three main reasons. First, the longterm economic health of European economies demands free access (best guaranteed through the development of an indigenous capability) to basic generic technologies. This is important both now in terms of stemming the tide of American and Japanese penetration of

---

[29] For details on European venture capital schemes see M Sharp and C Shearman (1987), op.cit., Chapter 4, and R Guth (1986), Initiative Commentaires pour la promotion du capital a risques, Europargne, No.7, July

[30] pe 127.487/fin, ppl0 and 23

European markets and for the future as the base for potentially important industries such as HDTV, home systems and other applications of consumer electronics. Secondly, the protection of European security interests implies a recognition that the interests of Europe and the United states might not always coincide. Finally, there has been the desire of Community countries to exercise a wide range of political influence globally in relation to, for example, the Gatt trade negotiations, glasnost and perestroika in the Soviet Union and developments in Eastern Europe.

The notion of a completed internal market had been on the policy agenda (in theory if not in practice) for over three decades. What provided it with a much greater degree of political momentum in the 1980s was the realisation resulting from collaboration projects of the precise difficulties posed by the fragmentation of the European market and the inherent benefits of the economies of scale which could be accrued from a unified market. This, combined with the urgent need to confront the continuing penetration of European markets by American and Japanese companies either directly or through inward investment, placed the attainment of European monetary, economic and (more recently) political union firmly on the Community agenda.

That 1992 has become a symbol of considerable political potency is evidenced not only by the fact that the internal market has generated a a (now irreversible) momentum of its own and heralded an intergovernmental commitment on the part of most Community member states to an unprecedented level of political integration but also by the fact that the United States has responded to the increased economic and political cohesion to be manifested within the single market with accusations of 'Fortress Europe'. Accustomed to exercising a somewhat dominant role in European affairs, the United States' expression of disquiet in the face of its waning influence was a measure of the extent to which European concerted action in this sphere was proving effective. The single market does not of course imply a Fortress Europe - though protectionism is necessarily an element of 'developmental' government. What is on offer is the notion of reciprocity in which Europe will open up its markets to the United States to the same extent as the latter does to Europe.

On the political front, the establishment of the Single European Act was a major step forward for European technology policymaking explicitly acknowledging as it did the Community's right of competence in this sphere together with a role in the defence sector where this proved appropriate to the promotion of European competitive performance. Nevertheless, intergovernmental wrangling over budgetary issues in general have served at time to weaken and undo progress made in the technology arena. Projects that were set up with some urgency under Esprit found themselves later subject to funding delays and/or uncertainty as governments sought to balance the Community's overall budget more equitably. Such delays inevitably retarded the companies' technological progress and did not help Europe to more rapidly confront the challenges facing it. Slowness in the marketplace can have longterm political implications as Europe gradually but inevitably loses credibility in the international economic sphere. Equally damaging

perhaps is the failure to provide a united face with respect to monetary and political union. Britain's propensity to drag its feet in relation to such issues not only slows down the political momentum within Europe itself but also detracts from the potential impact of a united European front elsewhere.

Training

List you will remeber suggested that the factors determining economic performance were its 'productive powers' - above all the skill and culture of its people. Training has become an increasing focus of attention at both the national and European level not least because Europe's employers continue to be faced with a mounting shortage of skilled workers and a declining pool of young labour resources and, within the context of 1992, a Europe-wide acceptance of national professional and technical qualifications is crucial. Most labour market predictions suggest that while Europe's high levels of longterm unemployment are unlikely to alter, patterns within the existing workforce are undergoing significant change. Self-employment is on the increase, as is work in private sector services. Major areas for employment growth are seen to be in the IT-related distribution, finance and business services and in leisure and tourism. The kind of workers likely to be required include electronic engineers, scientists, technologists, data processors, software engineers, marketing staff and multiskilled craftworkers.

The Comett programme is about influencing and changing attitudes in higher education and about creating lasting change in behaviour.[31] Its activities focus on four main areas. These are the development and application of technologies; advanced technological training; transnational approaches to technology training where there is a clear 'added-value' in two or more member states undertaking joint action, and higher education-industry cooperation to bring together the key actors in the supply and demand of advanced technology training. Of particular importance in the programme are the so-called UETPs or University Enterprise Training Partnerships. These structures comprise regional or sectoral consortia intended to serve as a focus for dialogue and action in the training sphere. About 125 such consortia were established under Comett 1 - three quarters of which were regionally based (although they may have a mainly sectoral bias) while the remainder were based on a specific technology sector such as, for example, very large scale integration design, computer integrated manufacturing, biotechnology and information technology.

Comett's remit is clearly extensive and its objectives longterm. As a programme it too has recently been subject to a process of review and evaluation. This concluded that not only had the programme proved reasonably successful (particularly given the breadth of its goals) but Comett support had also facilitated many projects that would not otherwise have taken place. It was considered to have exercised substantial influence in alerting the educational sector and, to a lesser extent, industry to the benefits of training in a Community and

---

[31] E Prosser: Prominent Partners, THES, 20.10.89

cooperative framework. It had helped to breakdown insular attitudes and put in place an infrastructure to facilitate transnational cooperative developments in training. Its initiatives were seen to have increased awareness of the need for mutually recognised common qualifications and the free movement of qualified people in order to exploit fully the potential of 1992.[32]

The Comett review identified three areas which needed strengthening if the programme were to continue to be effective in generating improvements in European education and training. Most importantly, the level of industrial involvement in Comett projects needed to be addressed. The 'supplier-led' nature of many Comett 1 initiatives meant that insufficient attention had been paid to market needs. Future activities would need to attach more emphasis to market research, the involvement of small firms and the marketing of training 'outputs'. Secondly, the transnational element of Comett activities (particularly in relation to university-industry links) had not been fully exploited. Thirdly, a certain amount of confusion existed over the relationship between Comett and other national and European initiatives such as the Community's Social and Regional Funds and this was seen to be inhibiting the effective promotion of Comett within industry and in the Community's less favoured regions. Overall, the formal evaluation of Comett indicated that the objectives of Comett would benefit from a certain amount of scaling down and prioritisation. The objectives which were considered to be the most important were those designed to increase the involvement of industry and to contribute to the development of less favoured and declining regions. More efficient marketing mechanisms for the diffusion of Comett outputs however would need to be developed for the future along with a strengthening of the UETP network and a more effective promotion and delivery of the programme at the national level.[33]

Given the extent of the constraints facing it, Comett has done well to effect the level of partnership and change in attitudes that it has. The implementation of its policy objectives are of course limited by the national infrastructures and idiosyncracies that it has inherited. Variations exist across Europe in the degree of university organisation, levels of entrepreneurship, sophistication of industry and market structures, awareness of training needs, competence to develop appropriate courses, flexibility of legal and financial frameworks in higher education, national financial instruments and facility with language. Given the existence too of a north-south divide within the Community in terms of regional development, technological infrastructures and standards of living amongst other factors, it is not surprising that French and British interests to a large extent have dominated the Comett network. Nor are the relatively low levels of industrial involvement to date unexpected. The UETP as a concept has yet to permeate the consciousness of most people in Europe and the extent of the university-

---

[32] Executive Summary Evaluation Report, Comett Bulletin, No 5, July 1989

[33] Executive Summary Evaluation Report, Comett Bulletin, No 5, July 1989

industry interaction officially demanded is still not common at the national let alone European level.

Effective training partnerships and programmes presuppose a knowledge of Europe's inadequacies and longterm needs. These in turn necessitate some knowledge of future skill requirements and employment opportunities. Here again there is a problem of public awareness in relation not only to potential future economic development but also to the contents of and opportunities afforded by the Community's Framework Programme. For most people, Europe remains something of a mystery and this is particularly true in relation to technological innovation and development. What is required is some form of marketing drive in a format which will not only inform but also excite the interest and participation of a much wider audience. Technological development and education and training should go hand in hand but despite the best of intentions links between the Framework Programme and Comett are still clearly embryonic. As the formal evaluation of the programme implied, projects developed under the auspices of Comett need to be more clearly and strategically guided. Levels of university-industry interaction may have been increased and catalogues of Comett products collated but the essential question is to what purpose? Here the active involvement in UETPs of a range of technology users such as local authorities and regional development agencies as well as large and small companies could prove useful in helping the participants of Comett projects more specifically to address their regional and sectoral training and technology transfer needs.

'Developmental' government: beyond the strategies

The implementation of these 'developmental' strategies however have not all proved equally successful and it is here that we return to the significance of our earlier emphasis on context and culture. Japan's success is not attributable to the panalopy of policy instruments listed above per se but to the implementation of those policies within the framework of Japanese social, political and cultural conventions. State-promoted industrial growth in Japan dates back to the Meiji era. The relationship between the state and private industry has always been close so that 'by the early 1950s, when Japan emerged from defeat and occupation, she possessed a long tradition of public-private collaboration in the interests of economic development; highly trained bureaucratic and managerial cadres, many of them graduates of the same elite schools, imbued with the values and assumptions of this common tradition; and a range of institutions with the capacity and will to bend market forces in the pursuit of national goals.'[34] Similarly, developments in France have been characterised by a long tradition of state intervention in the economy and a bureaucracy trained to believe that it serves a national interest which is greater than the sum of private interests. Marquand quotes the further examples of Sweden, where governments acting in concertation with trade unions have deliberately sought to shift resources from declining to growing industries, and Germany where governments have actively intervened in certain markets and

---

[34] D Marquand, ibid, p105

promoted new technologies and regional policies for essentially developmental reasons.

These and a myriad of other examples would seem to indicate that the extent to which a country, or a political and economic grouping of countries, is able to effectively accommodate economic change and innovation is intimately connected to the depth with which its economic and technological goals are woven into the wider fabric of its social and political culture. Technology cannot be divorced from political and social issues - and indeed it is vital that it is not. The relationship between technology and society is a two-way process - technology impacts on society and social factors in turn shape technological change. Technologies can and do feed, clothe and find shelter for us - and improve the quality of our lives generally. Equally though technologies can and do degrade and damage the environment within which we are living or serve to alienate the individual. In most countries, the level of public awareness of science and technology and its social implications is low. Yet if it is the cultural, institutional and political factors which shape the abilities of societies to be receptive to economic change, this feeling of alienation from technology (and by implication the economic goals associated with it) - a lack of connection as it were, which is the predominant experience of the majority of people in society today must be addressed. This brings us back to the three other major strands in Marquand's analysis which prove useful in determining an evaluative framework for Community technology policymaking - namely, the centrality of the distributive politics, the issue of political accountability and the importance of developing some kind of 'community' ethic.

Distributive politics

Economic adjustment is as much a political as an economic process involving as it does disinvestment as well as investment and costs as well as benefits. The so-called 'information revolution', like any other political or economic structural readjustment, has its winners and its losers - its own particular set of 'haves' and 'have nots'. The process whereby society handles the allocation of these costs and benefits -that is, the politics of redistribution - is crucial in shaping the extent to which a society as a whole is willing to accept the nature of such changes.

Across the Community as a whole and within national boundaries too therefore, the ways in which centre/periphery relationships develop is a matter for particular concern. Technology policies should seek to mediate some of the inherent negative effects of their activities on industrial restructuring, employment patterns and distribution of benefits. Within the Community there have been some attempts to do so through, for example, the Regional Development and Social Funds, the Social Charter, and specific programmes such as Star and Revolve.

The Star programme - Special Telecommunications Action for Regional Development - is designed to provide financial support for the equipment needed to provide advanced telecommunications services in Europe's less favoured regions and promote the supply and demand for advanced services

which utilise the telecommunications infrastructural in those regions.[35] Infrastructural activities include the digitalisation of switching and transmission facilities to facilitate the more rapid introduction of ISDN, the development of specialist overlay networks for high speed data transmission and the establishment and development of cellular radio compatible with the development of a Community-wide system. The most innovative aspect of the Star programme is its attempt to incorporate planned infrastructural developments into a larger and more coherent package of telecommunications policies by focusing not only on the infrastructural aspects of telecommunications provision but also the applications of potential services in the local economy.[36]

The Race programme's Revolve project meanwhile is seen to address the dependency/dominance relationship characterising core and peripheral regions in telecommunications and other sectors.[37] The tendency to wait until technologies have been tried and tested in core regions before introducing them to peripheral regions is a common characteristic of many policy decisions. It serves not only to extend and reinforce the existing dependency relationship but also to deprive the less favoured regions of any influence on the final form that the technology may take. Consequently the technology may prove inappropriate to their particular circumstances and the process of technology transfer be impeded. The approach of the Revolve - Regional Evolution Planning for the Less Favoured Regions - project therefore is to directly support the introduction of IBC services in rural and peripheral regions of the Community. While there is of course no guarantee that national PTTs, governments and regional development agencies will implement the output of the Revolve project, the less favoured regions are at least being assisted themselves to evaluate the implications (positive and negative) of IBCN for their areas.

These and similar Community initiatives are of a largely sectoral nature while the more global issues to a certain extent are being addressed under the umbrella of Fast. Current activities are focusing on the areas of science and technology and social and economic cohesion in the European Community; the internationalisation of technology and economy and the globalisation of Europe; regionalised scenarios of world society

---

[35] Commission of the European Communities (1986): Proposal for a Council Regulation (EEC) instituting a Community programme for the4 devlopment of certain less favoured regions of the Community by improving access to advanced telecommunications services, COM (85) 836 final, Brussels. Europe's less favoured regions in this context are defined as Greece, Portugal, Eire, Northern Ireland, the Italian Mezzogiorno, Corsica and French Overseas Departments and a number of regions in Spain.

[36] A Gillespie and M Hepworth (1988): op cit

[37] S O Siochru: Prospects for broadband in rural and peripheral regions in the European Community: The Revolve project under Race, Paper presented to 'Telecommunications and bNew Economic Opportunities: An International Conference, September 1988

and the future of urban societies.[38] The changes advocated as a result of such studies however require a sufficient level of political commitment in order to be enacted but, as indicated by the experience of the Social Charter to date however, this is unlikely to be easily achieved.

Future economic development is of course a longterm issue and the generation of new employment opportunities one of its most important social objectives. However not only are the conditions for the emergence of new technologies and industries difficult to replicate but employment opportunities in the short to medium term are more likely to rest with the more established sectors. In the first place, many of the applications in such technologies as information technology and biotechnology in general lead to the replacement of existing products and processes by others and thus can impact negatively on employment in some areas. Secondly, the employment effect of start-up firms is limited and tends to increase the demand for skills in those areas of the labour market already characterised by scarcity rather than oversupply. Technology policies at the European level therefore need to promote the development of industries at <u>all</u> stages of maturity but, with the exception of the Brite programme, are almost without exception directed at the newer end of the technology spectrum. This is a useful strategy in the <u>longterm</u> so long as the choice of technologies and industry sectors ultimately prove successful in the marketplace but offers little in the meantime for the large proportion of Europe's population which is currently unemployed.

A brief glance at the range of European initiatives currently underway is sufficient to realise that in many of them the benefits are accruing to large rather than small companies and the objectives primarily being met are business-oriented rather than social. The content of programmes such as Esprit, Jessi and Race reflect to greater or lesser degrees steps towards the implementation of the so-called 'information society'. Yet despite promises of a qualitatively different way of life in the future, the 'information revolution' is in reality serving to reinforce rather than redress many aspects of the existing status quo. The lives of those groups of people within the Community who already suffer some kind of disadvantage (be it based on gender, educational opportunities, age, employment status, physical disability or ethnic origins) are unlikely to be radically changed as a result of many of the European initiatives in science and technology. They might lack the money to access and use the services being provided or the skills and confidence to take up the opportunities on offer.

Importance of developing consensus

The prevailing political culture needs to reflect a consensus not only in regard to the future direction of societal development but also to what constitutes the public realm and the acceptable modes of, and criteria for, public intervention. It is here that Marquand draws on Olson's study of the causes and 'retardants' of economic growth in which the latter

---

[38] For details, see Commission of the European Communities, Monitor Programme (1989-1992) Information Package, July 1989

posits that the activities of organised producer groups (what he refers to as 'common interest organisations') mitigate against rapid economic growth.[39] This is because it is not in the interests of such groups to pursue objectives which are shared with the rest of society for the very rationale of these groups is to maintain their exclusivity. Thus trade unions might pursue higher wages and professional associations lower recruitment levels - self-interest is clearly the predominant motivator. If however membership of the common interest organisation turns out to be 'encompassing' - that is, representative of a large proportion of the population - it can rationally pursue the interests that its member share with the rest of society for it will gain significantly from policies that make the wider society more productive than it would otherwise be.[40] While Olson's reading of society's value systems may not be appropriate to all cultural settings, for those industrialised nations imbued with a sense of rational profit-seeking utilitarian individualism it offers some considerable insight. Societies characterised by inefficiencies and low rates of growth are likely to have high numbers of exclusive common interest groups. Those marked by rapid growth by contrast manifest a greater number of 'encompassing' organisations. 'Encompassing' in turn implies a higher level of consensus or shared interests. Significantly, the Framework Programme and Eureka have grown only because political consensus on the need to move forward quickly on 1992 has solidified over time. As Peterson has argued, 'in the process, the Commission has abandoned its single-minded determination to support only collaborative R&D which directly increases its own authority over technology policy. The Commission has expanded its 'acquis' at the initiative and intermediate levels only because it has responded to the reality that national technology policies do and wil remain distinct and harmonisation will proceed only very slowly at a macro-level. In short, collaborative R&D appears to require political consensus before it can effectively proceed, instead of acting to create it over time'.[41]

Accountability

This brings us back to the concept of partnership and distributive politics. 'Encompassingness', it would seem, is almost always the product of a kind of symbiosis between the government of industry and the conduct of the state.[42] In essence it reflects a form of 'neo-corporatism' in which the state shares power with certain common interest groups and to which it gives a privileged say in the development of public policy. In return, these groups effectively act as governing agencies - contributing to the implementation as well as shaping of policy and acting as a two-

---

[39] Mancur Olson: 'The Rise and Decline of Nations', Yale University Press, New Haven and London, 1982

[40] D Marquand, op cit,pp156-165

[41] John Peterson: 'Technology policy in Europe: Explaining the Framework Programme and Eureka in Theory and Practice', Journal of Common Market Studies, Vol XXIX, 3, 1991, p287

[42] D Marquand, op cit, p160

way channel of influence and pressure between the state and their members. What is important is that such neo-corporatism where successful has been explicitly acknowledged, with the powers and responsibility frequently enshrined in public law. In other words it has been open and accountable - and it is this institutional and political transparency that has served to engender a propensity for consensus.

The actual achievement of that accountability and consensus is of course a slow and difficult process - not least because of the sense of alienation experienced by many members of the general public in relation to technological developments. This again is reflected in the low level of public debate on science and technology issues where the links to broader political discussions are not often seen. To a certain extent this can be attributed to the perception that 'expertise' in these policy areas lies firmly in the hands of scientists and technologists. The consequence has been the development of a decision-making process for science and technology issues which to date has been largely devoid of any wider societal input. From the perspective of those outside them, programmes like Esprit, Brite, Race and Jessi resemble closed clubs of like-minded people. Even initiatives like Comett designed to attract a wider audience can in social terms be perceived to be relatively elitist, focusing as they do on higher education where the involvement of the population at large is, in educational terms, at its lowest. To be effective in the longterm though policy implementation needs a broad public acceptance. It is imperative therefore that in the 1990s greater attention is paid to increasing the levels of public awareness of science and technology issues and mechanisms are set in place to broaden the technology policymaking processes.

This becomes apparent too in the debates underway on the quality of life. Many of the assumptions underlying the scenarios of future technological development imply a commitment to sustained economic growth. It is important in this context however to take note of the quite major changes in public concern which characterised the latter half of the 1980s and which are most clearly manifested in the growing awareness within Europe of environmental or 'green' issues and the relationships between 'advanced' and Third World countries engendered by technological development. European consumers may come to be less interested in a high technology future in the sense of gadgetry and sophisticated services and more concerned with the utilisation of technology to improve the quality of life in a less materialistic sense. What <u>is</u> clear is that the general public no longer have the same faith in technological development as they used to. Experiences such as Chernobyl have taught them that technological advance does not necessarily equal progress. The emergence of green politics in Europe is demanding a change of philosophy and practice in many technology related areas which is only now slowly and somewhat reluctantly being acknowledged by the established policy actors. Such issues are likely to be heightened by the association of East European countries with the Community and the disparities between the Eastern and Western regulatory practices become clear. It is to be hoped therefore that the proposed institutional reforms associated with the implementation of the internal market will provide for a greater degree of political and democratic accountability.

'Community' ethics: directions for the future?

Most importantly, these and similar issues contribute to a sense of identity with a wider group of political interests - the sort of '<u>community</u> ethic' which could be said to have underlined the visions of the European Community's founding fathers. Ironically, the concept of community has long been associated with European technology. Indeed the idea of a technological community formed part of Jean Monnet's Action Committee's programme for a United States of Europe in the 1950s. More recently talk of 'a European Technology Community' has permeated the language of Council Summits, the Single European Act and the internal market. Today it refers to 'the creation of a space within which European technologies and technologists can readily move and communicate.'[43] But that of course belies the true nature of community - a wider social and political sense of community in which there is a common set of attitudes, shared images and 'Weltanschauungen'.[44]

Marquand sees the lack of community or notion of collective good in the British political culture as one of the country's major weaknesses. 'Public intervention implies a public purpose: otherwise, those who do the intervening cannot know what they are trying to achieve. But in a political culture shaped by the assumption that society is made up of separate, atomistic individuals, pursuing their own private purposes, the notion of a public purpose which is more than the sum of private purposes is apt to seem dangerous, or meaningless, or both. The result is an intellectual and moral vacuum at the heart of the political economy.'[45] Some consider this loss of a sense of community - of an identification with the collective greater good - as the leitmotiv of post-war history. For Bell, the hallmark of the late-twentieth century is the 'loss of 'civitas', that spontaneous willingness to obey the law, to respect the rights of others, to forego the temptations of private enrichment at the expense of public weal - in short to honour the 'city' of which one is a member'.[46]

Is there a way out of it? For MacIntyre, the only hope of sustaining intellectual and moral life lies in building 'local forms of community' - twentieth century equivalents of the monasticism of 1400 years ago.[47] While the imagery may be a bit extreme, the emphasis on local development may not be so far from the truth. Separate from and commensurate with

---

[43] A Barry: 'Community and Diversity in European Technology', Science and Public Policy, vol 17, 6, December 1990

[44] F. Tonnies: 'Community and Society', translated and edited by C P Loomis, New York, Harper and Row, 1963

[45] D Marquand, op cit, p11

[46] Daniel Bell: 'The Cultural Contradictions of Capitalism, Heinemann, London, second edition,. 1979, p245, cited in Marquand, op cit, p220

[47] Cited in Marquand, op cit, p220

European Community initiatives in information technology and communications, socially targetted regional initiatives are mushrooming across Europe - examples are to be found in the UK, Finland, Germany, Spain and Crete. Some, though not all, are informed by a political philosophy from the Left; all seek to empower through the acquisition of skills and facilities the disadvantaged groups in society. All are endowed with a degree of vitality and enthusiasm long since absent in the political cultures of national policymakers and administrators. Ultimately perhaps vitality at the local community and cultural level is indeed the key to regional economic regeneration.

So what for the future? Clearly the European Community needs to pay as much attention to the socialisation of its policies as to the development of its R&D - for the latter is after all merely a means to an end. The Social Charter provides a unique opportunity to harness economic development to social goals. It is the area of the internal market which is the least advanced in terms of implementation yet it is the most crucial. For without the framework of social consensus that it would help engender, the redistributive issues inherent in Europe's economic readjustment cannot hope to be addressed. The sense of social justice that it could encourage would prove an important tool in acquiring public acquiescence in and acceptance of what to date have broadly been private interest policies. Without that broad acceptance, it is hard to see how the vitality of the regions can permeate the supranational structures of the European Community.