

NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS
SCHOOL OF LETTERS

MSC PROGRAMME IN COUNSELLING AND CAREER GUIDANCE

LABORATORY OF EXPERIMENTAL PEDAGOGY

CENTERS FOR VOCATIONAL GUIDANCE AND COUNSELLING

PROCEEDINGS OF THE 1ST INTERNATIONAL CONFERENCE

ATHENS (23-25-1-04)

**PROMOTING NEW FORMS OF WORK ORGANIZATION AND OTHER
COOPERATIVE ARRANGEMENTS FOR COMPETITIVENESS AND
EMPLOYABILITY**

With the Support of the European Committee

ATHENS 2004

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SUBSTAINBLE DEVELOPMENT AND GLOBASISATION: NEW CHALLENGES AND OPPORTUNITIES FOR WORD ORGANISATION

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Abstract

The relationship between industrialization and its effects on the environment has captured the serious attention of national governments and international organizations, especially in light of increasing globalization. Sustainability in products, processes, and services has been increasingly emphasized by placing environment at the center of some industrial transformations -- or at least on a par with competitiveness. The key to *environmental* sustainability was recognized early as involving the design and implementation of environmentally sound products, processes and services, rather than addressing environmental concerns as an afterthought in industrial systems. At the same time as the environment has become more important in economic policy, European, as well as American, industrial economies have also begun to pay attention to the restructuring of labour markets reflecting changes brought about emerging technologies, new environmental priorities, and globalization. However, policies has been largely reactive, rather than proactive towards new job creation and better organization of work.

Just as thinking about environment *after* industrial development is planned and implemented does not optimize environmental quality, consideration of labour concerns also requires deliberate and intelligent actions *before* embarking on industrialization efforts in guiding industrial transformations. The recent downturn of the extraordinary long economic boom might be expected to reveal fundamental structural employment problems in the industrialized world. It is likely that employment considerations will be the central issue in the coming decade for countries in the expanding European Union, and will influence the nature and direction of (re)industrialization and the growth of the service economy. It is therefore timely to explore options and opportunities for *co-optimizing* economic development (competitiveness), environmental quality, and labour/employment concerns, all of which have implications for the organization of work.

Introduction

Work and the workplace are essential elements of industrial and industrializing economies. Work is combined with physical and natural capital to produce goods and services. The workplace is the place where the comparative advantages of workers and owners/managers create a market for exchange of talents and assets. Beyond markets, work provides both a means of engagement of people in the society, and an important social environment and mechanism for enhancing self-esteem. Finally, work is the main means of distributing wealth and generating purchasing power in dynamic national economic systems. This essay explores the complex relationship between employment, and the increasingly unsustainable and globalizing economy; the changing nature of industrial economies presents new challenges and

opportunities for the organization of work in both industrialized and industrializing countries.

The Unsustainable Industrial State

Those that argue that the industrialized state – whether developed or developing – is currently unsustainable emphasize a number of problems. These are depicted schematically in Figure 1. The ‘environmental problems’ include toxic pollution, climate change, resource depletion, and problems related to the loss of biodiversity and ecosystem integrity. The environmental burdens are felt unequally within nations, between nations, and between generations, giving rise to inter-national, intra-national, and intergenerational equity concerns that are often expressed as ‘environmental injustice’. The Brundtland formulation of sustainability seems to focus concern on intergenerational equity, but all three kinds of mal-distributions are important.

The environmental problems stem from the activities concerned with agriculture, manufacturing, extraction, transportation, housing, energy, and services -- all driven by the demand of consumers, commercial entities, and government. But in addition, there are effects of these activities on the amount, security, and skill of employment, the nature and conditions of work, and purchasing power associated with wages. An increasing concern is economic inequity stemming from inadequate and unequal purchasing power within and between nations – and for the workers and citizens of the future.

Whether solutions involving industry initiatives, government intervention, stakeholder involvement, and financing can resolve these unsustainability problems depends on correcting a number of fundamental flaws in the characteristics of the industrial state: (1) fragmentation of the knowledge base leading to myopic understanding of fundamental problems and the resulting fashioning of single-purpose or narrowly-fashioned solutions by technical and political decision-makers, (2) the inequality of access to economic and political power, (3) the tendency towards ‘gerontocracy’ – governance of industrial systems by old ideas, (4) the failure of markets both to correctly price the adverse consequences of industrial activity and (5) to deal sensibly with effects which span long time horizons for which pricing and markets are inherently incapable of solving. The solutions to these system problems will be explored in the context of their implications for the organization of work.

Globalization

‘Globalization’ has at least three distinct meanings [Gordon, 1995], with different implications for workers and working life. ‘Internationalization’ is the expansion of product/service markets abroad, facilitated by information and communication technology (ICT) and e-commerce, with the locus of production remaining within the parent country. ‘Multi-nationalization’ is where a (multi-national) company establishes production/service facilities abroad, to be nearer to foreign markets and/or to take advantage of more industry-friendly labour, environmental, and tax policies, while maintaining research-and-development (R&D) and innovation-centered activities in the parent country. The third meaning is the creation of strategic alliances, what some call ‘transnationalization,’ in which two different foreign

enterprises merge/share their R&D and other capabilities to create a new entity or product line. Those concerned with enhancing trade are especially worried about barriers to internationalization, while those concerned with possible erosion of labour/environmental standards bemoan the consequences of multinationalization. Transnationalization may lead to industrial restructuring with unpredictable consequences for national economies. All three kinds of globalization raise questions of excessive market, and hence political power where concerns for profits overwhelm democratic and ethical values.

Globalization raises new challenges for governance, especially vis-à-vis the roles of government, workers, and citizens in the new economic order. Within nation-states, the extent to which the 'externalities' of production – adverse health, safety, and environmental effects – are internalized differ according to the differential success of regulation/compensation regimes and the extent to which economies incorporate the ethics of fair play in their practices. There has been a constant struggle to establish good labour and environmental standards/practices within nations. With the advent of globalized, competition-driven markets, attention has now shifted to the harmonization of standards through ILO conventions and multi-lateral environmental agreements, with only a modicum of success. Countries are slow to give up national autonomy, and only where there is a trend toward significant economic integration (as in the EU) are there successes at harmonization. But globalization has brought an even more complex set of challenges through the creation of trade regimes – such as the WTO, ASEAN, and NAFTA – where the term 'fair trade' means the elimination (or equalization) of tariffs and so-called non-tariff trade barriers, which place labour and environmental standards at odds with trade objectives.

The trade regimes promote international laissez-faire commerce; and rights-based law/protections and market economics have become competing paradigms for public policy and governance. Government plays very different roles when it acts as a facilitator or arbitrator to resolve competing interests, than when it acts as a trustee of worker and citizen interests to ensure a fair outcome of industrial transformations [Ashford, 2002]. The differences are pronounced when stakeholders have largely disparate power – or when some are not represented in the political process, as in the case of emerging or new technology-based firms.

John Rawls argues that no transformation in a society should occur unless those that are worse off are made relatively better off [Rawls, 1971]. Operationalizing a Rawlsian world has its difficulties, but law operates to create certain essential rights that enable just and sustainable transformations. These include the right-to-know, the right to participate in decisions affecting one's working/non-working life, and the right to benefit from transformation of the state or global economy. Struggles won at the national level are now being eroded by a shift in the locus of commerce. Without consensus about fair play and the trustee institutions to ensure fair distributions from, and practices in, the new global economy, equity and justice cannot be achieved. It is now agreed that future development must be 'sustainable,' but that means different things to different commentators.

Sustainable development must be seen as a broad concept, incorporating concerns for the economy, the environment, and employment. All three are driven/affected by both technological innovation [Schumpeter, 1939] and by globalized trade [Ekins et

al., 1994; Divan and Walton, 1997]. They are also in a fragile balance, are inter-related, and need to be addressed together in a coherent and mutually reinforcing way [Ashford 2001]. Technological innovation and trade drive national economies in different ways [Charles and Lehner, 1998]. The former exploits a nation's innovative potential, the latter its excess production capacity. Innovation-based performance is enhanced by technological innovation and changing product markets, characterized by fluid, competitive production. Cost-reduction strategies are enhanced by increased scales of production and/or automation, usually characterized by rigid, mature monopolistic production. Economies seeking to exploit new international markets may enjoy short-term benefits from revenues gained as a result of production using existing excess capacity, but they may ultimately find themselves behind the technological curve. Performance-driven markets may be slower to gain profits, but may outlast markets driven by cost-reduction strategies. The consequences for workers may differ as well.

Increasing labour productivity, defined as output per unit of labour input, is a concern in nations pursuing either strategy. But labour productivity can be improved in different ways: (1) by utilizing better tools, hardware, software, and manufacturing systems, (2) by increasing workers' skills, and (3) by a better matching of labour with physical and natural capital and with information and communication technologies (ICT). Theoretically, increasing worker productivity lowers the costs of goods and services, thereby lowering prices -- and ultimately increasing the demand and sale of goods and services. Depending on the markets, it can be argued that more workers may be subsequently hired, than displaced as a consequence of needing fewer worker to produce a given quantity of goods and services. This optimistic scenario assumes a continual throughput society with increasing consumption. However, the drive toward increased consumption may have dire consequences for the environment [Daly, 1991]. In addition, questions arise as to whether, in practice, (1) labour is valued, and paid, more or less after productivity improvements, (2) there are positive or negative effects on job tenure and security, and (3) more workers are hired than displaced. The answers depend on the sources of the increases in worker productivity and the basis of a nation's competitiveness.

Innovation-based performance competitiveness presents opportunities for skill enhancement and building optimal human-technology interfaces, while cost-reduction strategies focus on lean production (with worker displacement), flexible labour markets, and knowledge increasingly embodied in hardware and software rather than in human capital. The consequences for workers are different for these two strategies. The former strategy rewards and encourages skill acquisition for many, with appropriate financial benefits for those workers. The latter creates a division between workers, some of whom are necessarily upskilled and many whose job content is reduced. Different national strategies might be pursued, reflecting different domestic preferences and culture, but there are further implications, depending on the extent to which trade drives the economy. Interestingly, the US is globalizing and focusing on expanding markets abroad, while the EU is selling a smaller amount and percentage of goods and services outside its borders, focusing instead on integrating its internal markets in which its various members compete on performance [Kleinknecht and ter Wengel, 1998]. In the US, wage disparities are large and increasing, while in some parts of the EU – notably the Netherlands – wage disparities are much smaller and decreasing.

The changing global economy, however, presents challenges for all nations as concerns for the number of jobs, job security, wages, and occupational health and safety increase. In the private sector, labour needs a role in choosing and implementing information-based technologies; in the public sector there is a need for integrating industrial development policies with those of employment, occupational health and safety, and environment. From the perspective of labour, these require implementation of the right to know, the right to participate, and the right to benefit from industrial transformations.

The right to know has been described elsewhere [Ashford and Caldart, 1996: Chapter 7] and includes the workers' right to know/have access to, and the employer's/manufacturer's corresponding duty to inform/warn workers about scientific, technological, and legal information. Scientific information includes chemical or physical hazard/risk information related to product or material ingredients, exposure, health effects, and individual or group susceptibility [Ashford et al., 1990]. As important as information about hazards is, information about technology is the key to workers being able play a role in reducing risks. This kind of information includes not only knowledge about pollution/accident control and prevention technology, but also technology options for industrial production. Knowing how production might be changed to make it inherently cleaner and safer, and the source of more rewarding, meaningful work, is a *sine qua non* of being able to participate meaningfully in firm-based decisions (see below). Finally, information about legal rights and obligations is crucial for using legal and political avenues for workplace improvement and redress from harm.

The right to know is made operational through the right of workers to participate in (1) the technology choices of the firm (through technology bargaining and system design) [Ashford and Ayers, 1987], (2) firm-based training, education, and skill enhancement, (3) national and international labour market policies, and (4) in the setting of national and international labour standards. While national unions enable workers to work with employers through industrial relations systems, and ILO utilizes a tripartite system that includes labour, management and government, the trade regimes mentioned earlier give little or no participatory rights to labour (or environmentalists) in global economic activities which have potentially significant effects on wages and working conditions. As trade becomes an important part of national economies, this omission needs to be corrected [European Commission, 2001]. Ironically, under the WTO trade rules, importing countries can restrict imports or place countervailing duties on items that harm their environment, but there is no 'equalizing action' that can be taken if the exporting countries produce those goods unsafely or with adverse environmental effects within their own borders. This reinforces non-enactment or non-enforcement of national health, safety, or environmental laws in the exporting countries, to the detriment of their own workers and citizens. Further, countries may be reluctant to ratify or adopt international accords – including ILO or multi-lateral environmental agreements – in hopes of maintaining or gaining short-term competitive advantage.

Finally, and at the core of justice in the global work life, is the right of working people to benefit from industrial transformations. The right to know and right to participate are essential, but the ultimate rights are those of a fair division of the fruits

of the industrial or industrializing state -- and a safe and healthful workplace. This translates into sufficient job opportunities, job security, and purchasing power, as well as rewarding, meaningful, and safe employment. This can not be left to chance or serendipitous job creation. In formulating policies for environmental sustainability, economic growth and environmental quality are simultaneously optimized, rather than having environmental interventions occur after harmful technologies are in place. Instead, we seek to design and implement cleaner and inherently safer production. Employment concerns deserves no less a place in center stage; growth, environment *and* employment must be *co-optimized*. Systemic changes must be pursued and selected that intentionally benefit employment. Even with better prospects for employment, in an industrial system that continues to replace labour with physical capital, increasing worker capital ownership and access to credit [Ashford, 1998] that turns workers into owners may be an additional necessary long-term option if disparities of wealth and income prevail.

Conceptualisations of Sustainable Development

It makes quite a difference whether you look at sustainable development as just an environmental issue, or alternatively as a multidimensional challenge in the three dimensions: economic, environmental, and social. We argue that competitiveness, environment, and employment are the operationally-important dimensions of sustainability – and these three dimensions together drive sustainable development along different pathways and go to different places than environmentally-driven concerns alone, which may otherwise require tradeoffs, for example, between environmental improvements and jobs. The inter-relatedness of competitiveness, environment, and employment is depicted in Figure 2.

A *sustainable development* agenda is, almost by definition, one of systems change. This is not to be confused with an *environmental policy* agenda, which is – or should be – explicitly effect-based, and derived from that, a program of policies and legislation directed towards environmental improvements, relying on specific goals and conditions. The sustainable development policy agenda focuses at least on processes (e.g., related to extraction, manufacturing, transport, agriculture, energy, construction, etc.), and may extend to more cross cutting technological and social systems changes.

TABLE 1: Comparison of Current and Sustainable Policy Agendas

| AGENDA | Competitiveness | Environment | Employment |
|--------------------|---|---|--|
| Current | Improve Performance/Cut Costs | Control pollution/make simple substitutions or changes Conserve energy and resources | Ensure supply of adequately trained people; dialogue with workers Provide safe workplaces |
| Sustainable | Change nature of meeting market needs through radical or disrupting innovation (a systems change) | Prevent pollution through system changes Change resource and energy dependence | Radical improvement in human-technology interfaces (a systems change) |

Referring to Table 1, note that *current strategy agendas*, even those that go beyond environmental goals, are defined as those that are focused on those policies that (1) improve profit and market share by improving performance in current technologies or cutting costs, (2) controlling pollution/making simple substitutions and changes, and conserving energy and resources, and (3) ensuring an adequate supply of appropriately skilled labour, dialogue with workers, and providing safe and healthy workplaces. We would describe these strategies as ‘reactive’ vis-à-vis technological change, rather than proactive. They are usually pursued separately and by different sets of government ministries and private-sector stakeholders. At best, policies affecting competitiveness, environment, and employment are *coordinated*, but not integrated.

In contrast, *sustainable agendas* are those policies that are focused on technological changes that alter the ways goods and services are provided, the prevention of pollution and the decreased use of energy and resources through more far-reaching system changes, and the development of novel socio-technical systems -- involving both technological and organizational elements -- that enhance the many dimensions of ‘meaningful employment’ through the *integration*, rather than coordination, of policy design and implementation.

The kind of innovation likely to be managed successfully by industrial corporations is relevant to the differences between current and sustainable technology agendas. We argue that the needed major product, process, and system transformations may be beyond those that the dominant industries and firms are capable of developing easily, at least by themselves. Further, industry and other sectors may not have the intellectual capacity and trained human resources to do what is necessary.

This argument is centered on the idea of ‘the winds of creative destruction’ developed by Joseph Schumpeter [Schumpeter, 1939] in explaining technological advance. The distinction between incremental and radical innovations – be they technological, organizational, institutional, or social – is not simply line drawing along points on a continuum. Incremental innovation generally involves continuous improvements, while radical innovations are discontinuous [Freeman, 1992] possibly involving

displacement of dominant firms, institutions, *and ideas*, rather than evolutionary transformations. In semantic contrast, Christensen [Christensen, 2000] distinguishes continuous improvements as ‘sustaining innovation’ and uses the term ‘disrupting innovation’ rather than radical innovation, arguing that both sustaining and disrupting innovations can be either incremental or radical, where the term ‘radical’ is reserved for the rapid or significant performance changes *within* a particular technological trajectory.

Thus, in Christensen’s terminology, radical sustaining innovation is a major change in technology *along the lines that technology has been changing historically*, for example a much more efficient air pollution scrubber -- and is often pioneered by incumbent firms. Major innovation that represents an entirely new approach, even if it synthesizes previously invented artifacts, is termed ‘disrupting;’ and in product markets, it almost always is developed by firms not in the prior markets or business. This is consistent with the important role of ‘outsiders’ – both to existing firms and as new competitors -- in bringing forth new concepts and ideas [van de Poel, 2000].

Counting only or mainly on existing industries, or on traditionally-trained technical expertise, for a sustainable transformation ignores increasing evidence that it is not just willingness and opportunity/motivation that is required for needed change, but that a third crucial condition -- the ability or capacity of firms and people to change -- is essential [Ashford, 2000]. In some situations they may do so because society or market demand sends a strong signal, but not in all or even in most of the cases.

We argue here that the same holds true for government and societal institutions faced by the triple challenge emanating from new demands in the areas of competitiveness, environment and employment. Intelligent government policy is an essential part of encouraging appropriate responses of the system under challenge, and of assisting in educational transformations as well.

An essential concept in fostering innovative technical responses is that of ‘design space.’ As originally introduced by Tom Allen et al. of MIT, design space is a cognitive concept that refers to the dimensions along which the designers of technical systems concern themselves [Allen et al., 1978]. Especially in industrial organizations that limit themselves to current or traditional strategies or agendas, there is a one-sided utilization of the available design space. Solutions to design problems are only sought along traditional engineering lines. In many cases unconventional solutions – which may or may not be hi-tech -- are ignored. For that reason radical, disrupting innovations are often produced by industry mavericks, or as a result of some disruptive outside influence (such as significantly new or more stringent environmental regulation and foreign competition, or influence of an outsider to the organization).

The Role of Government

Government is essential for achieving the kinds of industrial transformations that are desirable from an economic perspective, but that are also fair and just in their production and deliverance of goods and services. Among the suggested general functions of government are:

- to provide the necessary physical/legal infrastructure
- to support basic education and skills acquisition
- to invest in path-breaking science and technology development – for enhancing competitiveness, environmental improvement, and job design
- to act as a facilitator or arbitrator of competing stakeholder interests to ensure a fair process
- to act as a trustee of (under-represented) worker and citizen interests to ensure a fair outcome
- to act as a trustee of new technologies
- to act as a force to integrate, not just coordinate policies

More specifically, depending on the specific transformation desired, there is a role for government from the direct support of R&D and incentives for innovation through appropriate tax treatment of investment; to the creation and dissemination of knowledge through experimentation and demonstration projects; to the creation of markets through government purchasing; to the removal of perverse incentives of regulations in some instances and the deliberate design and use of regulation to stimulate change in others; to the training of owners, workers, and entrepreneurs, and educating consumers. The role of government should be considered beyond simply creating a favourable climate for investment. While it is true that ‘the government may not be competent to choose winners,’ it can create winning forces, and provide an enabling and facilitating role by creating visions for sustainable transformations.

There is continuing debate about the appropriate role of government in encouraging industrial transformations [Ashford, 2000]. Major differences revolve about two competing philosophical traditions: the dominance of unfettered market approaches and a more interventionist, directive role for government through laws and regulation. Market approaches concentrate on ‘getting the prices right,’ ensuring competition in capital and labour markets, and increasing demand for a clean environment, product safety, and good working conditions through the providing of information and education. In contrast, government intervention approaches focus on establishing minimum environmental, product safety, and labour standards and practices; requiring full disclosure by employers and producers of information needed by consumers, citizens, and workers to make informed choices and demands; encouraging technology development, transfer, and infrastructure through a deliberate ‘industrial policy;’ and requiring decision-bargaining in industrial relations.

Alternative roles for government in promoting sustainable development accomplish different things:

- *correcting market failures* by regulating pollution, and by addressing inadequate prices, monopoly power, uncompetitive labour markets, and lack of information *achieves static efficiency* through better working markets,
- acting as a *mediator or facilitator of environmental and labour disputes/conflicts* among the stakeholders *achieves static efficiency* through reducing transaction costs,
- facilitating an industrial transformation by *encouraging organizational learning and pollution prevention* leading to win-win outcomes (based on the concepts of 'ecological modernization' [Jänicke and Jacobs, 2002; Mol, 2001] or 'reflexive law' [Teubner, 1983]) *relies on rational choice and evolutionary change that moves towards a more dynamic efficiency, usually over many decades,*
- moving beyond markets and *acting as a trustee for minority interests, subsequent generations, and new technologies* by forcing and encouraging innovation, through coordinated regulatory, industrial, employment & trade policy *transcends markets, moving towards dynamic efficiency within a shorter time horizon.*

Conclusion

Recalling that a sustainable future requires technological, organizational, institutional, and, social changes, it is likely that an evolutionary pathway is insufficient for achieving factor ten or greater improvements in eco- and energy-efficiency and reductions in the production and use of, and exposure to, toxic substances. Nor are fundamental changes in the organization of work likely to emerge through evolutionary change. Such improvements require more systemic, multidimensional, and disruptive changes. We have already asserted that the capacity to change can be the limiting factor -- this is often a crucial missing factor in optimistic scenarios.

Such significant industrial transformations occur less often from dominant technology firms, or in the case of unsustainable practices, problem firms' capacity-enhancing strategies, than from new firms that displace existing products, processes and technologies. This can be seen in examples of significant technological innovations over the last fifty years including transistors, computers, and PCB replacements.

Successful management of disruptive product innovation requires initiatives from outsiders to produce the expansion of the design space that limits the dominant technology firms [van de Poel, 2000]. Especially in sectors with an important public or collective involvement like construction and agriculture, this means that intelligent government policies are required to bring about necessary change.

Rigid industries whose processes have remained stagnant also face considerable difficulties in becoming significantly more sustainable. Shifts from products to 'product services' rely on changes in the use, location, and ownership of products in which mature product manufacturers may participate, but this requires significant changes involving managerial, institutional, organizational, and social (customer)

innovations. Changes in socio-technical 'systems', such as transportation or agriculture are even more difficult. This suggests that the creative use of government intervention is a more promising strategic approach for achieving sustainable industrial transformations, than the reliance of the more neo-liberal policies relying on firms' more short-term economic self-interest.

This is not to say that enhanced analytic and technical capabilities on the part of firms; cooperative efforts and improved communication with suppliers, customers, workers, other industries, and environmental/consumer/community groups are not valuable adjuncts in the transformation process. But in most cases these means and strategies are unlikely to be sufficient by themselves for significant transformations, and they will not work without clear mandated targets to enhance the triple goals of competitiveness, environmental quality, and enhancement of employment/labour concerns.

The history of innovation has amply demonstrated that disruptive innovations are feasible, and they may bring substantial payoffs in terms of triple sustainability. They are within the available, but unused design space. However, the general political environment, governmental dedication, and incentive structure have to be right for the needed changes to occur.

Government has a significant role to play, but the government can not simply serve as a referee or arbiter of existing competing interests, because neither future generations nor future technologies are adequately represented by the existing stakeholders. Government should work with stakeholders to define far-future targets – but without allowing the agenda to be captured by the incumbents -- and then use its position as trustee to represent the future generations *and* the future technologies to 'backcast' what specific policies are necessary to produce the required technical, organizational, and social transformations. This backcasting will have to be of a next-generation variety of backcasting. It has to go beyond its historical focus on coordinating public and private sector policies. It must be multidimensional and directly address the present fragmentation of governmental functions – not only at the national level, but also between EU, national, regional, and local governmental entities.

There is a great deal of ontology, serendipity, and uncertainty in the transformation process, and the long-term prospects may be not be sufficiently definable to suggest obvious pathways or trajectories for the needed transformations. Thus, it may be unreasonable to expect that government can play too definitive a 'futures making' role. What follows from this is that rather than attempting tight management of the pathways for the transformations that are sustainable in the broad sense in which we define it in this work, the government role might be better conceived as one of 'enabling' or 'facilitating' change, while at the same time *lending visionary leadership for co-optimizing competitiveness, environment, and employment*. This means that the various policies must be mutually reinforcing. This newly-conceptualized leadership role – focused on 'opening up the problem space of the engineer/designer' -- is likely to require participation of more than one ministry. Increasingly, ministries of commerce/economic affairs and ministries of environment are working together to fashion a vision of *environmental* sustainability. What has been missing is a similar proactive role of ministries of labour to interface and integrate employment-related policies into the national and global policy agendas.

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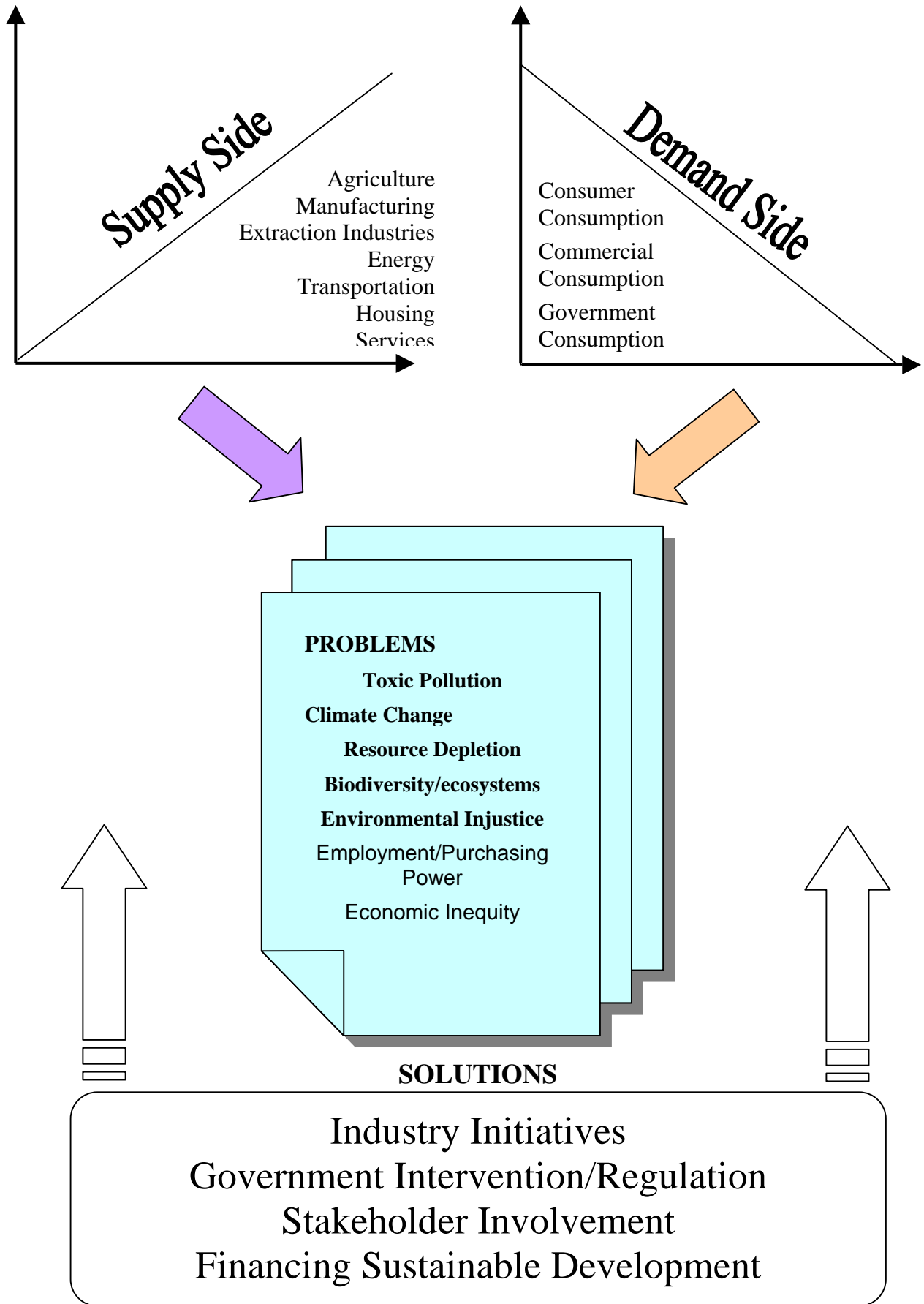


FIGURE 1: The Origins of Sustainability Problems in the Industrial State
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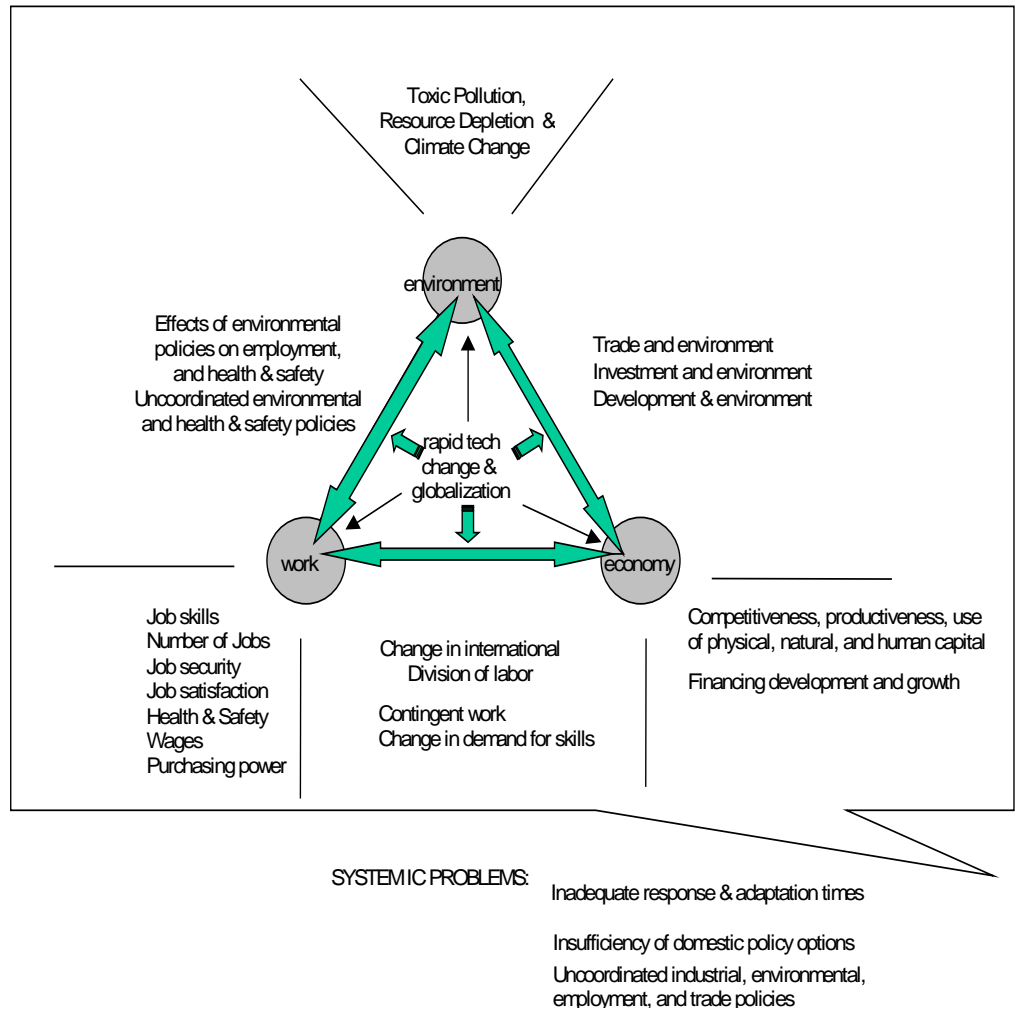


Figure 2: The Dimensions of Sustainability
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