

THE FUTURE OF MANUFACTURING IN EUROPE 2015-2020

THE CHALLENGE FOR SUSTAINABILITY

Governance, Social Attitudes and Politics

Final Report

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March 2003

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1 What is “Governance” and why is it important?

In the early part of the 21st century, the technologies emerging from the information technology and biotechnology revolutions will present unprecedented governance challenges to national and international political systems. These technologies are now shifting and will continue to affect the organisation of society and the ways in which norms emerge and governance structures operate. How policymakers respond to the challenges these technologies present, including the extent to which developments are supported by public research funds and whether they are regulated, will be of increasing concern among citizens and for governing bodies. New governance mechanisms, particularly on an international level, may be needed to address these emerging issues.

From the Summary of Francis Fukuyama & Caroline S. Wagner 2000, "Information and Biological Revolutions: Global Governance Challenges--Summary of a Study Group", RAND Science and Technology Policy Institute MR-1139-DARPA.

The quotation above underlines the seriousness of the challenge confronting systems of governance in the context of rapid technological and societal change. While Fukuyama and Wagner are very much concerned with the impacts of technological revolutions, the points made might equally well apply to efforts to change technological regimes around environmental objectives. Thus the question of what might constitute effective and appropriate modes of governance is being widely raised in connection with changes in technology and industrial organisation. This report presents the work of WP7 of the FUTMAN project, and identifies some major issues of concern.

1.1 From Government to Governance?

In the last decade of the twentieth century the concept of ‘governance’ has emerged from virtual obscurity to take a central place in contemporary debates in the social sciences. The concept has come to be used frequently, but often with quite different meanings and implications.

(Pierre and Peters, 2000)

The term governance has numerous connotations, and is applied across numerous contexts. Common to many of these is the reference to the institutions, frameworks, procedures and principles whereby an organisation - or potentially a looser system of related entities - is managed or governed. This management in question can refer to the organisational structures, resource allocation, performance reporting and assessment, and stakeholder relations.

Perhaps more interesting than the precise semantics of the matter, is what the rise to prominence of the term tells us. Why has the term "governance" come to prominence over that of "government" (or, for that matter, "management")? Most explanations suggest that this reflects an increasing recognition of the dispersion of power and authority across societies, beyond the apparatus of the state. Pierre and Peters (2000) argue that this extended concept of governance, by linking the policy-making system with its environment, completes the project of making political science policy-relevant. Questions of governance are thus questions of how best to steer economy and society towards shared goals. Crucially, the concept of governance does not presuppose that political action need be by the only, or even necessarily the principal, means of achieving these goals. Of relevance here is the related concept of corporate governance, which refers to the generation and exercise of authority within firms, and has attracted much attention in the wake to of the Enron debacle. It has also been a topic of growing interest for innovation researchers, accountants and others, as evidence has accumulated about variations in governance styles among countries, and the links of these to innovation and other aspects of performance and practice. In the following sections, specific conceptualisations and applications of 'governance' will be discussed.

1.1.1 Governance as a political science concept

Pierre and Peters (2000) discuss three drivers, or dimensions, of governance. These are: "moving up"; "moving down"; and "moving out".

Moving up

This phrase denotes the dispersal of power upwards to international organisations, in which nations choose to surrender part of their sovereignty in order to achieve a wider policy goal. Examples include regulatory bodies such as the World Trade Organisation, but the international organisation which most encapsulates the potential for the upward transfer of sovereignty and power is, of course, the European Union.

Moving down

This concept captures the growing importance of sub-national levels of social and political organisation at the regional, local or even community level. In many cases the transfer of power to these levels is the result of intentional decentralisation (for instance, changes in France and the UK, both until recently known for being highly centralised states, and political scientists have noted that such decentralisation changes the nature of policy networks in the geographical areas involved, by encouraging other actors to increase their level of engagement with regional or local, as opposed to national, policy-making institutions (Pierre & Peters, 2000).

Moving out

This final concept encapsulates the movement of power and capabilities traditionally held by the state into (at the very least) a more arm's length relationship to political actors. This encompasses developments such as the movement of large parts of government bureaucracy into 'executive agencies' run on by professional managers on a quasi-commercial basis and with commercial-style incentives and practices; the contracting-out of formerly publicly-performed services to private (or third) sector

suppliers; and the movement of organisations out of public sector ownership [often termed ‘privatisation’]. It is important to recognise that this ‘moving out’ does not always imply the transfer of power to the private sector, and also encompasses the greater involvement of NGOs and not-for-profit organisations in policy networks.

In his textbook on the emergence of ‘policy networks’ of governmental and non-governmental actors in which power and political resources are dispersed, Rhodes (1997, p46-7) identifies “at least” six separate uses of the term “governance”:

- As the minimal state
- As the new public management
- As corporate governance
- As ‘good governance’
- As a socio-cybernetic system
- As self-organising networks

Several of these uses are inextricably bound up with the transformation in thinking about the role of the state which occurred during the 1980s, and for the purposes of this report can be discounted¹. The most relevant of the others are briefly discussed below.

1.1.2 Multi-Level Governance (MLG)

The concept of ‘Multi-Level Governance’ has grown out of political science discussions of the relationship between EU level policy making, national and regional or sub-regional policy making (e.g. Rhodes, 1997). This reflects two of the three drivers or dimensions of governance discussed by Pierre and Peters (2000), namely “moving up” and “moving down”.

1.1.3 Corporate Governance

This usage is defined by Tylecote and Conesa (1999, p25) as “the system by which companies are controlled, directly or indirectly, by shareholders and other stakeholders”. It thus implies a rather broader influence over the direction of a company than that implied by the term ‘management’. Many authors, including Tylecote and Conesa, contrast the shareholder-dominated model of corporate governance typified by the US and UK with the more stakeholder-dominated model exemplified by Germany and Japan. Clearly, broad systems and styles of corporate governance may have an influence on innovation, and this has been a focus of considerable policy attention in recent years. Tylecote and Conesa, rather than simply evaluating the strengths of one model over another, suggest that the different models of corporate governance may be appropriate to different industrial sectors. This is clearly relevant to a discussion of the development of manufacturing in Europe and their work is returned to in section 2.3, below.

¹ Whilst at the same time recognising the fact that the term carries ideological baggage for some people: take for instance the sentiment expressed by Stoker that “Governance is the acceptable face of spending cuts” (Stoker, 1997) or the implication that the governance, by stressing the distributed nature of power in relation to policy action, is little more than an apologia for government inaction.

1.1.4 “Good“ Governance

This phrase encapsulates the concept that there is a best practice pattern of governance which can and should be widely adopted. It is strongly associated with the ‘institution-shaping’ agenda of international organisations such as the World Bank, which actively promotes a model of good governance based around liberal democracy flavoured with the tenets of the ‘New Public Management’ philosophy which espouses greater competition, contractorisation and marketisation in governance (Rhodes, 1997).

2 What are the challenges for governance?

2.1 Governance in the knowledge-based economy

The rise of "governance", as a necessary complement to "government", is intimately associated with the broader socioeconomic developments. In particular we can point to the development of what is widely known as the knowledge-based economy. Admittedly, this term is problematic. All human societies intrinsically rely upon knowledge. But in a new report for DG Enterprise, *Innovation Tomorrow*, (PREST, LLA, ANRT, 2002) the argument is made that the intersection of three trends forms a reasonable basis for using this terminology to identify the current period. These trends involve:

- ◆ The "service economy";
- ◆ The "Information Society";
- ◆ The rise of "learning organisations".

These three features of current developments are also intimately connected with such developments as globalisation and a new stress on technological (and organisational) innovation.

2.1.1 Service Economy

The bulk of economic activity, employment, and output is taking place in service sectors of the economy. This is the case across industrialised countries in general, and reflects the growth of marketed services as well as public services. Service-type work is prevalent in all sectors. White-collar work (and higher skill work in general) has grown as a share of employment compared to blue-collar (and low-skill) work within practically all sectors, as well as in the whole economy. More knowledge-intensive work characterises most sectors. The population contains many more people with requisite skills and experience.

The notion of service extends to all sectors - including manufacturing. Firms are oriented to providing services – whether their products are raw materials, goods or intangible products – focus increasingly on what their users are achieving. Their commercial strategies are oriented to achieving markets and customer loyalty by responding to user requirements – which means understanding of these requirements, i.e. knowledge. Customers require service from firms and public organisations.

Specialised services provide critical inputs to organisations in all sectors on a vastly increased scale. Some Knowledge-Intensive Business Services (KIBS) play important roles in facilitating technology choice, diffusion and implementation; others support organisational innovation and adaptation to changing market and regulatory circumstances. Technology-based KIBS, such as computer and engineering services, technological training and consultancy services, and R&D services, play important roles in generating innovations, and in improving the quality of innovation-relevant knowledge around the economy, as they grapple with the problems of their clients

2.1.2 The Information Society

Information society rests upon the large-scale diffusion and utilisation of new Information and Communications Technologies (ICT). ICT allows for unprecedented capabilities in data capture and information production, and in the processing, storing, and communicating of data and information, to be used across the economy. They allow for near-instantaneous communication on a global scale; much greater access to people in previously unreachable locations and circumstances; copying and sharing of information at very low cost; ability to process huge amounts of information in little time, and so on. This allows for transformation of established business processes, and the development of quite new products and business models. The need for tacit knowledge and expertise has meant that the Information Society changes the significance of spatial location, but has not rendered space irrelevant.

ICTs have diffused increasingly widely, from back-office applications in large organisations and process control in some areas of large-scale manufacturing, to being used in practically all business units in firms of all sizes. Their use involves substantial learning, and this is reflected in the evolving organisational strategies and government policies for them. Mobile and networked communications – voice and data – are moving Information Society on from a phase dominated by personal computing to one where networked computing is evermore central. The characteristic ways in which ICT is used now are quite different from those prevalent a decade ago, and continuing change is likely.

The **globalisation** of economies is facilitated by new ICT. The technology allows more co-ordination of economic activities on a wide geographic scale. It also increases the tradability of many services – or elements of services that are informational ones, at any rate. (Much of the globalisation of services takes place not through conventional exports, but through a variety of investment-related methods. Facilitating these, ICT can enable management control of far-flung branches.) Many firms and sectors that have so far been relatively sheltered from international competition are now having to confront it.

2.1.3 Learning Organisations

Organisations are confronted with an increase in the volume and variety of information, and of the knowledge with which to effectively use this information. More sorts of knowledge are required, as well as deeper knowledge of traditional areas of business. New products and processes often draw on very diverse bodies of knowledge. Some authors claim that a new mode of knowledge production has emerged (Gibbons et al, 1994). Here, there is a closer connection between knowledge and application, with traditional distinctions between pure and applied research breaking down. The problems that drive research, and the theories that guide it, are increasingly derived from practical situations (e.g. in microelectronics, genomics...), and increasingly solved “in the context of application”. Many scientists adopt a strategic approach to their own careers – they become “scientific entrepreneurs”. Furthermore, this analysis also indicates that knowledge production, informed by a context of application rather by the

concerns of traditional disciplinary communities, is forced to become more transdisciplinary.

Organisational knowledge is more than just a matter of scientific and technical (S&T) knowledge. Knowledge of markets and user requirements, of regulatory systems and trends, is vital for business practices in general. Globalisation promotes demand for better understanding of diverse cultures and regulatory systems, and allows for new avenues of learning from the experience of other organisations and countries. **Governments** also find themselves dealing with increasingly complex (and uncertain) knowledge, and governance reform is one element of their response. Another is the effort to work much more as a facilitator rather than controller of change, and to bring together different sets of knowledge – for example through Foresight programmes.

The growing complexity of knowledge means, among other things, that companies have to collaborate to access the knowledge required to enter new markets and to confront new challenges. This applies to innovations too, where collaborative R&D has become more important. Another result of the increased complexity of knowledge is that interdisciplinarity, and the capacity to manage multidisciplinary teams and dialogues, are highly sought after capacities

2.2 Significance for Governance

The emergence of **networked companies and company networks** raises concerns about the 'governability' of these global structures. In manufacturing industries, this trend can be observed most notably in car manufacturing, ICT industries and chemicals.

The rise of the globalised network company has not really found a response from the side of governments. How to **govern the network society** (Castells 1996) is still an issue of debate. However, in order to establish reliable institutions in particular fields or networks, new private forms of co-ordination and governance have been established, most visibly, but not solely, in the generation of standards. These have either been led by individual companies (e.g. car manufacturers or large retailers dominating their supply chains) or in a co-operative mode between companies and/or governments (e.g. internet domains, codes of conduct). In those cases where government agents are involved (e.g. the well-known GSM case), they tend to take the role of process managers or moderators, thus reflecting a network model also with respect to governance.

The changes in occupational and educational levels, together with the widespread adoption of ICT, lead to changing social demands and expectations of business. Citizens and consumers are more sceptical about expertise and authority, and may be placing more value on environmental and other issues. This is associated with the development of „Risk Society“ (Beck 1992). Beyond the conventional welfare and growth objectives that traditionally underpinned STI-policy, **new societal objectives** are raised with respect to what S&T should contribute. Most notably sustainability has turned into a major public policy objective raising major challenges due to the long time horizons it requires to look at and the multi-dimensional and often ill-defined character

of the objective itself. For manufacturing it could be translated as fostering „innovations that de-couple the environmental impacts of products from their functional performance and value-added“ (CEC 2001). But considerations of sustainability are not easily incorporated into the operating procedures of market-based companies – nor of public policy-makers.

One of the major challenges for governance that also has a high relevance to manufacturing is therefore this question of how **societal objectives such as sustainability** could be incorporated in processes and criteria leading to both private and public decisions. In the public policy domain, increasing attempts are made to cross-check all decisions and initiatives with respect to their impacts on sustainability, based often on qualitative assessments (Coenen et al. 2001). How satisfactory such methods are remains debatable. As regards decisions of private agents such as firms and individual consumers, for several years there have been debates about how to achieve the incorporation of environmental and/or sustainability considerations. Examples include methods of ensuring the internalisation of external costs, procedural requirements labelling, and voluntary agreements (e.g. EMAS), etc.

The **growing complexity, uncertainty and ambiguity** of S&T-related decisions affect governance in the political realm (Renn 2002) as well as in economics. At the same time, policy choices inevitably exert a major influence on the trajectories that certain industries will take in the future – though this influence is very difficult to ascertain in advance. Current S&T policy decisions have an influence on the future competitive position of Europe in manufacturing. Regulatory and taxation measures have the potential to help incorporate sustainability considerations more neatly into private sector decisions regarding the production processes of their products and services. For example, this might be by „going with the flow“ and supporting a service- rather than a product-based approach to manufacturing. Policies could also encourage closed material cycles, though this would represent more of step-change.

These key characteristics make the limitations of quantitative risk assessment all the more apparent. Given that we can rarely if ever achieve scientific certainty about the impact of technologies that are still in the making, the „assessment of risks in a quantitative, technical style needs to be complemented by attention to the contextual aspects of the complex systems in which hazards arise and within which social significance and acceptability must be appraised“ (Funtowicz et al. 2000). Greater attention to the application of the precautionary principle has been called for, also in EU policy, but it is also recognised that scientific evaluation and an analysis of the associated uncertainties will continue to be crucial in the future (CEC 2000).

The management of dispersed governance processes leading to societal choices on science and technology is arguably likely to be far more difficult to put into practice than top-down steering. Ways of anticipating emerging opportunities and challenges, and developing strategies to cope with them in a participatory mode, need to be devised. A growing **need for strategic intelligence** has been identified (Tübke et al. 2002); in fact, the existence of the Future of Manufacturing project in itself reflects this need.

2.3 Competing models of corporate governance

Tylecote and Conesa (1999) use a conceptual model of the relationships between innovation, finance and corporate governance to argue that different models of corporate governance are likely to favour success in different industrial sectors. Their model distinguishes “insider-dominated” [roughly equivalent to the more common term “stakeholder dominated”] systems of finance and corporate governance from “outsider-dominated” [roughly equivalent to shareholder-dominant] ones. In the former, stakeholders such as employee groups or major institutional or private shareholders (as typified by the German system), or the State (still typified by the French system despite the onset of privatisation), exist in a long-term relationship with the management of the organisation. In the latter systems, exemplified by the UK and US systems, influence is limited to shareholders who are generally “outsiders” to the firm and industry concerned, and who may not exist in a long-term relationship to that firm, and who are therefore in a weaker position to exert influence on the firm’s operation.

Crucially, in a move away from traditional, well-rehearsed arguments about the primacy of one model over the other, the authors suggest that the innovation dynamics of certain sectors may be suited to certain models, and that the prevailing corporate governance climate may therefore be one (though not the only, or even necessarily the most dominant) factor in determining the success or failure of domestic industrial sectors. Tylecote and Conesa argue that the outsider-dominated model exemplified by the UK system may be most appropriate to sectors in which returns are highly appropriable (typified by industries in which patenting is a central part of IP protection), where technological change is rapid, and where technologies are function-oriented rather than object-oriented (such as automobile production), whilst the insider-dominated model may be most appropriate for sectors in which user-supplier relations are more significant to innovation, where technological change is more incremental and design- or engineering-based, and where technologies are object-oriented. Based on this discussion, the authors suggest that sectors such as pharmaceuticals, general chemicals, and perhaps software industries, are more favoured by the outsider model, whilst others, such as those based on engineering technology and perhaps speciality chemicals, are more suited to the insider model. The authors go on to test their hypotheses against the success of various sectors in the UK, US, French and German economies, with mixed results, but the key implication of their conceptualisation is that governance regimes in general, and corporate governance and financial systems in particular, are not simply “good” or “bad” but will encourage some sectors whilst discouraging others. Such a statement provides much food for policy-making thought when thinking about “good governance” and harmonisation of regulatory frameworks at the European level.

3 Governance and Social Values

3.1 The “Risk Society”

Ulrich Beck (1992) argues that in contemporary societies, risk is increasingly created and managed – and (critically) seen as such. "In contrast to all earlier epochs (including industrial society), the risk society is characterised essentially by a lack: the impossibility of an external attribution of hazards. In other words, risks depend on decisions, they are industrially produced and in this sense politically reflexive" (p183). Beck defines risk as, "a systematic way of dealing with hazards and insecurities induced and introduced by modernisation itself." (p21) Modern risks are created by decisions and choices – by agency rather than by natural hazard or chance (disease, flood, famine, etc., or war, invasion, crime, etc.). This is not to deny that natural hazards do not represent autonomous risks as well, but increasingly major risks are deliberately shouldered when we undertake decisions to utilise our technological control of nature: the aim of course is to achieve benefits from so doing, and risks are a “by product“ of this.

This is a persuasive argument. It chimes with our perceptions of the rise of a “blame culture“ (where someone is held responsible when things go wrong – they should have been able to foresee dangerous consequences, it is claimed. It chimes also with the growing importance attached to the creation of audit trails and of risk management approaches in industry and elsewhere. It also quite possibly links with the ways in which some individuals assiduously seek to identify the individual consequences of their consumption decisions (food, narcotics, travel, sport...) and a proportion are also concerned about broader social and environmental consequences. See the volume by Lash et al (1996) that explores some of these themes further (if not conclusively).

There are probably several related trends here, which are hard to disentangle (and Beck’s analysis does not always help here). There are likely to be trends in the incidence of consequences of different kinds of risk (e.g. deaths from untreatable infectious disease as opposed to deaths in wars, as opposed to deaths from road and industrial accidents and from major pollution disasters). And there are likely to be trends in the perceived salience of these different kinds of risk, AND in the degree of human agency associated with their production and outcomes.

3.2 Risk and Motivation

Beck and most of his co-workers’ approach is sociological. However, a more social psychological approach – though pursued by quite different scholars – tends towards rather similar conclusions. This is probably the most influential of a fairly large number of efforts to examine trends in values and motivations in industrial countries (and beyond), though other approaches have been developed in the context of international economic development. For a fairly early review and critique of both strands of work, see Miles (1975).

The work of Ronald Inglehart (1971 and later) has been extensively adopted by social analysts. It follows a Maslow-type analysis of motivational hierarchies, in which (to put it in a language echoing Beck) the sorts of risk experienced in childhood help to shape the sorts of adult we become. To summarise rather simplistically: if our childhoods are marked by fear about the satisfaction of basic needs for food, shelter, etc., we are liable to carry high concern for these issues through our adult lives; if these risks are not prominent, we may be more concerned about satisfaction of interpersonal needs or self-realisation. As societies have become more free from the threats to basic welfare, so a gradual intergenerational value shift has been underway – Inglehart’s „Silent Revolution“.

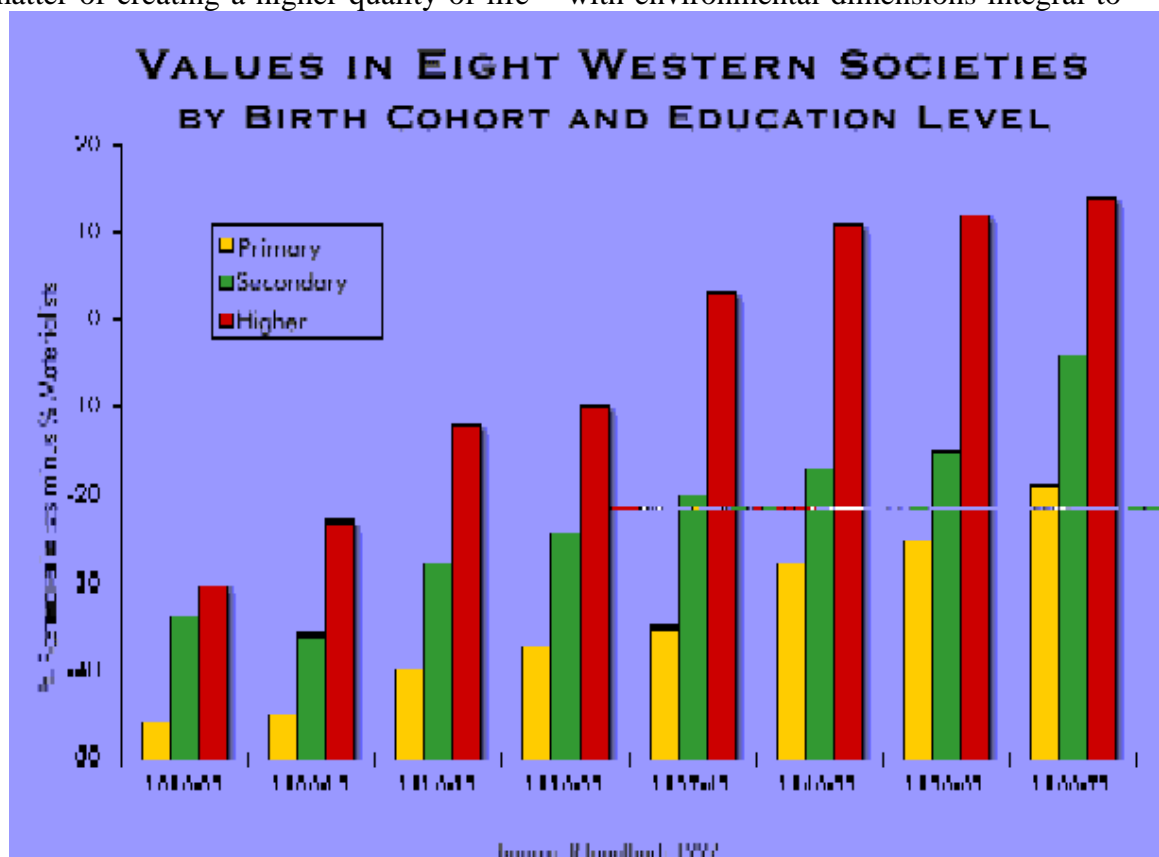
Economic deprivation or worse has been a central issue for most of the population, of most societies, for most of human history. Following the Second World War, however, Western countries experienced the “long post-war boom”, with the establishment of welfare states to alleviate the worse extremes of poverty, and a steady increase in average incomes (and such other indicators as life expectancy). Inglehart argued that this change of experience was affecting the cohorts who grew up in the more secure periods, leading to a gradual shift from "materialist" values toward "postmaterialist" ones – from emphasis on economic and physical security to emphasis on self-expression and the quality of life.

Beck’s arguments are largely based on observation of political movements, media concerns, and the like. Inglehart undertook a series of large-scale surveys seeking to measure the preponderance of various value clusters, with cross-national surveys (initially involving six West European countries) going back to 1970. The early studies found the anticipated differences between the value priorities of younger and older generations: later surveys found ongoing trends towards postmaterialism, and evidence for the stability of perspectives forged in childhood. Eurobarometer surveys have incorporated simple Inglehart indicators for surveys across the European Union from the early 1970s, and U.S., Japan, and other areas have also been included in numerous studies. As younger birth cohorts replaced older ones, the adult population has shifted toward postmaterialist values. In current European surveys, postmaterialists and materialists are roughly equally balanced in Western countries, while in the early seventies the ratio was 3 to 1 in favour of materialists. (Abramson and Inglehart, 1994).

Environmental attitudes are tied to postmaterialism, though it is (as argued by Miles 1975) unwise to assume that so-called postmaterialists no longer require material goods. (If anything, their material aspirations are particularly high – it is what else they desire, and thus how they may require their material needs to be met, that is changing.) More recent birth cohorts emerge as generally more environmentalist than cohorts born earlier – and the argument is that this is a more stable and consistent relationship than that between environmentalism and such variables as gender and occupational status. Postmaterialists are likely to give higher priority to protecting the environment and to be more prone to joining environmentalist groups than are materialists. Interestingly, the correlation between materialist-postmaterialist values and environmental activism (joining such a group) is higher than that with expressions of sympathy for environmental concerns – the argument being that activism is more likely to reflect deep-seated commitments, whereas verbal concerns may reflect conformity with

fashion. (Inglehart, 1990, Kanagy et al. 1994). Social scientists in the Inglehart tradition see the shift toward postmaterialism as a major driver of the environmental concerns and movements of recent years. (And thus, incidentally, as the basis of a new ideological polarisation, while the traditional left-right polarisation has seemingly declined as forecast in the analyses of Bell and others concerning the “end of ideology” – better the “end of some ideologies”).

Of course, there are many other factors involved in the emergence of environmentalist attitudes, and Inglehart himself has examined the role of actual environmental problems and cultural propensities, finding both to be important. But the existence of an intergenerational trend throughout industrial societies is a striking claim, and one that seems to be fairly well substantiated by a series of studies. The trend would seem to be for economic behaviour in general to be less motivated by survival concerns and more a matter of creating a higher quality of life – with environmental dimensions integral to



this

Figure 1 An Example of Data on Postmaterialist shift, Source: From a presentation by Inglehart at Global Trends 2005, available at: <http://www.csis.org/gt2005/conf08t46.html>)

3.3 And the Future of Manufacturing?

Neither Beck nor Inglehart can (as yet, at least) tell us much directly about the impact of changing values on industrial ecology and manufacturing technologies. But their analyses do have a number of implications for this topic that will bear further examination.

But first, a few cautions concerning the ramifications of these analyses.

First, nature can strike back. Major catastrophes can occur, and even our most advanced science can probably alert us only to a few of the threats that are not just possible, but practically certain on a timescale of a few centuries – asteroid impacts, mega-tsunamis, supervolcanoes, and so on. Other threats where nature rebounds from human instrumentality (e.g. the return of life-threatening mass infections) or responds to our interventions (e.g. global warming-related disasters) may even more readily provide opportunities for others to be blamed (though to the faithful – or terrified? – any disaster can be seen as a Newtonian god’s response to human frailty and error). But the outcome of unmanageable „nature“ may be a reversal of Beckian or Inglehartian trends.

Second, some sorts of human action may equally disrupt expectations of progress, security, manageable risk. From economic crises to 9/11, events may provoke widespread and potentially long-lasting insecurity. The draconian responses to 9/11, in particular, have not just come out of the blue – a security apparatus has been promoting its safeguards steadily and insistently around a whole succession of perceived threats (internet crime, for instance). Perhaps this is the last gasp of an eroding culture: perhaps it, too, is more deeply-rooted than at least the Inglehart analysis would suggest (Beck’s thesis is flexible enough to allow and even account for such developments).

The upshot of both of the first two points is that we should not necessarily expect trends to persist, especially where the underlying drivers are vulnerable to disruption.

Third, the perceived risks, and the perceived causal mechanisms which lead to responsibility for outcomes being attributed to various parties and actions, are not exactly simple derivatives of the social trends that have been alluded to. Whether the removal of mosquitoes (or sharks!) from an area is seen as an improvement in the quality of life is liable to be contentious even among postmaterialists. Whether the solution to environmental problems is to reduce demand drastically, to re-engineer production in the direction of clean technology, or to apply advanced techniques of clean-up and environmental management is even more challenging. The conclusions that individuals are liable to draw, and the actions that they will take and the policies that they will support, are products of argument and experience as well as deep-seated views about risks and social values.

This being said, some lines of argument can be developed.

- To the extent that there is a shift toward risk society and postmaterialism, we would expect an increasing recognition, at both a political and a corporate level, to the view that manufacturing processes should be governed so as to take a much fuller account of their environmental consequences.
- This receptiveness is liable to vary in fairly predictable ways across societies and age cohorts, though a great deal of „noise“ is liable to be introduced by cultural factors and by experiences of disruptive events (e.g. the economic crisis in Argentina).
- Environmental concerns are liable to interact in complex ways with other „new social movement“ issues, for example those concerned with identity politics, with sex and sexuality, lifestyle and ethnicity. For example, the technical means of self-expression for some subcultures are very material-intensive – and even apparently sustainable activities such as cycling can threaten natural environments. Thus “sustainability” can operate in different, sometimes contradictory directions: whether policy goals such as human health, employment, or environmental protection are emphasised by “sustainability” depends will depend on the interaction between networks of governance and prevailing social values.
- It is important to articulate arguments about the effectiveness of different strategies for moving toward sustainability; and quite possibly these arguments will need to be tailored to the wider experiences of the social groups to whom they are directed, and to be substantiated through experiential learning of one sort or another.
- Industrial and other actors will need to accept that they are seen as responsible for various things that were traditionally regarded as externalities, and will need to account for these effects of their actions (in accounting terms among others) and to account for their responses in terms of justification and demonstration of, for example, ameliorative actions and strategies for improvement).
- Such lines of action will quite possibly mean, moving beyond the traditional deployment of authoritative expertise, to engaging more in dialogue with representatives of new social movements. Wider participation in decision-making – a phenomenon emphasised in several official pronouncements concerning governance and a trend clearly observable in many areas of policy in which scientific and technological factors are significant – is often liable to be demanded, though the forms that this takes are extremely variable. It is likely that manufacturing firms will have to accept more transparency of and access to decision-making processes which affect their businesses (for instance, regulatory processes – or even their own internal decision-making process) and this implies also a better documentation and justification of the societal and environmental risks they intend to accept in their manufacturing activities, as well as of their benefits and potentials. Intellectual capital report is just a first step on the way towards more transparent accountability.²

² On the other hand, there are also opportunities for companies and sectoral groups arising out of new and more participatory forms of decision-taking. An interesting example of relevance to this study is that of the UK Government’s recently-established ‘Chemical Stakeholders Forum’, which brings together a range of groups (including industry representatives, trades unionists and environmentalists) to provide advice to government on issues surrounding chemicals in the environment. Although the body is explicitly not an expert advisory committee, and members are present as representatives of a particular sectional interest rather than as experts in themselves, this committee engages which precisely the kind of discussion about possible environmental effects of particular chemicals that its parallel scientific advisory

- Proponents of “industrial ecology” concepts will need to evaluate the risks and perceived risks of their strategies. What can go wrong, where are the critical dependencies, how can risks be managed, where do responsibilities lie, who will take the blame for problems, who will carry the can? These questions will concern politicians as well as economic actors.

It is often suggested that better public education will make the governance of scientific and technological issues more effective. A technocratic rationale is often the underpinning for this: if people are better informed, they will recognise the wisdom of expert advice. This particular technocratic rationale, dubbed by its critics the “deficit model” (for the deficit in knowledge which the public supposedly exhibits) has been progressively discredited. It seems more likely that a scientifically aware public may become more sensitised to scientific disputes, to the uncertainties that are inevitably associated with the application of knowledge, to the new uncertainties that are liable to be associated with the application of new knowledge. Whether this leads to more, rather than less, perception of and caution about risks depends on more than simply scientific literacy.

A rather different technocratic argument is that a better-informed public will be more able to feed its improved awareness into policymaking structures: public consultations, for example, will evoke more and higher quality participation. Early recognition of the problems associated with attempts to bring about structural change (e.g. in manufacturing regimes) may save considerable expenses before these are incurred in the wake of substantial investments. (There are plenty of examples of “grass roots” or “shop floor” participants being aware of the impending problems of new industrial systems long before senior management are alerted to the issue.) Better inputs of knowledge may enable early modification and better organisational learning. This argument about the mobilisation of different knowledge bases³ evolves into an argument about increasing democracy – more open and participatory governance, in the current jargon – where a more informed citizenry takes a more active role in decision making. The familiar problems of democratic governance – how to articulate and consolidate interests (corporatist, parliamentary, or other types of structures?) and how to deal with dissensus and strongly-held minority views, for example – are well known.

committee does. The body is meant to embody the range of viewpoints held by the stakeholder organisations represented, but is presumably still expected to come to a consensus in order to be able to offer advice to ministers. Whilst the model is a significant recognition of the fact that scientific and technological advice cannot be generated in a vacuum, the question remains of how policy-makers will deal with divergences between supposedly pure scientific advice from the long-standing expert committee on chemicals in the environment, on the one hand, and explicitly non-scientific advice from the forum on the other. Whatever the potential political problems, the stakeholder forum model seems to be in favour at least in the UK Department of the Environment, Food and the Regions (DEFRA), who are rolling it out by creating new stakeholder bodies to look at other contentious socio-technical topics such as hazardous waste.

³ Which may extend to user or consumer knowledge, increasingly recognised as important to innovation in knowledge-intensive business and service sectors as diverse as scientific or medical equipment and computer games.

Recent years have seen numerous (and diverse) practical efforts to create new fora for public consultation and dialogue about major innovations and directions of technological change – ranging from consensus conferences to Foresight programmes, from web-based consultations to experiments in deliberative democracy (there exists an exhaustive literature on this topic: see also footnote 2, previous page).

3.4 Current and emerging responses in governance and politics

The reform of governance systems has arisen as a political concern in part because of strong evidence of a growing loss of confidence in policy institutions. Poorly understood and complex systems of policymaking are not trusted to deliver the policies that citizens want, or to produce them in the way that they want. Reform of governance recognises the need to treat citizens as (actually or potentially) knowledgeable and informed participants in policy processes. Their participation and consent is required for regulatory (and other) policies to be effective and robust. Whether this is a sufficient condition, as opposed to a necessary one, is less clear.

The EC identified the reform of European governance as one of its four strategic objectives in early 2000. The White Paper on European Governance [COM (2001)428] proposes “opening up the policy-making process to get more people and organisations involved in shaping and delivering EU policy. It promotes greater openness, accountability and responsibility for all those involved... The quality, relevance and effectiveness of EU policies depend on ensuring wide participation through the policy chain: from conception to implementation...”.

The White Paper recommends:

- ◆ Less of a top-down approach, with EC policy tools more effectively complemented by non-legislative instruments.
- ◆ Better involvement and more openness – with up-to-date, on-line information on preparation of policy through all stages of decision-making.
- ◆ Stronger interaction with regional and local governments and civil society. Member States bear the principal responsibility for achieving this, but the Commission has a role to play.
- ◆ Subsidiarity: to clarify and simplify proposed regulations and support schemes and determine if support can be decentralised, with consequences for empowerment at national, regional, sectoral and other levels. This should strengthen ‘local’ infrastructures where necessary. The importance given to industry and technology clusters in recent innovation management thinking might be considered alongside these developments.
- ◆ The right mix between imposing a uniform approach when and where it is needed, and allowing greater flexibility in the way that rules are implemented on the ground.

This should **encourage the diversity of European culture and systems**, an important strength of Europe's knowledge-based society.

These considerations clearly respond to widespread expressions of dissatisfaction with remote and nontransparent policy institutions – and can be seen as a manifestation of the emergence of the knowledge-based economy and society, as well as of the recognition of the limitations of political steering.⁴ What results from these developments is a shift in the governance of major societal choices regarding technology, with public policies turning more and more in only some of the contributors to these choices, be they very influential ones.

First developments in this direction can also be observed in political practice. As already noted, there is a clear, if uneven, trend towards **more participation in any decision leading to major technological decisions**, in particular in several fields related to science and technology, most notably large-scale infrastructures, genetic engineering, biotechnology, but also in relation to the information society. With respect to manufacturing this means for instance that large-scale manufacturing plants are subject to complex permit procedures involving the public, in particular if they are based on the use of hazardous chemicals or conflict-laden technologies (nuclear, genetically modified products, etc.). But already in the early phases of research, debates and decisions about political and regulatory framework conditions involve participatory processes and can affect the perspectives for future manufacturing (Glynn et al. 2001). The recent debates about the use of stem cells in research give evidence of this. Indeed the specific question of the governance of scientific research which may underpin future industrial developments is an important question which has not been addressed in detail in the project, but which is attracting the attention of European policy-makers⁵.

⁴ See the Governance Web Site: http://europa.eu.int/comm/governance/index_en.htm for debates on governance initiated by institutional and non-governmental actors, debates on the Future of Europe and the Commission's portal on interactive policy-making.

⁵ For instance, the recent report of the UK Better Regulation Taskforce (BRTF, 2003).

4 Governance and the politics of manufacturing

Two main issues are going to be addressed in this section: First, what sorts of actors are required to effect changes in manufacturing regimes, given these pressures on governance and second, what sorts of strategies may be pursued?

4.1 Who?

There are numerous lines of sociopolitical enquiry that may be pursued here. However, particularly useful for the analysis of sociotechnical transitions is that developed by Alfonso Molina, in the context of examining the origins of large-scale (and more modest) research and development programmes.

In Molina's view, the development of **socio-technical constituencies** - ensembles of institutions and entities that interact with one another through and within the development of a technology - is the key to understanding the relationship between technological and industrial change, the accumulation of knowledge-based skills and capabilities, and regulation. The resultant technology can be thought of as a physical manifestation of the workings of the constituency that shaped its development. **Constituents** may include technical knowledge and technological artefacts as well as people, interest groups, etc. All these factors are intertwined, changing their interactions dynamically in ways that result in the strengthening or weakening of the constituency. Like the actor-network approach developed by Michel Callon and colleagues, the idea of a socio-technical constituency recognises that technology can only be shaped within limits imposed by the physical world, but that - within these limits - technological development is usually the result of the combination of human, material, financial and time & space resources. The combination of these elements depends upon interactions between the people and institutions that control these resources, thus shaping the development of the technology. These latter interactions may be national or international, competitive or collaborative in nature. In the model of a socio-technical constituency, these three levels - the technical level, the resources level and the social/institutional level - form three concentric circles linked by two-way flows of influence (see diagram below). The constituency itself is further influenced by (and will in turn influence) technical and market trends, regulation, and historical pressures all of which are the result of the effects of interactions with other constituencies.

Thus, technology, according to Molina, is simultaneously shaped by intra-constituency interactions and by interactions with other constituencies in this "context of historical circumstances, legislation, and technical and market trends which, full circle, are themselves the result of the process of socio-technical constituencies' interaction" (Molina, 1990, p312). These forces, which may appear to many constituents as external, are both shaping and being shaped by the constituency in its dynamic interaction with other constituencies.

The socio-technical constituency provides a useful means of conceptualising the way in which transformation in technologies or business models is shaped in conditions not only of commercial and technical but also social and political uncertainty. The relevance of such an approach to a discussion of governance and social values and the development of European manufacturing sectors to 2020 is not hard to see. The concept

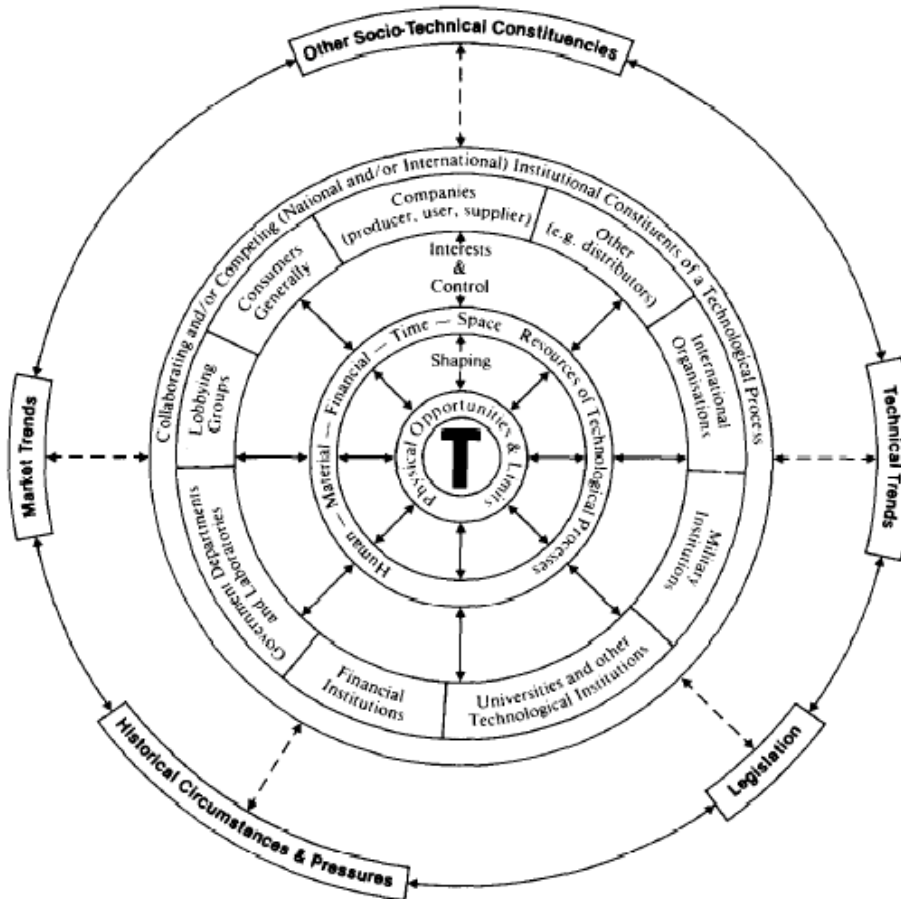


Fig. 1. Institutional representation of a possible socio-technical constituency.

provides a way of thinking about the groups of actors that may have to be brought on board in governance of manufacturing industry, in the transition to new manufacturing paradigms. It complements more conventional stakeholder analysis by pointing us to the resources and institutional settings that have also to be taken into account. However, it only raises questions as to the sorts of perceived interests and strategies that these may pursue. Other empirical and conceptual approaches are required to progress towards strategies for the specific areas concerned in FUTMAN - indeed this is reason for the presence of both scenario and case study methodologies elsewhere in the project.

4.2 What?

Again, there are numerous lines of sociopolitical enquiry that may be pursued here. However, particularly useful for the analysis of sociotechnical transitions is the approach developed by Rotmans et al (2000, 2001). Transitions are here characterised as involving structural changes to society (or a complex subsystem of a society – such

as manufacturing industry), which typically unfold in a gradual way. This gradual systemic change involves both slow changes (developments in stocks) and more rapid dynamics (flows), but are liable to span at least one generation (i.e. several decades). The complexity of the system means that technological, economic, ecological, socio-cultural and institutional developments interact; and these are at different scale levels.

Rotmans et al introduce the notion of **transition management** as a process aimed at exploring, guiding and fostering such transitions, aiming to help movement toward more desirable outcomes. This approach echoes concerns for more participatory and open governance – and the hope is that greater participation will help build legitimacy and support for the policies adopted. The potential conflict between long and short-term policy thinking is to be tackled by situating short-term policy development in the context of longer term ambitions. Intermediate aims are to be formulated on the basis of the longer-term perspectives. The challenge is to find structured ways of doing this.

One element of this is the interactive development of a **transition goal** that „sketches the ambitions in terms of quality images“, providing a vision of the „corridor“ of development. The policy corridor for key variables indicates the margins within which the associated risks

are considered acceptable. The commitment of different actors (in the sociotechnical constituency – and possibly in its opponents and bystanders) is thus critical. Government perspectives at any one point in time are only one set of such goals. A collective transition goal will thus not be determined on the basis of government fiat: Transition management needs approaches that can leave different development paths open, and span different goals and ambitions

The transition goal needs to be flexible. Key actors will need to be involved in ongoing evaluation of the process and its goals, which raises further design issues. Government has a key role to play in determining these key actors. The transition goal comprises a multitude of policy objectives and actors' aims: it is not the traditionally quantitative risk-based target-setting approach. The objectives are more flexible, and at best semi-quantitative; sustainability issues pose complex, multi-scale problems whose risks cannot easily be expressed in the traditional ways. Transition management aims at an integrated risk analysis which can involve setting minimum levels for certain stocks (where unacceptable consequences, irreversibilities, or rapid deterioration is likely) and for aspiration levels (of goals that must be achieved). The risk estimates are subjective to the extent at least that the system's structural uncertainties are matters of speculation and disagreement.

If transition goals are flexible and development paths to be kept open, monitoring and assessing of progress along the transition path needs to be conducted continuously, as well as looking for alternatives that could turn into new promising pathways. In other words, what is needed is a system of distributed and strategic intelligence (Kuhlmann 2001) that allows to gather this information, and interpret the findings in terms of alternative transition scenarios. This is an important issue because contingencies may arise that put into question the transition path taken. The oil crisis or 9/11 took most actors by surprise, and there was a real need to be able to react promptly and

consistently. This kind of robust strategy development is an important complementary element to the transition management approach.

Rotman et al believe that transition management offers „ a basis for achieving more coherence and consistency in public policy and societal initiatives towards sustainability and will increase the chances for an actual transition to a more sustainable future... It offers a framework for the choice of instruments and institutional arrangements. Transition management does not exclude the use of control policies, such as the use of emission trading and standards, and hence is not an alternative for global climate change policies. Transition management helps to find additional instruments and arrangements that contribute to the transition process. It thus offers a framework for policy deliberation and the choice of instruments and societal action. Policies are evaluated against two criteria: first, the immediate ... , and second, the contribution of the policies to the overall transition process. Learning, maintaining variety and institutional change are thus important.“

The evolution of this approach – mainly through studies of, and policy consultation about, transitions in energy and transport regimes – is liable to have lessons for FUTMAN. The types of instrument proposed seem in accord with those discussed earlier, but the specific instruments of transition goals and corridors, together with the methods employed to identify these, look promising tools.

4.2 Summary and Synthesis of Findings

From Government to Governance

The term ‘governance’ has numerous connotations, and is applied across numerous contexts. In political science, the term implies the increasing dispersion of power and authority beyond the apparatus of the state. Questions of governance are thus questions of how a wider network of actors, within and without government, steer (each applying their own social, economic and political resources) economy and society towards shared goals. Crucially, the term governance does not presuppose that political action need be, or should be, the only means of achieving those goals.

Political Governance

This can be considered to have three dimensions: the dispersal of power upwards from nation states to international organisations, in which nations choose to surrender part of their sovereignty in order to achieve a wider policy goal; the dispersal of power downwards towards sub-national (regional, local or even community) levels of political organisation; and the dispersal of power outwards through reforms which place activities traditionally carried out within the public sector at arms length to political actors, or into the private or third sectors. The term ‘multi-level governance’ has been coined to characterise the relationship between international (EU), national (member state) and regional/sub-regional policy-making.

Corporate Governance

This usually taken to mean the system by which companies are controlled by shareholders and other stakeholders, thus implying a rather broader influence over the

direction of a company than that implied by the term ‘management’. Many authors contrast the shareholder dominated model of corporate governance typified by the US and UK with the supposedly more stakeholder dominated model exemplified by Germany and Japan. The extent to which different styles of governance may influence innovation has become a focus of considerable policy attention, though some argue that the evidence suggests that different models may be appropriate to different industrial sectors. Such a finding, moving away from long-standing arguments over the primacy of one or the other model, is clearly highly relevant to the EU context.

Governance in the Knowledge-based economy

The rise of governance is intimately associated with broader socio-economic developments. In particular, policy problems have become more complex, and the resources needed to tackle them have become more dispersed, in the context of an increasingly knowledge-based economy. This development is itself driven by the growth in economic and social importance of the service sectors of the economy; by the diffusion and large-scale take-up of new technologies, particularly new ICTs (which is one factor facilitating economic globalisation); and by the growing knowledge-intensity of all kinds of organisations (which is driving the concern to build learning organisations), both public and private. In the political realm, scientific and technological knowledge is ever more pervasive (and ever more necessary in dealing with policy problems), but the growing complexity, uncertainty and ambiguity of science and technology related decisions has affected the reputation of traditional governance mechanisms to the extent that many member states have introduced substantive changes. The development of new networked forms of organisation, and dispersal of knowledge and resources across supply chains and other collaborative relationships (including public-private supply relationships) has also raised new governance questions. At the same time, consumer attitudes are changing, with more scepticism about expertise and authority, and more value placed on environmental and health issues (c.f. the massive growth in the organic food market in the UK, which has been driven not by the major retailers but by consumer demand). A major governance challenge then is how societal objectives such as sustainability can be incorporated into public and private decision-making processes. As part of this, a growing need for strategic intelligence has been identified – a need which, in a sense, the FuTMan project is itself a response to.

Governance and Social Values

The ‘risk society’ hypothesis holds that modern society is characterised by the extent to which the risks it faces are the result of its own actions and decisions, rather than natural hazards or chance occurrences. This, it is argued, constitutes a fundamental transformation in the social understanding, and perception, of risk (and in expectations concerning risk reduction or avoidance). Risk is one driver in changing social values (a shift which can be understood more broadly as one from materialist to postmaterialist values), characterised by a higher priority for sustainability, environment, health and quality of life over more traditional wealth-driven consumer values. Added to this must be a growing disenchantment with traditional representative democracy on the party politics model, and a corresponding increase in single-issue politics which in itself may be a response to the ‘hollowing out’ of government implied by the ‘governance’ model and which might ultimately lead to new political alignments.

Current and emerging responses

For all these reasons, the reform of political and corporate governance systems has become a major policy concern, with the EC identifying reform as one of its four strategic objectives in early 2000. Reform initiatives tend to encourage greater openness, improved accountability and wider participation in decision-making processes, less of a top-down approach to policy-making and implementation, and striking a better balance between diversity and uniformity. New policy networks (or socio-technical constituencies) need to be built that bridge the gaps that have resulted from the progressive dispersal of power, resources and knowledge throughout economy and society in order to allow for the efficient and effective regulation of manufacturing in the context of new social values. New constituencies (combinations of knowledge, actors and resources) are also required within and across industrial sectors, taking in suppliers, end-users and other stakeholders, if the development of more sustainable products, processes and services is to be encouraged. Fundamentally, governance may be about making choices between the different and sometimes divergent 'pillars' of sustainability – with sustainability in employment or economic terms often pulling developments in a different direction from sustainability in resource or environmental terms.

4.3 New Modes of Manufacturing and Governance: Lines of Enquiry

This section of the paper summarises the major conclusions reached during WP7, and points to some directions for further research and analysis.

Greater participation and openness in decision-making challenges traditional bureaucratic - and technocratic - approaches to policymaking. In the context of industrial ecology and new modes of manufacturing, particularly challenging sets of issues arise.

First, central to many of these is **the role of expert knowledge**. Industrial and trans-industrial design requires detailed knowledge of many matters that are poorly understood by the general public (and often by many more informed people, too). But there is evidence that public distrust of scientific and other authoritative advice is growing, as is unease about the sourcing and utilisation of such advice by policymakers. Public trust in the integrity of regulatory institutions needs to be maintained (or regained where it has been eroded). This applies especially to those regulatory institutions which represent public interests and air concerns in respect of environmental issues and where major transformative technologies are concerned. These institutions may need to be designed and revitalised to create and maintain trust.

Second, **there are bound to be many uncertainties and requirements for ongoing learning in the transition to new industrial systems**. Advice can only be provisional, experimentation will be required. Risks will remain incompletely ascertained, while some people and places may be in the position of being guinea pigs.

Third, **political democracy confronts the problems of economic feudalism in new guises in a globalising economy**. As noted in the report of the “Industrial Approaches” strand of the project, industries are increasingly footloose (while this should not be overstated, neither should it be ignored), and may refuse or cease to play ball with an industrial ecology regime for a variety of reasons. These may involve discontent with the environmental regulations themselves, or extend into broader motives to do with social regulations, labour markets, or economic incentives.

This analysis points to some key research topics some of which could be further addressed in future research:

- **Much better knowledge is required about the relations between regulations, governance and innovations** of the sort involved in the transformation of manufacturing. For instance, the findings of Morgan and Morley (2003) on the role of EU public procurement regulations in inhibiting the formation of local production/consumption networks for food in Wales stress both a strength and a weakness of the EU system of multi-level governance: the tension between uniformity of regulation across the member states, and diversity in practices and traditions, and in the application and interpretation of EU regulations from member

state to member state. The study *Innovation Tomorrow*⁶ represents a vital first step at analysing the relationships between regulation, governance and innovation. However, it is only a first step. Much more work needs to be done in order to underpin the development of intelligent policy for a more sustainable manufacturing future.

- **A transition management type of approach to the transformation of manufacturing systems should be tested**, but informed by a solid understanding of the underlying “socio-technical constituencies”.
- **More analysis is required of the links between risk society (and other macrosocial analyses) and the sorts of value changes examined in the analyses of postmaterialism** – and how these relate not just to environmentalist sympathies, but how the discourses and experiences of environmental problems and solutions are intertwined with these elements. Public appreciation of different types of risk and uncertainty is a key topic for analysis. Some work has been done in this area – much remains to be done.
- **There is scope for exploring more deeply the educational repercussions of the above debate.** Probably, additional interventions will be required to align education systems to the transformation in manufacturing.
- **New modes of interest articulation as they relate to the above phenomena need to be tested**, in order to explore the scope for utilisation of new mechanisms of deliberative democracy in the course of transition management.

⁶ DG Enterprise, 2003, *Innovation Tomorrow: innovation policy and the regulatory framework: making innovation an integral part of the broader structural agenda* – a report by Louis Lengrand Assoc/PREST/ANRT, Innovation Papers No.28, EUR 17052.

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