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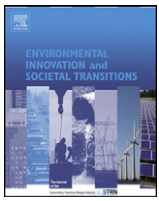

Survey

The crisis in employment and consumer demand: Reconciliation with environmental sustainability

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ABSTRACT

This paper argues that a sustainable industrial system depends not only on good environmental and public health outcomes, but also on adequate employment and earning capacity in a well-functioning and equitable economic system. These concerns are likely to dominate future national political debates, requiring responses that increase the earning capacity of individuals through changes in the nature of work and employment, and in the ownership of productive capital. Making the economy greener, while certainly necessary for long-term economic and societal survival, does not necessarily mean more and better paying jobs on a large enough scale to make serious progress to reducing unemployment and underemployment. At present, national and global reforms are focused on improving the financial system, which is not synonymous with reforming the economic system or improving the economic status of individual citizens. This paper discusses specific policies and initiatives that need to be considered to ensure sustainable employment and livelihoods.

1. Introduction

This paper (and the book upon which it is based)[1] breaks with most mainstream literature on sustainability in that it, like many contributions to what is known as the "new economics," argues

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[1] This paper emerges from a major treatise on sustainable development published in October of 2011, *Technology, Globalization, and Sustainable Development* (Ashford and Hall, 2011b). See also Ashford and Hall (2011a) for a discussion of the importance of regulation-induced innovation for sustainable development that expands on the ideas introduced in this paper.

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that a sustainable industrial system depends not only on good environmental outcomes, but also on adequate employment and a well-functioning and equitable economic system. Sustainable employment is concerned with adequate job opportunities, job security, and purchasing power, as well as rewarding, meaningful, and safe employment for those individuals who desire to work. We believe that for the foreseeable future, unemployment and underemployment (the under-utilization of the skills and productive potential of employed labor) are likely to dominate political concerns and debate, requiring an increase in the earning capacity of individuals through changes in the nature of work and employment, and in the ownership of productive capital. At present, national and global reforms are focused on improving the financial system, which is not synonymous with reforming the economic system or improving the economic status of individual citizens.

While we agree that it is important to discuss what impact the current preoccupation with finance and economic growth will have on environment and public health, we do not begin with a predominant focus on *environmental* sustainability for a number of reasons that are revealed in the following sections. Instead, the paper is positioned within the context of a major re-orientation that is underway in both industrial and industrializing nations, due to globalization and the increased inter-connectedness of both their financial and production systems, and their increased reliance on trade as an engine of economic growth. In addition, the observation made by Ayres (2006) that we are witnessing the end of exponential growth for a variety of reasons – and scholarship emerging from the "degrowth" movement (van den Bergh, 2011) – needs to be acknowledged. Not only have prior periods of large rates of growth historically depended on access to cheap energy, they also occurred as a result of monetizing previously non-monetized work, for example by women entering the salaried workforce and payments being made to others for child and elderly care (Ayres, 2006). Apparently, this monetization process has now come to an end. In addition, Ayres (2006) mentions the exhaustion of pollution-absorbing avenues that limit future industrial activity as a cause of decreasing rates of economic growth.

There is no greater source of social and political instability and desperation (social exclusion) than a widespread lack of people's earning capacity and purchasing power. Insufficient opportunities to work (unemployment) and inadequately paying jobs are the major social issues and challenges facing both developed and developing countries. Moreover, these issues dominate politics and election outcomes, as we have recently seen in many countries. Inadequate employment and earning capacity means the continuation of a low- or no-growth economy because of the resulting low economic demand, unless revenues from trade dominate the source of national income. Without a long-term strategy that promotes well-paid and meaningful employment, the resulting low- or no-growth in many economies is unlikely to generate the resources needed (through green consumer demand or tax revenues) to make real progress in addressing global climate change and other environmental/public health challenges. Job training alone will not suffice. An entirely new approach to job creation is needed. The kinds of jobs available in both the near and farther terms are crucial. Wishful thinking aside, making the economy greener (Smith et al., 2010; UNEP, 2011), while certainly necessary for long-term economic and societal survival, does not necessarily mean more and better paying jobs on a large enough scale. Historically, commentary on the sources of continuing or increasing unemployment of labor has emphasized technological displacement (Rifkin, 2004; Vivarelli and Pianta, 2000), the re-location of production and service facilities abroad (Scott, 2001, 2003), and the decline of unionization (Baccaro, 2008; Baker, 2002; Munck, 2002). Only recently have the adverse effects of globalization on employment come to be accepted, while those singing the praises of technological advance continue to deny its adverse effect on employment. The economic crisis that began in 2008 (Stiglitz, 2010) and the limits of exponential growth in the industrial state (Ayres, 2006) are now recognized as additional, if not proximate direct causes.

This paper argues there is a need to confront the necessity of reversing the present course taken by the industrial state in promoting consumption (currently encouraged by advertising and other forces that influence social norms); in supporting forces that increase wage and wealth disparity; in decreasing labor content in production and services; in trade patterns; in bank capitalization (excessive leverage); in the weakening of health, safety, and environmental protection laws; in avenues that concentrate power in corporations and other economic actors; and in a loss of critical thinking (by giving equal access of expression to unequally meritorious ideas and explanations in the mass media).

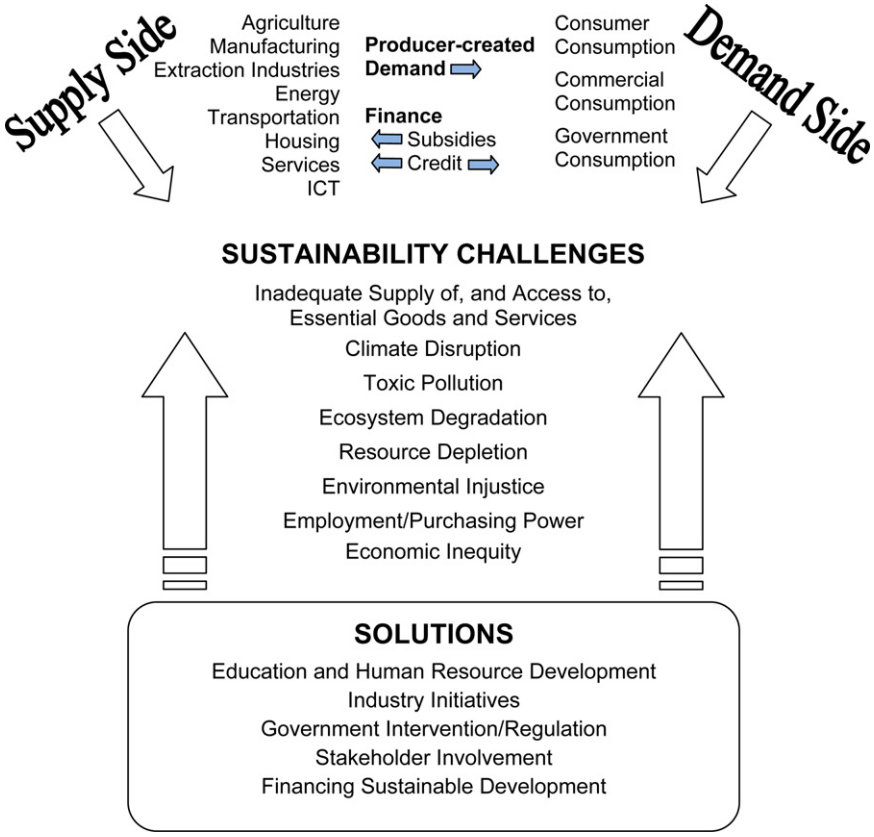

Fig. 1. The origin of unsustainability problems in the industrial state and possible solutions.

The paper focuses on a description of current industrial systems and what makes them unsustainable, what systemic problems need to be confronted in order to transition these systems toward sustainable development, why unemployment has persisted and what can be done to address this problem, the economic and social importance of work and the workplace, the limitations of GDP and labor productivity as metrics to guide and evaluate policies, the importance of innovation in achieving transformations,[2] and policies and initiatives that need to be considered to ensure sustainable employment and livelihoods.

2. The unsustainable industrial state

As depicted in Fig. 1, the modern (or aspiring) industrial state engages in a number of activities that supply or provide products and services for its citizens from agriculture, to manufacturing products, to services. These outputs are desired by ordinary citizens, business entities, or the government itself. While, in theory, supply and demand are assumed to be independent, through direct advertising and other influences, producer-created demand affects what consumers actually want (Alexander et al., 2011; Galbraith, 1958). Traditional neo-classical economists focus their concern on encouraging policies that work primarily through competitive markets that ensure that supply and demand are in sync

[2] Applied to the nation state, the term "transformation", in contrast with the word "recovery", underscores a perspective that the economy of the nation state as we now understand it cannot return to what it was – and that restructuring is necessary.

– i.e., that there is neither a surplus nor a deficit in supply – in order that equilibrium be attained. But there is more than that at play. First, vested economic interests have arranged for production subsidies from the public treasury that distort the true cost of goods and services; examples include agricultural, petrochemical, and other energy subsidies. Secondly, financial mechanisms are used to provide credit to suppliers to expand production. Finally, credit is provided to encourage the consumption of goods, services, and housing by eager buyers. Between subsidies and easy credit, one can hardly say the system is one of free markets.

2.1. What makes the industrial system unsustainable?

Those who argue that the industrialized state is currently unsustainable emphasize a number of challenges. These are also depicted schematically in Fig. 1. The first listed problem is the failure of government to provide, either directly or indirectly through workings of the private sector, an adequate supply of, and access to, *essential* goods and services for all its citizens. These goods and services include manufactured goods, food, housing, transportation, healthcare, and information and communication technology (ICT), among others, that contribute to the general welfare.

Next are five categories of environmental problems emanating from the activities of industrialized and industrializing economies that do not adequately internalize market externalities. These categories include climate disruption, toxic pollution (which directly affects public and worker health and safety), ecosystem degradation, and resource depletion. The environmental burdens and efforts to ameliorate them are felt unequally within nations, among nations, and among generations, giving rise to equity concerns that are often expressed as environmental injustice.

Finally, there are the effects of these activities on the amount, security, and skill of employment, the nature and conditions of work, and purchasing power associated with wages. Already mentioned is economic inequity stemming from inadequate and unequal purchasing power and earning capacity within and among nations and for the workers and citizens of the future.

2.2. What systemic problems need to be confronted?

Fig. 1 also depicts five categories of solutions to unsustainability. Whether solutions involving education and human resource development, industry initiatives, government intervention, stakeholder involvement, and financing can resolve the unsustainability problems depends on their potential for correcting a number of fundamental flaws in the characteristics of the industrial state:

1. the fragmentation and inadequacy of the knowledge base, resulting in a lack of understanding of the complex origin and interrelatedness of problems and the need for integrated solutions rather than approaching a problem from a single discipline or implementing single-purpose solutions[3];
2. the inequality of access to economic and political power among people and nations and between individuals and corporations, business organizations, and financial institutions;
3. the tendency toward gerontocracy, whereby there is both technological and political lock-in, usually, but not always, accompanied by concentration of economic and political power;
4. the failure of markets and of the policies that shape market transactions to price correctly the adverse human and environmental consequences of industrial activity;
5. the limitations of perfectly working markets due to (a) disparate time horizons, whereby costs must be incurred now to solve problems whose solutions yield benefits later, sometimes in generations to come, which are discounted in value in present terms and therefore receive inadequate attention, and (b) the delay in recognizing problems with current industrialization and

[3] Examples are focusing on advancing energy independence without taking into account costs and environmental consequences, or focusing on increasing the use of biofuels without considering the impact on land utilization, food prices, and air pollution.

consumption, such that responses come very late (for example, the failure to perceive limits to growth), both of which cause inappropriate production and consumption patterns to persist;
6. the failure to engage individuals (workers and citizens) in society to realize their human potential, resulting in social exclusion;
7. a high-throughput industrial system, driven by ever-increasing material and energy consumption;
8. an addiction to growth (and dominance of GDP and labor productivity as metrics of economic progress);
9. the failure to deal with employment as a fundamental issue and to fashion job creation policies that do not exacerbate environmental sustainability compromised by inappropriate growth;
10. the significant concentration of the ownership of capital in the hands of the few; and
11. corruption.[4]

2.3. Why has unemployment persisted and what can be done in the short and long run?

The sources of current unemployment involve three factors:

1. The loss of individual wealth and disposable income (Mishel et al., 2009), and an uncertain economic future, have decreased the demand for goods and services because people are spending less and saving more (when they are able). Sellers of goods and services, already adversely affected by the economic downturn, produce and sell fewer products, provide fewer services, and shed labor or do not hire new workers.
2. Since around 1970, manufacturers and providers of services have replaced workers with technology (automation and efficient production systems) displacing large numbers of workers (Rifkin, 2004; Vivarelli and Pianta, 2000). They also gradually replaced higher-skilled workers with lower-skilled workers – by embedding knowledge in technology/processes – who earn less and buy less. Both responses reduced overall demand. Giving workers or non-workers increased access to easy credit created an artificial stimulus to buying which has now come to an end, exacerbated by falls in the housing market.
3. The loss of U.S. and other European jobs to Asia, exacerbated by China's under-valued currency (Scott, 2007).

Turn-key or "shovel-ready" projects such as painting bridges and repairing/improving infrastructure could give immediate relief if quick financing mechanisms could be put into place, but the nature of these projects makes this unlikely. Relief is of the order of a year away after the adoption of Keynesian spending policies. Even if turn-key projects could be established, creating continuing longer-term employment opportunities requires a restructuring of the role of work in the economy. Designing high-value work back into the economy both in manufacturing and services is crucial and possible. Manufacturing could return to the Northern countries with the correct policies. But this will require deliberate interventions and changes in the industrial system that are addressed later in this paper.

2.4. What is wrong with developed economic systems aside from high unemployment and underemployment?

An economy built on credit only makes sense if the future will be better than the present. Industrialized states, and the consumers within them, have been borrowing and spending many times more than they can expect from future revenues. Economic growth prior to 2008 resembled a giant Ponzi scheme, fueled by increases in bank leveraging and credit card and mortgage borrowing, resulting in

[4] Corruption is more than the misappropriation of funds or unjustifiably favoring a firm or person in government dealings. We argue that it includes the perversion of governmental responsibility implicit in the social contract, such as failing to enact, monitor, or enforce environmental, public health, antitrust, banking, economic, labor, social, and other regulations or legislation that protects or promotes the public welfare in all of its dimensions. In the United States, the 2008 financial and mortgage industry breakdown stands out as the most recent national example. The demise of collective-bargaining rights for public-sector workers in Wisconsin serves as an example of a perverse state government action.

raising the prices of goods, homes, and services leading to eventual collapse (Stiglitz, 2010). The major winners have been the financial sector and the lenders to the business sector. The crisis facing Greece is the tip of the iceberg. Without systemic changes to the European Union's financial/banking system and financial regulation, no bailouts, subsidies, and/or defaults will correct the system and the economic demise of other nations is a real possibility. Few countries can survive intact economically without a restructuring of both their banks and their debts. In addition to restructuring the financial institutions,[5] what is needed immediately, and in the short run, is an injection of capital where it will be effective – on the consumer, not the banking, side. In the longer term, the production and service economies need restructuring as well. There is class warfare, but not as Marx predicted between employers and workers, but between lenders and borrowers: the financial industry, short-term profit-takers, and ordinary consumers.

3. Conceptualizing sustainability: the inter-connectedness of the economy, employment, and the environment

Sustainable development is a multidimensional challenge: economic, environmental, and social.[6] We argue that the economy, the environment, and employment are the *operationally important* dimensions of sustainability, as depicted in Fig. 2. These three dimensions together advance sustainable development along different pathways, are related to one another, and their nature and inter-relationships are driven by both innovation and globalization, but in different ways. Innovation is broadly conceived as technological, organizational, institutional, and social change. The important consideration is the *rate* at which innovation occurs, which is discussed further in Section 5. Globalization – the interconnectedness of nations and people – affects four major areas important for sustainable development: (1) the production of goods and services (industrial globalization); (2) the mobility of knowledge and information; (3) the mobility of financial capital; and (4) the international movement of labor and human resources, and migration. These connective pathways influence one another, and present opportunities and challenges for sustainable development.

3.1. The importance of work and employment

Work and the workplace are essential elements of industrial and industrializing economies. Their importance encompasses both economic and social purpose. Human effort (work) is combined with physical and natural capital to produce goods and services. The workplace is the marketplace where workers and owners or managers of firms exchange their contributions, with the transfer of financial capital as wages providing purchasing power for those workers. Wages are the main means of distributing wealth in dynamic national economic systems.[7]

Beyond labor markets, work provides both a means of engagement of people in society, and the workplace and work provide an important social environment and a means for enhancing self-esteem (Eurofound, 2002, 2004, 2005). There is a complex relationship between employment and the increasingly environmentally unsustainable and globalizing economy (Ashford and Hall, 2011b). The changing

[5] The major flaws in the financial systems of the European Union (EU) and the United States are not quite the same. The EU lacks a sufficiently powerful central bank (independent of the national banks of the member states) like the U.S. Federal Reserve, while both venues suffer from the encouragement of unprecedented leveraged lending creating too much credit, a lack of oversight of financial instruments and transactions, a failure of the rating agencies, a lack of transparency, and a weakening of other financial regulations.

[6] The sustainability triangle is often depicted as the economy, the environment, and social concerns, or the economy, the environment, and equity. Because all policies that affect the economy and environment have social effects and because the distributional consequences of differential access to necessary goods and services and different environmental burdens have significant equity consequences, we do not relegate the third corner of the triangle to either. Instead, we argue that employment should occupy the third corner of the triangle (see Fig. 2) because employment is the enabling activity that allows workers and citizens to achieve economic, environmental, and social well-being and because employment is the focus of traditional government concerns and policies, along with economic and environmental policies.

[7] Allowing workers (or citizens) to acquire capital ownership of the means of production is the cornerstone of binary economics that offers an alternative pathway to increasing earning capacity (see Ashford, 2010).

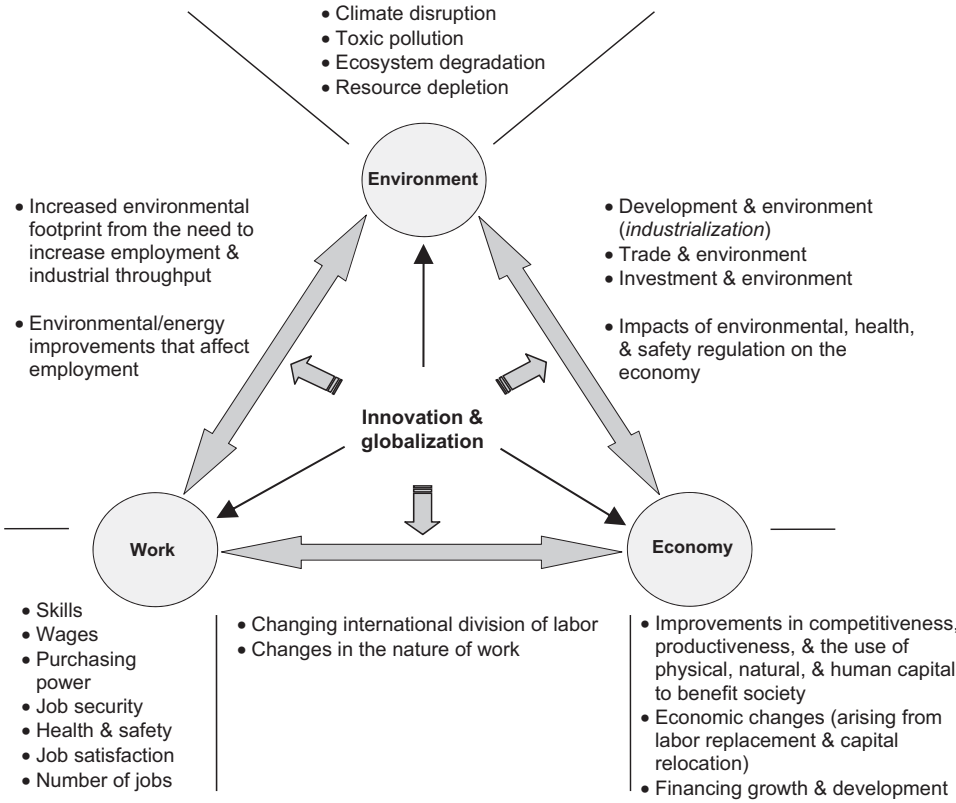

Fig. 2. Innovation and globalization as drivers of change within and between three operationally important dimensions of sustainability.

nature of industrial economies presents new challenges and opportunities for the organization of work, as well as for the environment, in both industrialized and industrializing countries.

Just as thinking about the environment before industrial development is planned and implemented is necessary to optimize environmental quality, consideration of labor concerns also requires deliberate and intelligent actions *before* embarking on (re)industrialization efforts in guiding industrial transformations. The recent downturn of the extraordinarily long economic boom and the 2008 financial crisis has revealed fundamental structural employment problems in the industrialized world that were not previously appreciated.[8] It has been argued earlier in this paper that employment considerations will be the central issue in the coming decade for countries in the expanding European Union, as well as for the United States and the developing world, and that employment concerns will influence the nature and direction of (re)industrialization and the growth of the manufacturing and service

[8] The 2009 Nobel Prize in economics was given to three economists who demonstrated that some unemployment is inevitable, even in economies that are in equilibrium because of "search friction" – also known as "structural unemployment" or "equilibrium unemployment" – because of the mismatch between the skills of the current workforce and the needs of employers (Cho, 2010, p. 330). Unemployment exists alongside vacancies in jobs. In the United States, while 2–3 percent unemployment was at one time considered structural, equilibrium unemployment seems to have now approached a number two or three-fold that historical measure. For a contrary view, see Romer (2011) who argues that most of U.S. unemployment is the consequence of low demand for goods and services by consumers, which in turn is fueled by high unemployment among them, as well as by the collapse of the housing market and unprecedented indebtedness. Neither view emphasizes technological displacement or trade as major factors.

economies. It is therefore timely to explore options and opportunities for co-optimizing economic development, environmental quality, and labor and employment concerns.

4. Misleading metrics: GDP and labor productivity

In this section, we discuss the fundamental problem with GDP and labor productivity metrics through the lens of the Jackson–Victor (2011) analysis and more generally. We argue that their analysis needs to be broadened to cover the full-range of issues related to labor productivity and limited access of workers and citizens to capital ownership.

4.1. The Jackson–Victor analysis

In their article on productivity and work in the green economy, Jackson and Victor (2011) present a two-fold strategy to address the 'productivity trap' that occurs if *technology-led* – or, more broadly, *innovation-led* – labor productivity improvements outstrip economic growth, resulting in a decline in the number of available jobs. Put differently, efficiency-enhancing innovation makes capital inputs cheaper and hence more desirable than labor inputs to the owners of capital (i.e., the owners of product and service firms), shifting the balance in the factors of production toward capital and away from labor. This process eventually reduces the potential number of new jobs.[9] To address this problem, Jackson and Victor (2011) recommend reducing working hours and a sectoral shift to green service-based activities that is focused on maintaining full employment, especially while there is degrowth in the formal economy.

While reducing the workweek and promoting labor-intensive work are important options to consider, the Jackson–Victor analysis is based on the problematic metric of labor productivity and does not account for other important factors that can significantly impact growth and earning capacity. The following shortcomings of the analysis deserve attention. The analysis does not:

- account for the role of trade in driving economic growth by increasing foreign consumption, even if domestic consumption falls;
- acknowledge the fact that hours worked abroad are excluded from the measure, thus creating an incomplete picture of the true nature of productivity gains. Focusing solely on domestic productivity gains gives a distorted picture of nations involved in global commerce;
- speak to the problem of firms externalizing their production or service costs onto consumers who are forced to take on tasks previously undertaken by paid workers, such as assembling flat-pack furniture and responding to voice-activated menu prompts in accessing airline reservations, engaging in financial transactions, and accessing technical support services. This tendency effectively de-monetizes labor formerly employed in production and services;
- recognize that labor and capital are independently productive and therefore misses the importance of capital ownership in promoting demand/economic growth – i.e., it is important to consider who owns, and has access to, the capital; and
- adequately explain that even if the costs of capital substitution were not directly cheaper in the production of products or the delivery of services, the owners of firms prefer using inputs that they own (machinery, materials, etc.), rather than inputs they must rent (labor). The latter cannot be easily shed if employment is secured by a labor contract or public pressure. Capital temporarily sitting idle accrues relatively small costs to firms, while retaining surplus labor accrues significant costs. The result of firms' preference for maintaining labor flexibility minimizes their use of labor as an input. In addition, the volatility of product and service markets during economic turmoil incentivizes firms to increase their capital content and shed labor.

[9] In early stages of the practice of substituting capital for labor, the cost of producing products may decrease, with the result that consumer demand increases sufficiently to maintain employment parity or even increase employment. However, in industrial economies we have now passed this point, and substitution of labor by capital currently results in job and wage loss (Ashford and Hall, 2011b; Rifkin, 2004).

The following discussion places some of these issues in a broader context.

4.2. What is wrong with GDP and labor productivity measures?

Using Gross Domestic Product (GDP) to measure the level or change in economic health of a sector or nation, or the relative merits of valuing one activity or nation over another, is a major system flaw. The readers are surely aware of its inadequacies: (1) not all economic activities are inherently beneficial or things we desire to increase, such as hurricanes and subsequent money spent on disaster relief; (2) much that society benefits from or values is not reflected in the metric, such as clean air and water, and non-monetized work by family members; and (3) distributional effects are ignored. Van den Bergh (2009, p. 127) called GDP "the greatest information failure in the world." And yet we continue to use that metric almost to the exclusion of all others.[10]

The metric "labor productivity" is used even more perniciously in the design and evaluation of economic policies. Productivity is a ratio; it is not a measure of output. It is calculated by dividing an output by a factor of input (labor or capital), that is, it is the amount of output per unit of input. In contrast, *productiveness* is a measure of the quality of being productive or the capacity for producing. Examples are a more productive machine that is capable of faster output (an example of capital productiveness) and a more productive worker who is capable of more creative or faster work and higher-quality outputs (labor productiveness) if his/her skills have been enhanced. As a statistical artifact, either can increase labor productivity.

Thus, labor productivity can be increased by the use of more productive capital (such as a faster or more flexible machine) or more productive workers. As a result, it is important to know the productiveness of labor, capital, and the labor–capital interface because this provides a more accurate measure of where a company's/nation's competitiveness lies – i.e., in its capital, its labor, the interface between the two, or a mixture of two or more of these elements.

A further, more subtle, problem is that labor productivity metrics can be greatly distorted by the fact that hours worked abroad are not included in the calculations of productivity (Tonelson and Kearnes, 2010). Thus, the mere act of outsourcing mathematically improves the productivity of the industry, since firms that use off-shore labor do not count their labor hours or wages in calculating labor productivity. Tonelson and Kearnes (2010) argue that such action weakens the case for free trade. To the extent that off-shoring simply increases corporate profits at the expense of domestic workers, with no real gains in productivity, the national economy is not strengthened and is not as innovative, as is implied from reported productivity increases. Another issue is the externalization of production or service costs onto consumers, who are providing their labor for free or for a perceived reduction in the price of a product/service. Thus, it is important to understand the mechanism behind an increase in labor productivity – i.e., whether it is [1] due to more productive labor or capital, [2] a statistical artifact from off-shoring with no substantial domestic productivity improvements, or [3] due to the externalization of costs onto consumers. In the following discussion, we focus on the first mechanism.

From a *productiveness* perspective, reducing the costs of production or the provision of services by the firm can be accomplished in different ways that contribute to economic growth: (1) by utilizing better tools, hardware, software, and manufacturing systems; (2) by increasing workers skills and commitment; and (3) by a better matching of labor with physical and natural capital and with ICT.[11] Theoretically, increasing labor productivity, by any of these means (including using fewer worker hours per unit of output) lowers the costs of goods and services, thereby lowering prices and ultimately increasing the demand for and sale of goods and services. It can be argued that at least in some markets, more workers may be subsequently hired than displaced by following the first pathway above.[12]

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[10] Gross National Product (GNP) includes net revenues from activities resulting from trade, but suffers from the same essential defects as GDP.

[11] The labor–capital interface is the match between a particular technology and a person for a given production scenario. For example, ergonomically designed workstations are a better – and more productiveness-enhancing – match than poorly designed ones.

[12] It may be the case that market demand for the outputs produced by a particular firm becomes saturated, in which case it is argued that cost savings to the consumer results in more disposable income that the consumer can then spend on other goods

This optimistic scenario assumes a continual throughput society with increasing consumption. However, the drive toward increased consumption may have dire consequences for the environment and human well-being (Kasser, 2002; Meadows et al., 2004; Princen et al., 2002). In addition, questions arise whether, in practice, (1) labor 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 sector's or nation's competitiveness. Giving workers better technologies to work with may increase their productivity, but not their productiveness; that is, the labor content of, and contribution to, the product or service may have actually decreased. Here, it is capital productiveness that has increased.

The failure to see the important distinction between labor productivity and labor and capital productiveness can limit the potential options for realizing sustainable development. While we agree that reducing working hours or engaging in a structural transition toward low-productivity growth sectors (referred to as a "Cinderella" economy) are possible ways to address the productivity gap, the Jackson–Victor analysis could benefit from considering an expanded set of options.

A sector or national economy that increases its competitiveness through innovation-based performance presents opportunities for skill enhancement and higher-paying jobs, whereas pursuing competitiveness through cost-reduction strategies focuses on lean production (with worker displacement), flexible labor markets, and knowledge increasingly embodied in hardware and software rather than in human capital (Charles and Lehner, 1998). The consequences of these two strategies for workers are different. 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 are necessarily upskilled, but the skill content – and wages – of many are reduced. Harris (2010) argues specifically for an eco-Keynesian approach focusing on fostering human-capital-intensive services, investment in energy-conserving capital, and investment in natural and human capital leading to increases in well-being without growth in throughput, a major concern of Daly (1996) who long ago advocated a steady-state economy as the basis for ecological economics. Harris advocates policies geared toward achieving dynamic, rather than static efficiency through innovation, and also argues for more labor-intensive production. Focusing on environmentally friendly technology and social investment [which can bring about disruptive innovation (see the following section)] results in growth of a different kind of economic activity, without growth in resource throughput and harmful ecological consequences.

Many commentators (Jackson, 2009; Schor, 2010; Speth, 2010a,b,c) advocate spreading out the work without addressing the question of the level of overall wages paid. Increasing the number of workers employed can effectively redistribute wages among the working and potentially working population, but it does nothing or little to redistribute the share of profits of industrial production or the provision of services from capital or business owners to workers. Asking wage income to be shared by more workers under the soft euphemism of enticing some workers to either enjoy more leisure time or to spend more time taking care of their children and their elderly parents, seems to ignore the fact that the majority of those working in a depressed economy want to work more, not less. And, of course, these two activities – leisure and home care – are not the same. Workers are also likely to demand higher hourly wages for a shorter workweek to maintain wage parity or seek a second job, leading to higher job turnover and net unemployment for some groups. For this reason, the French adoption of a 35 h workweek was for a while at best a temporary moderate financial success for most workers, but not successful for some, and it had mixed results on conditions of work and gender (Hayden, 2006).[13] The overall level of employment was essentially unaffected (Estevão and Sá, 2008).

and services for which demand and employment is increased. What the final outcome of this worker-for-worker substitution is in a particular instance will vary.

[13] Hayden (2006) provides a detailed analysis of the implementation of the shorter workweek with some wage retention that was accomplished by reducing the payroll taxes levied on employers. Thus, rather than wage parity maintained by transferring wealth from employers to workers, it was actually accomplished indirectly by transfers from the taxpayers to the workers. Even so, because of concessions in work-time flexibility of hours (including evening and weekend work) that could be demanded – on short notice – by employers of their workers in any particular week, the advantages of extra leisure time was compromised by uncertainty in time demands on workers, especially those that were lower-paid and less-skilled, as well as reductions in overtime pay.

Jackson's (2009) and Schor's (2010) focus on labor productivity does set their contributions apart from many others who ignore not only the importance of work for a sustainable society, but also the impacts of policy changes on employment. However, they assume that most improvements in labor productivity will necessarily follow the historical patterns that come from increases in capital, rather than from labor *productiveness*, resulting in fewer hours worked. As emphasized above, productivity and productiveness are not the same.

Greener growth or "sustainable de-growth" – as some call it – is one thing, but deliberate redistribution of the spoils of the industrial state is another. Redistribution options necessitate tax-based transfers of wealth and income from more well-endowed parts of a developed nation's economy (both well-off persons and business entities) to working families (Spangenberg, 2007). Neither (1) the legal (or market-based) tools that mandate the internalization of environmental damage costs (such as taxing resource consumption, placing caps on CO_2 emissions, or a establishing carbon tax) nor (2) wealth or income transfers to create more purchasing power in working families through "spreading the work out," but *with fully compensated reduced working time that maintains wage parity* is likely to be greeted enthusiastically by profit- and traditional growth-oriented enterprises, at least initially. However, reflecting on the observation that labor costs make up about 20 percent of business costs, while material and energy costs represent over half and 2 percent of business costs, respectively, Spangenberg (2007, p. 32) argues that by "stimulating resource productivity gains over labor productivity increases" a reorientation of the economy is possible.

Alternatively, Robert Ashford (2010, 2011) focuses not only on the unemployment and underemployment of labor (which he traces to automation, other technological advances, and the inadequate distribution of earning capacity), but also to the unemployment and underemployment of *capital* which he traces to flaws in the system of corporate finance that promote the concentration rather than broadening of capital acquisition with the earnings of capital. His proposal to achieve more broadly distributed capital earning capacity – and thereby create more consumer purchasing power by effectively extending to all individuals capital acquisition with the future earnings of capital through voluntary binary economics financing – avoids the pitfalls of both continued wealth or income redistribution, and the temporary solutions offered by traditional Keynesian spending. Unfortunately, the basic binary proposition (that the broader distribution of capital acquisition with the earnings of capital will both broaden the distribution of earning capacity *and* promote growth) has received little attention by mainstream economists. In light of environmental concerns, Robert Ashford acknowledges that the facilitation of ownership-broadening binary-financing may need to be complemented with other governmental policies to ensure that the resulting increased purchasing power is not spent in an environmentally destructive way. Increasing purchasing power and changing the nature of what is demanded by aggregate increases in disposable income needs to be factored into a coherent policy. If increases in capital ownership are what drive an economy, one can argue that at least this ownership ought to be shared.

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.

Even before the crisis of 2008, the changing global economy presented challenges for all nations as concerns about the number of jobs, job security, wages, and occupational health and safety increased. In the private sector, labor needs a role in choosing and implementing information-based and labor-affecting technologies. In the public sector, there is a need to integrate industrial development policies with those of employment, occupational health and safety, the environment, and trade. To the extent that trade in goods and services increases, revenues from foreign consumers can compensate for lost domestic consumption, but this assumes the same increases in labor productivity working to the detriment of workers driven by technological displacement are not also occurring or are not soon to follow in other venues. An important question that then arises is: what is to become of the consumer society? Greater unemployment translates into smaller domestic consumer demand. We present options to address insufficient earning capacity and purchasing power in the final section of this paper.

5. The importance of innovation in achieving transformations

Not all innovation advances all the dimensions of sustainability or advances them sufficiently. The ideal set of policy instruments necessarily involves both those that work through markets and those

that work through government intervention, especially through national and international law. Stakeholder involvement is crucial in both. In some cases, law is necessary to establish the framework or general environment in which the market can function in a better way. In other cases, the prescriptive features of law to create clear and unambiguous goals and targets and to force compliance through legal coercion are needed.

The challenge of achieving sustainability is sufficiently complex to require a complementary set of policies and instruments, without resorting to ideological preconceptions,[14] especially those that discount the potentially important role of government or adhere to the belief that all that has to be done to achieve sustainability is to get the prices right. In addition to a clear understanding of the causes of unsustainability and having a vision for a sustainable transformation, what is of paramount importance is the creation of appropriate incentives (and removal of perverse incentives) that can transform industrial societies into sustainable ones. In the last analysis, one must be humbled by the fact that history shows us that there are many more ways to get policies wrong than to get them right. But we are compelled to try, nonetheless.

Innovation, whether technological, organizational, institutional, or social, may be enhanced or hindered by the dynamics and culture of the society in which it might be spawned. We argue that the rate at which nations and economies are becoming unsustainable on a global basis requires deliberate and focused visions to guide, encourage, or even force developments and changes that would either occur slowly or not occur at all. We are currently experiencing two tipping points. One associated with global climate change and a second related to the global financial crisis. Others, such as endocrine disruption related to toxic chemical exposures (Colborn et al., 1996; Cordier, 2008; Saey, 2008), are beginning to surface. There is no time to wait for evolutionary change, although that is the preferred pathway of some observers (Geels, 2011; Kemp et al., 2007).

We are not arguing that government should limit social choices per se, but rather that government should expand choices into more sustainable options through technological, organizational, institutional, and social innovations to encourage socially responsible and informed choices. The instruments available for encouraging social innovation are educational, economic, and legal or regulatory. Education and the provision/communication of information on the desirability and availability of sustainable products and sustainable production and service systems, and about the options that could and need to be developed,[15] can influence consumer and worker demand for the satisfaction of basic needs, wants, and the use of leisure or saved time. Here, the consumer is broadly defined as including individuals and commercial and government consumers (see Fig. 1).

We treat the acquisition of employment skills as a supply side concern and arguably within the province of technological innovation because physical capital, labor, and knowledge are currently considered the most important factors in production and services. Labor skills and know-how can have a profound impact on the innovativeness of a firm and a particular industrial sector. However, although there are great promises for the so-called knowledge-based economy, and there are certain sectors and firms for which high returns on investment in worker education and training might be expected, it is not at all clear that unfocused and large programs will be any more successful than a large increase of financial or physical capital across the board. More targeted policies may be needed. Note that changing the capabilities and skills of workers will also alter their demands from the market, both because it changes what workers may want and because it may augment the purchasing power of workers.

[14] One of those ideological preconceptions is the so-called growth imperative and the conceptualization of sustainability within the neoclassical economic paradigm (see Sanders, 2006). One of the ways in which we have chosen to decouple the economic paradigm from the concept of sustainability is to redefine competitiveness of the nation-state not in terms of market share or level of economic growth (which is how competition is measured) but rather in terms of the ability to adequately deliver essential goods and services to its people. It is not the no-growth assumption rejected by the Stockholm and Rio conferences, but rather a limited-growth goal with distribution of essential goods replacing economic growth maximization. For a treatment of the distinction between sustainable development and sustainable degrowth, see Martinez-Alier et al. (2010).

[15] Vergragt and van Grootveld (1994) argue that rather than forecasting, what is needed is backcasting in which decision makers are asked: what will we need in twenty years, and what do we need to do now to get there? The identification of technology options is closely related to this recommendation.

Speth (2008) and many before him speak of developing a new consciousness on the part of people in their choices of what they want and how they want to live. This cultural transformation could be advanced by a new narrative, by social marketing, by social movements, by religion, and by education (ibid.). As observers of the recent unpleasant battle over health-care reform (really insurance-industry reform) in the United States, we find it hard to imagine how cultural shifts toward real improvement can easily occur.[16] Europe may be a more receptive venue for successful cultural change, which could then be emulated if American hubris that we do everything better in the United States could be circumvented. In the meantime, educational initiatives are crucial and may be the only practical pathway toward societal change for both increasing the capacity for critical thinking and creating change agents to conceive of and apply the needed solutions.

The distinction between incremental and radical innovations be they technological, organizational, institutional, or social is not represented by points on a continuum. Incremental innovation generally involves continuous improvements while radical innovations are discontinuous (Freeman, 1987), possibly involving displacement of dominant firms and institutions rather than evolutionary transformations (Ashford, 2000).[17] We have argued that more radical, rather than incremental, innovation is needed to achieve factor 10 (or better) improvements in both resource productivity and pollution reduction (Ashford and Hall, 2011b). Similarly, radical interventions in employment policy may be needed to offset increasing unemployment and underemployment in the United States and Europe. Solving these problems may require instruments, policies, and targets that are very different from those that foster incremental improvements.

Further, a preoccupation with product and process innovation, to the neglect of organizational and social innovation, may shortchange the potential to advance three-fold sustainability. The benefits of organizational innovation seem to be under-appreciated (Andreasen et al., 1995) and organizational changes that ignore the potential benefits of anthropogenic or human-centered production may not achieve their intended results. A focus on limited organizational change for example, as reflected in the concept of lean production emphasizing the organization and selective automation of tasks, maximizes the technological and minimizes the human aspects of production, especially the extent to which problem solving is actually a significant part of the worker's involvement,[18] and repetitive, stressful work and burnout continue to prevail (Jürgens, 1995).

Finally, a simplistic call for more worker training to upgrade skills (Reich, 1992), without corresponding changes in both technological and organizational innovation, may not be particularly helpful. Not all firms and sectors are in a position to use enough of these skills either in industrialized or in developing countries. It should be obvious that all four kinds of innovation need to receive attention in a coordinated fashion in the design of policies to promote sustainability. Moreover, there is an increasing belief that it is the combination of technological, organizational, institutional, and social factors that more adequately explains growth than R&D, capital, or human investment alone.[19] It is especially important to acknowledge the relationship of technological innovation to both the environment and employment in hopes of attaining three-fold sustainability. An important strategy for addressing unemployment and underemployment concerns is the careful consideration of jobs when promoting different types of innovation. From the perspective of the overall society, the following general strategies might be used to encourage the use of labor more effectively:

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[16] Speth (2008, p. 218) quotes William Greider: "If an activist president set out with good intentions to rewire the engine of capitalism to alter its operating values or reorganize the terms for employment and investment or tamper with other important features the initiative would very likely be chewed to pieces by politics because of powerful vested interests". Perhaps President Obama should have paid earlier attention to these warnings.

[17] Kemp et al. (2007) argue that radical (disrupting) system innovation can be accomplished by successive step-wise changes over a period of 25 years or more. However, it is hard to square this assertion with the concepts of disrupting or radical innovation put forth by Christensen and Freeman. Christensen (1997) uses the term disrupting innovation rather than radical innovation, arguing that both sustaining and disrupting innovations can be either incremental or radical.

[18] See Charles and Lehner (1998) for a discussion of lean production and why it imposes considerable limitations on a firm's propensity to innovate.

[19] Ayres and Warr (2009) argue that it has been innovation in the technology of energy conversion and utilization, rather than technological innovation in general, that drove earlier growth – and that this kind of innovation has reached its limits, heralding the end of high exponential growth.

1. distinguishing productiveness from productivity;
2. striving for an innovation-enhancing rather than a cost-reduction strategy;
3. investing in increasing the capacity of human resources rather than replacing labor with capital;
4. paying more attention to the human/technology interface;
5. advancing beneficial industrial relations in the nation, sector, or firm;
6. investing in education and training;
7. using economic incentives to maximize human resource use and improvement; and
8. taxing pollution and carbon content of energy sources rather than labor.

Some of these changes would not be enthusiastically welcomed by many in the private sector. They would need to be adequately explained and defended by government in fashioning mechanisms to implement them.

6. A greater or lesser role for government?

While it has not been the fashion to recommend a strong role for government intervention in the economy, the financial crisis and lack of progress on much-needed energy and global climate initiatives has renewed the intervention debate. In general terms, government is needed in order to facilitate a transformation to economic, environmental, and social sustainability and stability:

- to provide the necessary physical/legal infrastructure;
- to support basic education and skills acquisition (human resource development);
- to invest in path-breaking science and technology development to enhance competitiveness, environmental improvement, and job design;
- to sustain a healthy economy that creates rewarding and meaningful employment with sufficient purchasing power that reduces poverty, and provides the opportunity for a high quality of life for all;
- to protect the environment and ensure that every person benefits from clean air, clean water, and a healthy home, work, and leisure environment;
- to regulate deceptive and inaccurate advertising, as well as to provide counteracting government messaging to discourage unsustainable consumption;
- to act as a facilitator or arbitrator of competing stakeholder interests to ensure a fair process;
- to act as a trustee of (underrepresented) present and future worker and citizen interests to ensure a fair outcome in transformations of the economy;
- to act as a trustee of new technologies;
- to act as a force to integrate,[20] not just coordinate policies;
- to ensure a democratic political process, free from corruption and undue influence of vested interests which act to the detriment of the rest of society; and
- to broaden the ownership of productive capital.

In the opening introduction and overview to the first issue launching this journal, van den Bergh et al. (2011, p. 4) comment that "Economic studies show that the major part of reduction of emissions in the coming decades is unlikely to come from technological innovation but instead from environmental regulation that changes decisions about inputs and outputs by producers and consumers, which will alter the sector and demand structure of the economy. . . . These changes in behavior will of course involve changes in technology, but through adoption of already existing technologies rather than innovation trajectories which generate new technologies." We take exception to this generality, as it ignores the significant innovation-forcing effects that early stringent U.S. regulation has brought and the potential for regulation to move firms beyond evolutionary to revolutionary change, even without linkages to specific innovation policies – see especially Ashford and Hall (2011a).[21] Likewise, while care

[20] See Ashford and Hall (2011a,b) for a fuller discussion of policy integration. See also Alkemade et al. (2011).

[21] While beyond the scope of the discussion in this article, we remain unconvinced that the co-evolutionary processes of transition policy and strategic niche management can be an effective means to achieve radical or disrupting innovation, even

must be taken to account for rebound effects in fashioning and coordinating regulatory and industrial innovation policies, it is not necessarily true that "another reason why solving environmental problems with innovative technologies is difficult is that they always result in unintended second-order effects, referred to as energy and environmental rebound" (van den Bergh et al., 2011, p. 4). We, do, of course caution policy makers to address this very carefully.

6.1. Regulation's role in benefitting the economy and the environment

Regulation – properly fashioned – can transform products and processes which confers both economic and health, safety, and environmental benefits (Ashford et al., 1985, 1979). In contrast, neoclassical economic analysis of the relationship between health, safety, or environmental regulation and competitiveness maintains that stringent regulation increases production costs, diverting resources from R&D, and consequently hinders innovation (Jaffe et al., 1995; Rennings et al., 2003). This assumption was challenged first in the late 1970s at MIT (Ashford et al., 1979) and made popular in 1991 by the so-called "Porter hypothesis."

Porter posited that firms which respond to stringent regulation by developing new technologies have a "first mover" advantage and can capture the market for their products/services. Based upon his research into the competitive advantage of nations, Porter (1991, p. 168) claimed that "[s]trict environmental regulations do not inevitably hinder competitive advantage against foreign rivals; indeed, they often enhance it. Tough standards trigger innovation and upgrading." He continues, "[p]roperly constructed regulatory standards, which aim at outcomes and not methods, will encourage companies to re-engineer their technology. The result in many cases is a process that not only pollutes less but lowers costs or improves quality. . . . Strict product regulations can also prod companies into innovating to produce less polluting or more resource-efficient products that will be highly valued internationally" (Porter, 1991, p. 168).

Earlier empirically based work on the stimulating effects of regulation, dates back twelve years before Porter's work to research undertaken at MIT (Ashford, 1993; Ashford et al., 1979, 1985; Ashford and Heaton, 1983). This earlier work showed how stringent and focused regulations in the U.S. chemical producing and using industries had the effect of inducing fundamental product and process innovations, sometimes by incumbent producers, but also by creating conditions that enabled new producers to enter the field (Ashford et al., 1985).

A weakness of Porter's hypothesis is that it neglects the important dynamics of new entrants (van de Poel, 2000). Porter and van den Linde (1995a,b) argue that regulation, properly designed, can cause a regulated firm to undertake innovations that not only reduce pollution – which is a hallmark of production inefficiency – but also save on materials, water, and energy costs, conferring what Porter calls "innovation offsets" to the innovating firm (and what Ashford called "ancillary benefits"). This can occur because the firm, at any point in time, is sub-optimal. If the firm is the first to comply with regulation in an intelligent way, other firms will later have to rush to comply and do so in a less thoughtful and more expensive way. Thus, there are "learning curve" advantages to being first and early.

Given Porter's focus on innovation offsets – i.e., the cost savings due to induced innovation that could exceed the cost of the regulation – he is mainly concerned with the net costs to incumbent firms. However, it is possible to differentiate between "weak" and "strong" forms of the regulation-induced innovation hypothesis (Ashford, 1999) – a distinction that Porter does not make. In its weak form, as Porter observes, firms subject to more stringent regulation respond with incremental product and process innovations. Thus, while environmental and worker health and safety improvements may be realized, the offending products and processes are only incrementally changed.

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if aligned with innovation policies (Ashford and Hall, 2011b, Chapter 8). Alkemade et al. (2011) argue that transition policy seeks to displace the incumbents over the long term, while innovation policy does not. We read the transition management literature as characterized by Alkemade et al. (2011) quite differently, regarding it as extending the dependence on incumbents, rather than seeking their displacement. We agree that timid innovation policy is unlikely to displace incumbents, but see an important role for stringent regulation in promoting disruptive change – see the discussion below on the *strong* form of the regulation-induced hypothesis.

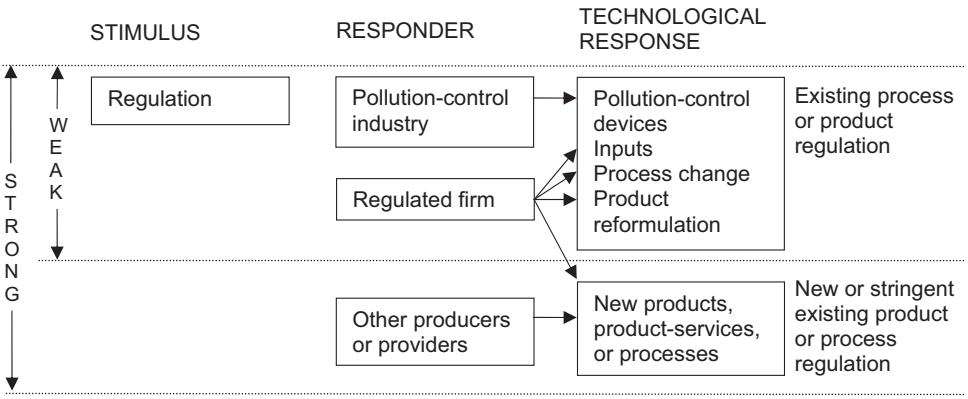

Fig. 3. A model for regulation-induced technological change for "weak" (Porter) and "strong" (Ashford/MIT) forms of the regulation-induced innovation hypothesis.

However, in the strong form of the regulation-induced innovation hypothesis, very stringent regulation can stimulate the entrance of entirely new products and processes into the market, thereby displacing dominant technologies. In this situation, unless incumbent firms have the willingness and capability to produce and compete with the new forms of technology, they too are likely to be displaced from the market (Christensen, 1997). Fig. 3 provides a simple depiction of the likely technological responses to the strong and weak forms of the regulation-induced innovation hypothesis.

This research tells us that regulation can be an effective and proper instrument for government to guide the innovation process. Well-designed regulation that sets new rules changes the institutional framework of the market. It can thus be an important element in creating favorable conditions for innovation that will enhance environmental sustainability and create incentives for the development of powerful lead-markets, which pull innovation toward that sustainability (Jänicke and Jacob, 2004). With regard to regulation, what seems to matter is not only the stringency, mode (specification versus performance), timing, uncertainty, focus (inputs versus product versus process) of the regulation, and the existence of complementary economic incentives – but also the inherent innovativeness (usually in new entrants) or lack of it (usually in the regulated firms) that the regulation engenders (Ashford et al., 1985; Ashford and Heaton, 1983).

In order for innovation to occur, the firm (or government itself) must have the *willingness*, *opportunity/motivation*, and *capability/capacity* to innovate (Ashford, 2000; Ashford and Hall, 2011b). We argue that government has a key role to play in affecting the needed behavioral changes for all the stakeholders in the industrial state.

7. Promoting sustainable livelihoods in the context of environmental sustainability and a strong economy

Specific major policies and initiatives are all necessary for achieving transformations to a more sustainable industrial state. Leaving any of the major policies out of consideration could cause others to fail. For example, shifting part of the economy from the provision of products to product-services[22]

[22] Mont and Lindqvist (2003) and Tukker and Jansen (2006) emphasize the advantages of shifting from manufacturing products to providing product-services that could create significant opportunities for lower environmental impact and more and better job creation, upskilling, and wages. Product-services are exemplified by a firm providing photocopying services on a leased basis rather than selling a photocopying machine. The firm takes ownership of the machine from cradle to grave, resulting in optimal design for use and resilience, energy and material content, maintenance and repair, and ultimate disposal (usually of components). Compared with the sale of machines that are ultimately disposed of entirely with large amounts of embodied energy and material (i.e., capital), leasing allows more use of higher-skilled labor to design and redesign, manufacture, maintain, and repair the machine, resulting in less adverse environmental consequences and more higher-skilled jobs with variety and job satisfaction.

would not succeed without significant social change influencing the desirability or acceptability of that shift. Failure to integrate initiatives in a comprehensive manner has caused many good ideas to fail to meet their potential in the past. What would translate them into necessary and sufficient action is that they be applied in an integrated fashion, such that industrial, environmental, employment, and trade policies are co-designed and co-implemented. The complexity and interrelatedness of the many forces and interests in modern society require this. As difficult as it may be to transform industrial economies into more environmentally sustainable systems, the challenges facing the creation of more satisfying, rewarding, and safer jobs with improvements in purchasing power are even more daunting.[23]

7.1. The relationship between employment and policies that affect growth

Simply priming the pump to encourage economic growth is a blunt instrument for creating more employment, especially because replacing old facilities with new facilities usually results in shedding jobs, and greening the economy without attention to the redesign of jobs as well may return only a small double dividend. We have already addressed the problems associated with spreading out available work through a shorter workweek. Longer-term policy, cultural, and societal changes are needed.

Developed countries (and pundits within them) are deeply divided on whether Keynesian spending to stimulate the economy in order to create jobs and lead to greater consumer purchasing is what is needed to address low economic growth and high unemployment, or whether creating more flexible work rules, allowing for wage concessions, or relaxing hiring/firing practices is needed. Germany instituted more liberal labor policies but also the Kurzarbeit (short work) policy by which employers were encouraged to retain workers in times of economic slowdown. When a firm needed to reduce its output, employees could either be on furlough or a shorter work schedule, with the wage shortfall made up by a government fund to which employers had contributed in better times (Kulish, 2010). In 2009, around 1.4 million jobs in Germany were supported by government subsidies (Foroohar, 2011). These employment policies supported a form of German miracle where an annualized growth rate of 9 percent was achieved based on 2010 second-quarter growth. This reinforces the view that direct protection of jobs, rather than indirect monetary and fiscal policies, may be a better policy direction. The costs of protecting jobs is likely to be lower than the costs of recovering economic capacity once demand re-emerges. Decreasing demand for the consumption of material and energy-intensive products and services may not alleviate unemployment or underemployment, but using more human rather than physical capital may yield that result. For years, capital has replaced labor in the production of goods and the provision of services (Rifkin, 2004; Vivarelli and Pianta, 2000). Reversing decades-old trends of designing labor out of production and services by redesigning the use of labor may actually be cost-effective. It will certainly utilize unused human capital and have social benefits as well.

Moreover, instead of a household spending its disposable income on material and energy-intensive goods and services beyond the basic necessities, it could engage persons to deliver services that employ mostly human capital, such as tutors, language teachers, music and art teachers, financial advisers, and persons engaged in providing other social services. Also, increasing the teacher-to-student ratio in schools would be an important start.[24] The multiplier effect of employing human rather than physical or natural capital could be significant. Increasing the demand for human capital in this context would,

[23] Among sustainability commentators, it is interesting to see the increasing emphasis on the issue of jobs. For example, Speth stated in an address before the National Council for Science and the Environment that a "post-growth economy would shift resources away from consumption and into investments in long-term social and environmental needs. I put jobs and meaningful work first . . . because they are so important and unemployment is so devastating. Likely future rates of economic growth, even with further federal stimulus, are only mildly associated with declining unemployment" (Speth, 2010b, p. 17).

[24] Although a discussion of comprehensive educational reform is beyond the scope of this paper, we regard it as essential. The U.S. practice of basing the financing of schools on property taxes that are constrained by "proposition two-and-a-half" budget limitations should be eliminated in favor of federal financing of education. Federalizing educational support in other countries needs to be encouraged as well.

of course, require significant medium- to long-term cultural changes,[25] and large corporations that have organized the current means of production driven by economies of scale and that use advertising to create artificial demand would be less likely to be interested in selling these services.

Finally, too many critics of prior attempts to make progress toward more sustainable industrial systems may have given up too soon on the importance and potential power of government, as well as succumbing to overly romanticized expectations that cultural transformations driven by social forces and grassroots organizing[26] alone, without a strong government, will establish a new American or European narrative.[27] There are many more ways to do things wrong than to do things right, but there have been plenty of successes in government, in addition to failures. A stronger government is not necessarily a bigger government. Integrating governmental functions not only connects social goals that need to be achieved in mutually supportive ways, it may also downsize the fragmented bureaucracies.

Societal and industrial transformations are indeed needed, but establishing and enforcing clear rules of a new game through law are the key ingredients. Cultural transformations require inspirational and uncorrupted political leadership, as well as direct participation in governance by citizens. We need to ask continually what and who are standing in the way of progress toward a more sustainable future and to be prepared to challenge mainstream beliefs that limit possibilities and perpetuate the unsustainable practices and thinking of the past. In the United States, wages and salaries make up roughly three-fourths of total family income, but that portion is even higher for the broad middle class. Policies which produce uneven and adverse impacts on various groups within a nation are not socially or politically sustainable, even if aggregate growth were to increase. The Economic Policy Institute produces an annual report on The State of Working America. Its 2009 report is a poignant reminder of the social consequences brought about by the neo-liberal policies of the Washington Consensus. The analysis by Mishel et al. (2009, p. 3) reveals that: "the most recent business cycle the 2000s was unique: despite significant productivity growth in the overall economy, most families experienced stagnant or falling real incomes. The American workforce is working harder, smarter, and more efficiently, yet failing to share evenly in the benefits of the growth. It appears that the real income of a typical, middle-income family (i.e., the medium) was lower at the end of the 2000 cycle than at the beginning."[28] Addressing worsening mal-distributions of income, wealth, and opportunities for people in the world's nations needs to be a central focus of transformation policies.

7.2. Options to address insufficient earning capacity and purchasing power

If the authors of this paper are correct in their prediction that earning capacity, purchasing power, and sustainable livelihoods of people are destined to become the major social concerns facing not only developing countries, but developed nations as well, then what are the options for addressing these concerns?

1. Transfer wealth or income from capital owners and highly paid workers to those under-or unemployed. *A redistribution of wealth or income*.[29]

[25] Investing in better education and lifelong learning is, of course, central to cultural change and shifting demand toward the use of more human capital.

[26] In the U.S., ironically, leaving health-insurance reform to the states gives the insurance industry more rather than less influence. This is consistent with the conservative preference for devolving government to the states, where environmental, public health, and labor and human rights protections are generally more easily compromised.

[27] It remains to be seen whether in the U.S., the "Occupy Wall Street" and similar protests in Europe lead to significant policy reforms. The media are circumspect as to the lasting nature or depth of the sentiments expressed in these protests and their likely effects.

[28] Since 2008, the situation is likely to have worsened. The collapse of the housing market in the U.S. has erased a significant proportion of middle-class wealth, while higher-income earners, who tend to invest more of their wealth in stocks, have seen their worth rebound more quickly (Foroohar, 2011), reflecting the distinction between the health of the financial sector and what others consider to be the real economy.

[29] For a discussion of the redistribution of income through taxes, social transfers (social insurance, pensions, and unemployment insurance), and social expenditures (education, health, water, and other social services), see Prasad (2008). Looking over

2. Engage in Keynesian spending for labor intensive projects improving infrastructure, with government and taxpayers footing the bill. *This represents job creation in the face of insufficient current demand for public services, probably by deficit spending; effective over the short term, but not likely to become a successful long-term strategy*.[30]
3. Spread existing work out over a larger population by shortening the workweek, but *without* maintaining wage parity. *A redistribution of wage income from existing workers to a larger pool of potential workers, a system that involves no wealth transfer to labor as a whole*.
4. In contrast, spread out existing work over a larger population by shortening the workweek, but with the *maintenance of wage parity*. *More of the fruits of industrial production and services going to labor; requires a redistribution of income from either profits or the tax base*.
5. Limit the elimination of jobs, supplement most of the shortfall in paid wages from a government-administered, employer-financed fund. *Allowing a quicker recovery of fuller employment when demand, especially foreign demand, increases; used in Germany*.[31]
6. Increase labor's contribution and therefore its claim on the profits from production and services by upskilling and redesigning work back into production and services. *Requires a redesign of labor's role in commercial activities that will reverse the decades-old trend in replacing labor with capital*.[32]
7. Meet essential human needs in a less-expensive and less resource-intensive way by redesigning products, production, services, and systems. *Requires a re-conceptualized national industrial policy and restrictive trade practices.*
8. Change the nature of consumer and human-centered demand by encouraging cultural change more focused on using disposable income on services with significantly less capital and energy intensiveness and much more labor-intensiveness. *Requires a shift of demand from "stuff" to human services*.
9. Better enable poor and middle-class people to become owners. *By extending to them effective market opportunities to acquire capital with the earnings of capital, based on binary economics*.

The 2008 financial crisis, of course, has exacerbated income inequality (Eichhorst et al., 2010). However, looking at the G20 countries, labor-market institutions (employment protection legislation, unemployment benefits, and active labor market/job creation programs) which provided strong internal flexibility in combination with relatively strict employment protection (like Germany) were able to stabilize employment, however, with the marginal workforce bearing the brunt of the crisis. Deliberately focusing on these options, rather than attempting to return to a growth-based, export-led economy as we knew it, allows for creative experimentation with what is likely to become the major social concern of government, without benefiting profit-oriented, capital acquisition by the usual cast of economic actors. Such an outcome causes redistributions that exacerbate the disparity among economic winners and losers, with many people ending up as the losers. Some of these options have

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the previous fifteen years in a large number of both developed and developing countries, Prasad (2008) found that the redistributive impact of taxes and social transfers, which have become increasingly regressive over time, have thus not been able to reverse income inequality. On the other hand, as experience in Mauritius, Malaysia, Nordic countries, and for low-income people in Brazil has shown, social policy can be used more aggressively without adversely affecting growth or employment objectives. Both tax and social policy are needed to support employment objectives specifically.

[30] For details of options for fiscal interventions to increase economic growth and employment assembled by the U.S. Congressional Budget Office, see CBO (2010a,b). Also see the footnote above.

[31] See Eichhorst et al. (2010, pp. 27–29) for a detailed explanation of stable employment in Germany, even in the face of decreasing export activity.

[32] Knowledge applied in an iterative way (knowledge injected periodically or continuously over time) can have a cumulative effect, with new knowledge building on past knowledge acquisition and investment. This is akin to adding financial flows to previous investments that have accumulated and appreciated in value and is unlike investments in physical capital that depreciates in value over time because its functionality decreases due to regular utilization. Knowledge capital, even if it sometimes becomes less valuable over time, may nonetheless grow (accumulate) from using it and adding to it over time (Foray, 2006). This observation has direct relevance for the choices that are made as to which factor endowments to invest in producing a product or providing a service. Hardware deteriorates, but knowledge held by a skilled person who continues to learn can appreciate in value for many years. This calls into question the replacement of labor by physical capital as a growth strategy.

the potential to limit wasteful growth (6, 8) and limit underutilized human capital (4, 5, 7, 8). Some options (1, 2, 3, 4, 5, 6, 9) require other complementary policies to limit wasteful consumption as well.

The alternatives are to act as if the crises will soon be over, to assume that recovery without transformation is possible, to continue the failed policies of the past, to assume that technology and ingenuity will be sufficient to save us, to accept the inevitable that there will be winners and losers, and to fail to distinguish policies which aid the financial sector from those that improve the real economy.

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