

## POLICY INTEGRATION FOR SUSTAINABLE DEVELOPMENT – EFFORTS OF DEVELOPING AND TRANSITION ECONOMIES

Ralph A. Luken and Paul Hesp

### ABSTRACT

All countries, including developing and transition economies, need to integrate sectoral policies to enhance the positive impact of industry on sustainable development. This article assesses the extent to which recent changes in industrial, environmental and technology policies in seven countries (Chile, China, the Czech Republic, Pakistan, Tunisia, Turkey and Zimbabwe) have more closely aligned industrial development with the aims of sustainable development. The assessment found that the seven countries did not make great advances in policy integration in support of sustainable development in the 1990s. The countries undertook only limited efforts to coordinate policy domains and to implement cooperative programs and projects. Only three countries attempted to find convergence among policies in support of sustainable development and none of these three countries attempted to align their coordination and cooperative measures in support of a coherent vision for sustainable development. With regard to the effectiveness of policy domains, two countries appear to have relatively effective policy domains and two countries appear to have relatively ineffective policy domains. With regard to the actual contribution of industry to sustainable development, there were only two countries where industry made substantial contributions to socio-economic development while reducing its potential adverse impact on the environment over the period 1990-2000.

### 1. INTRODUCTION

The 1992 UN Conference on Environment and Development (UNCED) or 'Earth Summit' recognized that sustainable development would require countries to 'build upon and harmonize the various sectoral economic, social and environmental policies and plans'. Spurred by UNCED, most developing country governments, supported by international organizations, have made efforts to draw up national sustainable development strategies (NSDSs) that would integrate the three dimensions of sustainable development. The UN General Assembly in 1997 set 2002 as the target year for completion of these strategies and the September 2000 Millennium Declaration, signed by 147 countries, confirmed country commitments to the integration of sustainability principles in national policy making. The 'Johannesburg Plan of Implementation' approved at the World Summit on Sustainable Development calls for the completion of NSDSs and the beginning of their implementation by 2005 (UN 2002).

In its preparatory activities for WSSD, UNIDO requested national experts in 18 developing and transition economies to report on the extent to which recent changes in industrial, environmental, and technology policies have more closely aligned industrial development objectives with sustainable development objectives. The experts were also requested to assess the impact of industry (manufacturing in particular) on sustainable development, roughly over the period since the 1992 Earth Summit (Luken et.al. 2001).

This article draws on seven of these country reports to characterize their industrial, technology, and environmental policies and programs that have the potential to enhance the positive impacts of industry on sustainable development and puts forward two complementary approaches that assess the degree to which industry in these countries has impacted sustainable development. The seven country reports are for Chile (Urzua and Alvarez-Arenas (2003), China (Wang and van der Tak, 2003), The Czech Republic (Kovanda and Moldan, 2003), Pakistan (Ali et al, 2003), Tunisia (Nafti and van Oyen, 2003) Turkey (Cetindaram and Erer, 2003) and Zimbabwe (Gomez and Guarjena, 2003). In addition the article includes material from the comparative analysis of their policy integration efforts (Luken and Hesp,2003).

## 2. ANALYTICAL FRAMEWORK

### 2.1 Characterizing Policy Integration Efforts

The policy review started with searching for literature on sustainable development planning efforts in industrial and developing countries. The review focused on finding an appropriate analytical framework to assess the potential of industrial, environmental and technology policies to enhance the contribution of industry to sustainable development. The review found one assessment of the experience of industrialized countries-- *Implementing Sustainable Development* (Lafferty and Meadowcroft, 2000). It found many more of the experience in developing countries -- 'The DAC Guidelines: Strategies for Sustainable Development: Guidance for Development Cooperation' (OECD 2001), *Sustainable Development Strategies: A Resource Book* (OECD/UNDP 2002), 'Stakeholder Dialogues on Sustainable Development Strategies: Lessons, Opportunities and Developing Country Case Studies' (Dalal-Clayton, 2002), 'Report of an Expert Forum on National Strategies for Sustainable Development, Meeting held in Accra, Ghana, 2001' (UNDESA, 2002a) and 'Guidance in Preparing a National Sustainable Development Strategy: Managing Sustainable Development in the New Millennium' (UNDESA 2002b). None of these guidance or assessment documents address in any detail the industrial sector or offer an analytical framework for categorizing and evaluating the effectiveness of policy integration efforts. Consequently, we prepared our own guidance on the key instruments of industrial, environmental and technology policies and formulated an analytical framework for categorizing the roles of key instruments in enhancing the contribute of industry to sustainable development.

In the case of the industrial development policy domain, the main categories of policy instruments are:<sup>1</sup>

- (i) A regulatory framework, such as anti-trust legislation;
  - (ii) Alterations of the price system, such as subsidies for energy and water, capital; and
  - (iii) Provision of goods and services, such as technical extension services for small and medium sized enterprises and investment promotion services.
- (UNIDO 1999).

In the case of the environmental policy domain, the main categories of policy instruments are:

- (i) Command and control, such as licensing;
  - (ii) Economic incentives, such as taxes and fines;
  - (iii) Voluntary arrangements, such as negotiated agreements or covenants; and
  - (iv) Information disclosure, such as pollutant release inventories.
- (OECD 1997)

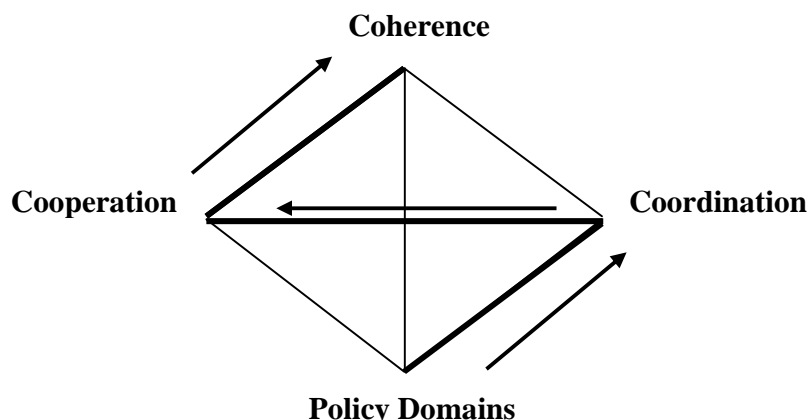
In the case of the technology policy domain, the major categories of policy instruments are:

- (i) Development of generic technologies, such as information technology and biotechnology;
  - (ii) Support for technological infrastructure, such as a manufacturing extension service;
  - (iii) Firm level focus on building technological capabilities; and
  - (iv) Subsidized research and development to be undertaken by firms.
- (Dodgson 2000)<sup>ii</sup>

In some cases, assigning a particular policy instrument to one policy domain is arbitrary, as it may be used in other domains. The most obvious case is a technical extension service that can be an instrument of both industrial and technology policies.

The degree to which these seven countries have aligned their developmental and environmental objectives are characterized by three, increasingly demanding, levels of policy integration (Figure 1).<sup>iii</sup>

Figure 1 Policy integration for sustainable industrial development



The most basic level of policy integration is a requirement, often specified in legislation, for coordination among the three policy domains. For example, industrial policy can be coordinated with environmental policy to minimize the impact of industrial output on environmentally sensitive geographic location on environmental quality, and with technology policy to enhance the uptake of innovative technologies. Environmental policy can be coordinated with industrial policy to minimize the economic impact of regulatory requirements on industrial competitiveness and with technology policy to

encourage the utilization of advanced process technologies rather than pollution control equipment for complying with environmental regulations. Technology policy can be coordinated with industrial policy to enhance the skill and technology intensity of industrial development patterns and with environmental policy to accelerate the up-take of environmentally sound technology.

Cooperative programs and projects among the policy domains and their support institutions constitute the second and more advanced type of policy integration for sustainable development. One example is an extension service for SMEs supported by industrial policy (or technology policy), which can provide advice on least cost solutions for environmental compliance. Another example is an environmental covenant program as an instrument of environmental policy; it can assign first priority to key subsectors identified by industrial policy and can include support for technology decision makers at the firm level.

The third and most advanced type of integration is coherence among policies i.e., national visions for development. 'Coherence brings together the cumulative value added from the contributions of different policy communities' (OECD/UNDP 2002). Such a shared vision, which no country has yet put forward for manufacturing, could be part of a NSDS. It would be the strategy for industrial development that draws upon a reasonable set of internally consistent coordination and cooperation measures among the three policy domains in support of a shared vision.

The denser lines in Figure 1 suggest the usual path towards policy integration. Coordination efforts in turn stimulate cooperative programs and projects. Participants in cooperative programs often come to realize that policy convergence leads to maximum benefits. However, the path is not always the smooth one suggested by the straight lines; rather it is usually a series small step. Moreover, policy domains can include cooperative programs and projects without any explicit coordination and can directly call for more coherence without joint programs and projects. However, full integration is achieved only when there is a set of coordination and cooperation measures that are supportive of a shared vision. The extent of policy integration is a good indicator of the commitment of governments to enhance the positive impact of industry on sustainable development.<sup>iv</sup>

## 2.2 Process and Outcome Indicators

The article presents two complementary approaches for assessing country efforts to enhance the contribution of industry on sustainable development. The first approach, a set of process indicators, measures the relative effectiveness of the industrial, environmental and technology policy domains. The more effective these key policy domains, the more likely it is that industry will make a positive contribution to sustainable development. The second approach, a set of outcome indicators, evaluates the actual change in the impact of industry on sustainable development. It does so by drawing on a limited number of measures of economic, social and environmental performance, without attempting to integrate them into a composite measure.

### 2.2.1 Process Indicators

Industrial development policy aims to increase the output of manufactured goods by increasing the efficiency with which the capital stock is being used and expanding the capital stock. More efficient use of the capital stock (process optimization) generally reduces the generation of pollutants; most often new capital stock utilizes less energy, water and raw material than the capital stock it replaces and in doing so reduces the amount of pollutant generation.

One measure of the effectiveness of industrial development policy is the competitive industrial performance (CIP) index, which measures the ability of countries to produce and export manufactures competitively. UNIDO (2002) combined manufacturing value added per capita, manufactured exports per capita, the share of medium and high technology products in MVA and the share of medium and high technology products in manufactured exports to estimate the CIP. All these data are for 1998. Building on available data, UNIDO ranked 87 countries. The full ranking and associated index numbers are listed in Annex 1.

Environmental policy in regard to industry primarily aims to reduce the negative impact of industry on human health and the environment. Thus the selected process indicator for environmental policy should be one that shows the extent to which negative impacts are being reduced. Unfortunately, there is no commonly used measure of the effectiveness of environmental policies as there are for industry-related and technology policies. Consequently, we constructed a multiplicative index of effectiveness of environmental effort (EE) by combining (a) an assessment of over-all government effectiveness and (b) changes in organic matter water pollutant discharge between 1990 and 2000. Kaufman et al (2003) estimated several governance indicators for 1996-2002. Their composite indicator for 'government effectiveness' combines "into a single grouping responses on the quality of public service provision, the quality of bureaucracy, the competence of civil servants, the independence of the civil service from political pressure and the credibility of the government's commitment to policies."(p3) The World Bank (2002) estimated discharge in organic matter water pollutant discharge for the period 1980-2000. They base their estimate of biochemical oxygen demand (BOD) on pollutant coefficients for 13 countries and employment.<sup>v</sup> We could rank 65 countries was possible with data for government effectiveness in 2002 and the change in organic pollutant matter discharge between 1990 and 2000. The full ranking and associated index numbers are listed in Annex 1.

Technology policy aims to enhance domestic capabilities to adopt or to utilize newer technologies through a) the provision of services to firms via manufacturing extension services and b) the training of the labor force. As stated above, most new technologies tend to be more efficient in their utilization of water, energy and raw materials. Thus the selected process indicator for technology policy is the technology effort (TE) index, which reflects the intensity of technological activity in a country. The composite index is derived from two measures: R and D financed by productive enterprises and the number of patents taken out internationally (in the US). UNIDO (2002) ranked 87 countries with the data available for the period 1997-1998. The full ranking and associated index numbers are listed in Annex 1.

### 2.2.2 Outcome Indicators

Numerous efforts are underway to build and apply systems of indicators of sustainability in development.<sup>vi</sup> The CSD work programme on indicators of sustainable development alone involves 22 countries of which 16 are developing countries (UNDESA 2001). The programs in these countries were reviewed to find if any met three criteria: (i) globally comparable indicators; (ii) all three dimensions of sustainability - economic, social and environmental - and, most importantly, (iii) sufficient data about the industrial (manufacturing) sector in developing countries. Unfortunately no system of indicators was found that meets all three criteria.

The one system that met the first two criteria is the Indicators of Sustainable Development (ISD) (UNDESA 2001). The ISD framework is based on the so-called pressure-state-response approach. This approach distinguishes among pressures on human activities (for example, energy, transport, industry, agriculture), the state of the environment (for example, air, water, land and natural resources) and responses by various agents (for example, government, business, households or the international community). Unfortunately, the ISD has virtually no industry-relevant social and environmental indicators.

The Environmental Sustainability Index (ESI) is a global assessment of environmental change. The ESI covers 142 countries on the basis of a set of 20 core indicators, each of which combines two to eight variables for a total of 68 underlying variables (CEISIN 2002). Unfortunately, it has virtually no industry relevant data for developing countries.

Given the limitations and complexities of the current indices, the assessment of industry's impact on sustainable development for the seven countries could not use either the ISD or the ESI, but rather drew almost exclusively on globally available data from international organizations including the International Energy Agency, the International Labour Organization, the World Bank, the United Nations Environment Programme and UNIDO. The globally available data consist of the following:

- Economic indicators: manufacturing value added (MVA), MVA as a percentage of GDP, MVA per capita, total exports, manufactured exports, manufactured exports as a percentage of total exports and the share of medium- and high-technology goods in manufactured exports (in most cases for 1990-2000);
- Social indicators: total employment, employment in manufacturing, manufacturing labour force as a percentage of the total labour force, percentage of females in the manufacturing labour force (1990 and 2000, in most cases);
- Environmental indicators: total industrial carbon dioxide (CO<sub>2</sub>) emissions, CO<sub>2</sub> emissions per 1000 US\$ MVA, organic water effluent measured as biological oxygen demand (BOD), BOD per 1000 US\$ MVA and percentage of MVA in the most polluting manufacturing sub-sectors (1990 and 1999, in most cases);

### 3. POLICIES AND PROGRAMS

This section briefly describes and classifies industrial, environmental and technology policies and associated programs that the seven country reports identified as having the potential to enhance the contribution of industry to sustainable development.

Table 1 summaries the classification of these policies and programs as efforts to achieve coordination, cooperation or coherence.

### 3.1 Coordination

#### Chile

One approach being used for coordination between the public and private sectors is the *Acuerdos de Producción Limpia* (Clean Production Agreements, APLs). In the context of APLs, the public sector's promotional, regulatory and monitoring organisations work with industrial associations, trade unions and syndicates to create an agenda of dialogue and agreements based on shared commitments. The incorporation of monitoring institutions in the APLs made preventive monitoring possible, horizontal relationships with the participating companies helping to prevent pollution.

#### China

The 'Decision on Key Aspects of Current Industrial Policy' addressed issues of wastewater treatment, energy conservation, air pollution abatement and efficient use of raw materials. The lists of sectors, products and processes prohibited also shows an awareness of environmental impacts. These same industrial policies clearly recognize the importance of technology upgrading. The latest policy (1999) aims to 'improve technological levels and economies of scale in Chinese industry.' The task of SDPC and its local counterparts is to coordinate the different plans so that a comprehensive plan results. This does guarantee some coordination between the different policies, but at the same time there is little coordination between the different line ministries.

There is as yet little cooperation between technology and environmental policymaking. However, the new law on promoting cleaner production contains several articles that, on paper at least, seem to provide incentives for innovative, environmentally sound technologies.

#### Czech Republic

In the Czech view, sustainable development is only possible if responsibility is shared among the government, manufacturing enterprises and the general public (whose experiences under central planning have stimulated a strong interest in environmental matters). This has resulted in cooperation agreements between the Ministry of Environment, the Confederation of Industry and Transport and the Business Council for Sustainable Development, a comprehensive public information system, a rapidly increasing number of firms with ISO 14000 certification and voluntary agreements to minimize health and environmental impacts in the chemical industry.

Table 1 Examples of coordination, cooperation and coherence efforts in the seven countries

Country	Coordination	Cooperation	Coherence
Chile	CP Agreements	National Cleaner Production Centre; National Innovation System	
China	Industrial policy banning polluting industries, encouraging eco-friendly products; support for environmental service industry	National Cleaner Production Centre; CESST; high-tech development zones	Tenth Five-Year Plan
Czech Republic	Environmental considerations in industrial policy; shared public private responsibility; policy on raw materials reduction and IPPC	Czech Cleaner Production Centre; Project Silesia	State Environmental Policy of 2001, National Strategy for Sustainable Development
Pakistan	Industrial location decisions; consultation on environmental standard setting	Environmental Technology Programme for Industry; sub-sector cleaner production centres for oil and gas and leather	
Tunisia	Five Year Plans address environmental issues; technology policy to consider EST	National Programme for Industrial Upgrading; NCPC; sub-sector extension services	
Turkey	Ministry of Trade and Industry uses EIAs prepared by Ministry of Environment; Ministry of Environment must approve industrial estates to be established by MIT	Joint training programs; cooperative research programme for cleaner technology	8 <sup>th</sup> Five Year Development Plan (2001-05)
Zimbabwe	Municipal by-laws; Reform Water Act for environmental protection and economic efficiency	NCPC and related projects	



The State Environmental Policy of 1995 is based on the concept of sustainable development. The industrial sector's contribution, according to the policy, would consist in incorporating environmental considerations in strategies and business plans, moving into higher value-added products and large-scale introduction of technologies that minimize pollution and resource use.

The Ministry of Industry and Trade and the Ministry of Environment have jointly prepared a raw material policy, which intends to optimize the contribution of domestic resources to the economy while minimizing resource requirements through recycling and technological advances, thereby safeguarding the environment.

Although the industrial research base was eroded during the 1990s, the research programs of individual ministries supported technology development, including EST, through grants during the period. The National Research and Development Policy (2000) seeks to reverse the lack of financial support in the forthcoming decade. With significant input from the Ministry of Environment, it identified several research and development priorities for solving environmental problems.

#### Pakistan

The Eighth Five Year Development Plan (1993-1998) incorporated salient features of the NCS. The Plan called for broad utilization of environmentally sound process technology. It recognized that improper industrial location was damaging productive land and that much of this damage could be avoided by locating industrial facilities in properly planned estates and zones. Unfortunately, little has been done to implement these proposals.

The NCS acknowledged that environmental regulation needed to take account of economic impacts on industry in its proposals for more stringent effluent and emission standards. It proposed alternative locations in cases where the effective imposition of penalties would either render industries non-competitive or make the provision of subsidies too costly. The PEP-Act 1997 called for revised national environmental quality standards in full consultation with the private sector.

A major element of the 1993 National Technology Policy is the promotion of technologies for environmental sustainability. Fiscal incentives have been suggested for import of ESTs. In addition, while the technology drive is primarily the responsibility of the Ministry of Science and Technology, the mandate of the Ministry of Environment, Urban Affairs, Forestry and Wildlife gives the Ministry a role in the adoption of environmental technologies by the industrial sector.

#### Tunisia

The Eighth (1992-1996), Ninth (1997-2001) and Tenth (2002-2006) Five Year Socio-economic Development Plans address environmental issues. However, environmental considerations are not yet an integral element of industrial policy and efforts to promote coordination between the industrial and environmental ministries are relatively recent.

Technology policy and programs recognize the need to consider EST. The Ministry for Higher Education, Scientific Research and Technology aims to boost R&D and technology in every sector of the economy, including the uptake of EST. The national sectoral support centres offer services aimed at improving production processes through waste minimization and pollution control programs and better environmental management at the enterprise level.

### Turkey

Mandated coordination of policies among ministries is very limited in Turkey, which makes two efforts particularly worth mentioning. One of them is environmental impact assessment of new manufacturing firms. Before the Ministry of Trade and Industry approves the location and operation of an enterprise, an EIA report is required. The Ministry of Environment is responsible for monitoring industrial facilities for which such a report is submitted. The second effort is the establishment of industrial districts by the Ministry of Industry and Trade. These industrial districts are generally organized for SMEs in specific sub-sectors, such as textiles and leather, and are located outside urban areas. The Ministry of Environment must approve the establishment and location of these districts. These districts, particularly the ones established in the 1990s, after the creation of the Ministry, have centralized wastewater treatment facilities.

### Zimbabwe

Neither the 1990-1995 Economic Structural Adjustment Programme (ESAP) nor the Zimbabwe Programme for Economic and Social Transformation (ZIMPREST) make any reference to environmental issues, in spite of the opportunity to incorporate elements of the NCS prepared in 1989. The new science and technology policy includes a provision for R&D funding of cleaner technologies, but it is unclear how and when this policy will be implemented.

The current environmental laws do not require taking economic considerations into account in enforcing regulations, but for the most part this makes little difference as the environmental regulations at the national level are poorly enforced and fines imposed on violators are too low to be a deterrent. It should be noted however that municipal by-laws are well enforced and industry is often under pressure to reduce pollution, as evidenced by the demand for cleaner technologies from the SMEs. The objectives of the Reformed Water Act, for example, are to promote both environmental protection and economic efficiency, and the use of economic incentives and penalties is one of the cornerstones of the Act.

## 2.2 Programme and project cooperation

### Chile

Since the announcement of the 1997 Clean Production Policy, there has been a significant increase in the number of projects and initiatives aimed at minimizing pollution by companies, technology institutes and universities. From 1997 to 2000, solely through FONTEC, the number of projects funded rose by 130 per cent and the total sum of subsidies by the fund increased by 100 per cent.

The Clean Production Centre in the National Corporation for Technological Innovation (INTEC) is focused primarily on the elaboration of sub-sector technical guidelines for process and product improvements. It also provides cleaner production (CP) advisory services to SMEs. INTEC was funded by a loan from the Inter-American Development Bank and is now being incorporated into Fundacion Chile, a publicly funded development agency.

### China

An institutional network for CP has been formed through multilateral and bilateral support programs and the recently approved Cleaner Production Law. UNIDO and

UNEP, for example, jointly supported the then National Environmental Protection Agency to establish a National Cleaner Production Centre in 1993. The Asian Development Bank (ADB) provided technical assistance for the Ministry of Science and Technology (MOST) to set up a Centre for Environmentally Sound Technology Transfer (CESTT). More than two-thirds of the provinces have launched or plan to launch CP initiatives and enterprises in over ten industrial sectors have conducted pilot CP projects.

China has established 53 high technology development zones (HTDZ) as growth poles for technological innovation and diffusion. These HTDZs are widely distributed. The Urumqi HTDV in Xinjiang Autonomous Region has focused on the development of renewable energy resources and products based on local raw materials.

#### Czech Republic

The Czech Cleaner Production Centre, set up with UNIDO/UNEP support, is active in promoting cleaner production in the industrial sector. Major stimuli for more innovative approaches in this field may be expected in the near future from the Integrated Prevention and Pollution Control Act, which follows EU directives: this will put pressure on many firms to adopt the best available techniques.

Project Silesia was an international environmental project for the heavily polluted industrial region (Ostrava) that straddles the Polish and Czech borders. The project recognized the importance of negotiating solutions for resolving environmental conflicts and worked closely with coke producers to identify the most cost-effective measures for pollutant reduction.

The Ministry of Industry and Trade approved several EST projects in its sectoral operation plan for industry for 2001.

#### Pakistan

The Environmental Technology Programme for Industry (ETPI), a joint project of the Federation of Pakistan Chambers of Commerce and the Government of the Netherlands, supports CP and pollution control in many industrial sectors by working with local Chambers of Commerce and Industry and industry associations. One plant in each sub-sector is provided with technical support that identifies appropriate cleaner process and pollution control, but it must fund implementation of the measures itself. The experience is then to be shared with other plants, but this has proven to be difficult.

In addition the Government of Norway is supporting a CP centre for the leather sub-sector in Sialkot and UNIDO is supporting a CP centre for the oil and gas sub-sector in Rawalpindi.

#### Tunisia

The most important programme for achieving industrial objectives set by the Government is the National Programme for Industry Upgrading (Programme de Mise à Niveau - PMN), launched in 1996. The programme, implemented by the Tunisian Ministry of Industry, aims at raising the performance and competitiveness of key industries to an international level. The programme's diagnostic service includes assessment raw material utilization. Under this programme, 4000 manufacturing enterprises (out of a total of 9300) are targeted for measures to consolidate their strengths and alleviate their weaknesses.

The introduction of cleaner technologies has been supported by multilateral and bilateral aid over the past decade. From 1994-1997, USAID provided training on this subject to hundreds of industry representatives, consulting engineers and engineering

students. Subsequently, UNIDO and UNEP supported the transformation of CITET into a national cleaner production centre.

The technical centres for leather and mechanical and electrical engineering have initiated environmental management programs at the enterprise level as part of their technical extension service.

#### Turkey

Chambers of industry, the Union of Chambers of Commerce and Industry, universities, and research institutions organize integrated industrial training programs on work safety, environmental management systems and quality assurance. Similar training activities are done through the implementation of the EU-Turkey Business Centres in Izmir, Gaziantep and Kocaeli.

Cooperation can also be observed in establishing treatment plants. The Ministry of Environment and a few industrial sectors signed voluntary agreements in the late 1990s. Accordingly, firms in the same sub-sector, such as leather and paper industries, agreed to establish jointly used treatment plants. Due to this initiative, the number of wastewater treatment plants has increased in Turkey.

Another area where cooperation takes place is research and development. The Scientific and Technical Research Council of Turkey cooperated with other actors to finance research and development activities in the field of cleaner production technologies. As funds are very limited, the results are not substantial.

#### Zimbabwe

Over the past decade international donors have funded several CP initiatives. These include the UNIDO/UNEP National Cleaner Production Centre funded by the Netherlands, the Cleaner Technology project funded by Denmark and the Environmentally Conscious Manufacturing Project funded by Germany. All projects have demonstrated, in a limited number of factories, the potential for securing environmental and economic benefits from waste minimization efforts. They have also trained national experts and proposed policy changes.

### 2.3 Coherence

#### China

The Tenth Five Year Plan (2000-2005) recognizes the importance of implementing a strategy of sustainable development. It concentrates on industrial restructuring to achieve economic goals and to reduce pollution problems. It recognizes the need for simultaneously pursuing economic and social development particularly in the Western Region and enhancing traditional industries with new and advanced technologies. It calls for intensifying construction of water conservation, transportation, energy and other infrastructure facilities to reduce resource consumption.

#### Czech Republic

The State Environmental Policy of 2001 takes sustainable development as its starting point. This policy shows that the Ministry of Environment recognizes the importance of integrating environmental decisions into economic development rather than being a stand-alone programme.

The industrial development goals of the National Strategy for Sustainable Development, yet to be approved by the Government are: (i) contributing to high

employment and the long-term prosperity of all of citizens; (ii) minimizing negative impacts on human health and the environment, keeping social and economic considerations in mind; (iii) strengthening the competitiveness of the sector in EU and global markets, and gradually achieving the competitive levels of the most advanced EU countries; and (iv) assigning priority to eco-effective solutions.

#### Turkey

The Eighth Five-Year Development Plan (2001-2005) calls for integration of industrial, environmental and technology policies in the preparation of the National Environment Strategy and Action Plan. This plan is expected to start collaborative decision-making across ministries. In addition to the Five-Year Development Plan, the Turkish government announced its own National Programme for the adoption of the EU acquis in 2001, which has a special chapter on the environment aiming to harmonize Turkish and EU environmental legislation. This will help Turkey to build a sustainable development strategy by improving enforcement of existing legislation, integrating environmental concerns into other policies, encouraging the market to work for the environment, empowering citizens and changing behaviour and land-use planning.

### 4. APPRAISING COUNTRY EFFORTS

As discussed in the introduction, there are two complementary approaches for appraising country efforts to enhance the positive contribution of industry to sustainable development. The first approach assesses the relative effectiveness of the industrial, environmental and technology policy domains. The second approach looks at the actual changes in the impacts of industry on sustainable development between 1990 and 2000. It does so by drawing on a limited number of economic, social and environmental variables.

#### 3.1 Policy Effectiveness

The effectiveness of the industrial policies of the seven countries is assessed based on their standing among 87 countries on the competitive industrial performance (CIP) index (Table 2). According to Lall and Albaladejo (2002), there are five country groupings according to 'natural breaks' in the final performance index; these are high, medium-high, medium-low, low and very low. The rank order and index numbers for the seven countries reviewed in this article are listed in Table 2. Three of the countries we include fall into the medium-high grouping (Czech Republic, China and Turkey); three into the medium-low grouping (Tunisia, Chile and Zimbabwe) and one into the low grouping (Pakistan).

The effectiveness of environmental policies of the seven countries is based on one their standing among 64 countries on the environmental effort (EE) index. We rather arbitrarily divide the countries into four groups —high, medium-high medium-low and low. The rank order and index numbers for the seven countries reviewed in this article are listed in Table 2. Four countries fall into the medium-high effectiveness group (Czech Republic, Turkey, Chile and Tunisia), two countries into the medium-low effectiveness group (Pakistan and China), and one country into the low effectiveness group (Zimbabwe).

The effectiveness of the technology policy of the seven countries is assessed based on their relative ranking based on the technology effort (TE) index. According to Lall and Albaladjo (2002), countries can be divided into four groups—technology leaders, moderate technology activity, low technology activity and no significant technology activity. The rank order and index numbers are included in Table 2. One country falls into the moderate technology activity group (Czech Republic), four fall into the low technology activity group (Chile, Turkey, China and Tunisia) and two into the no significant activity group (Pakistan and Zimbabwe).

Table 2. Assessment of Policy Effectiveness

Industrial performance			Environmental Effectiveness			Technology Effort		
Rank	Country	1998	Rank	Country	2002	Rank	Country	1988
		Index			Index			Index
24	Czech Rep	0.243	24	Czech Rep	0.984	26	Czech Republic	0.2000
37	China	0.126	26	Turkey	0.9642	36	Chile	0.0047
39	Turkey	0.108	28	Chile	0.9462	39	Turkey	0.0029
45	Tunisia	0.068	40	Tunisia	0.8849	48	China	0.0006
47	Chile	0.056	46	Pakistan	0.8543	61	Tunisia	0.0002
51	Zimbabwe	0.052	49	China	0.8849	68	Pakistan	0.0000
60	Pakistan	0.031	56	Zimbabwe	0.7454	87	Zimbabwe	0.0000

An over-all comparison of the effectiveness of three policy domains in the seven countries suggests some country groupings. First two countries, the Czech Republic and Turkey have relatively high effectiveness rankings for all three-policy domains, which indicates that there exist comparatively strong stimuli for industry to contribute positively to sustainable development. Second, two countries, Pakistan and Zimbabwe, rank relatively low among the seven countries, which indicates that there exists only weak or no policy stimuli for industry to contribute positively to sustainable development. Third, three countries, Chile, China and Tunisia, have mixed ranking, sometimes similar to the countries with a higher ranking and in one case (China on environmental performance) similar to those countries with a lower ranking.

#### 4.2 Impacts of Industry on Sustainable Development

The second approach, drawing almost exclusively on consistent, globally available quantitative data, shows trends in key industry-relevant indicators for the seven countries over the period 1990 to 2000. Table 3 gives an overview of the most important figures.

Comparing their positions in 1990 and 2000, the industrial sectors in two countries, China and the Czech Republic, clearly made remarkable progress towards sustainable development. The industrial sectors in another three countries, Chile, Tunisia

and Turkey, had moderate positive impacts on sustainable development, with some considerable differences among the countries. Lastly, the industrial sectors in two countries, Pakistan and Zimbabwe, contributed only in a limited way to sustainable development because of major macro economic problems and political instability.

The impacts of China's industrial sector were remarkable in all three dimensions of sustainability. MVA growth and export performance were exceptional among all developing countries, MVA per capita increased by 400 per cent and the share medium and high-tech goods in merchandise exports increased by 32.5 per cent. Its performance in social terms is difficult to assess in the absence of ILO data for the manufacturing sector, but Chinese data show impressive increases in the work force in the TVE sector. Global environmental data showed a relatively modest increase in CO<sub>2</sub> emissions and a significant decrease in discharge of BOD effluents. Compliance with environmental norms by industry improved as a result of a more aggressive and multi-faceted regulatory programme. Plant closures, both large and small, clearly contributed to the reduction in pollutant loadings.

The impacts of the Czech Republic's industrial sector were remarkable for all three dimensions of sustainability, but in ways different from China. Industrial output at the end of a difficult transition to the market economy was the same as before the transition, MVA per capita remained among the highest among the transition economies and medium- and high-technology goods constituted a high percentage of merchandise exports. The sector lost many jobs during restructuring, but remains an important employer, partly due to SME growth; the sector held on to most of the gains in female employment. Global (CO<sub>2</sub>) and national (BOD) environmental data showed a decrease in most pollutants; the industrial environmental management effort is given a high mark because it was comprehensive and achieved results. To some extent, however, the progress was due to the closure of many pollution intensive plants.

Table 3. Trends in industry's impacts on sustainable development in the seven countries

Country	% MVA change 1990 -2000	MVA in 2000 (US\$ million)	% Change MVA/GDP 1990 - 2000	% MVA per capita change 1990-2000	MVA per capita in 2000 (constant US\$)	% Mfg. export change 1990- 2000
Chile	60	11 700	-3.7	36	775	5
China	250	382 110	1.7	410	509	16.6
Czech Rep.	9	9 360	0.2	10	911	-
Pakistan	46	10 360	-2.3	14	75	6
Tunisia	70	4 390	1.3	45	459	8
Turkey	55	38 660	-4.5	33	592	13.4
Zimbabwe	-9	1 290	-7	-26	102	2.8
Country	% Mfg. goods in exports in 2000	% Change in med/high tech goods 1985 -1998	% Med/high tech in 1998	% Change mfg. employment 1990-2000	Mfg. employment in 2000 (thousands)	% Change mfg. employment as % total employment
Chile	16.2	3.9	6.3	5.3	754	-2.1
China	88.2	32.5	36.6	-9	80 430	-2.5
Czech Rep.	88.3	-	51.9	-16	1 196	-2.8
Pakistan	84.7	1.3	9.2	-5	3 579	-2.7
Tunisia	77	0.5	15.5	-	-	-
Turkey (1999)	81.2	5.3	23.5	5	3 117	-0.7
Zimbabwe	28.1	-3.4	15.3	2	1 316	-1.2
Country	Mfg. employment as % total employment 2000	% Female employment in 1990 and 2000	% Change in CO <sub>2</sub> emissions	% Change in BOD effluents <sup>1</sup>	% Change in MVA produced by highly polluting sub-sectors	Industrial environmental management effort <sup>2</sup>
Chile	14	25.2 and 26.8	50	9	-4.6	3
China	11.3	-	18	-12	1.6	2
Czech Rep.	25.2	42.1 and 39.9	-56	-25	-	1
Pakistan	10	12.2 and 12.3	25	-8	1.2	4
Tunisia	-	-	15	7	-19.7	3
Turkey	14.1	20.1 and 20.5	30	-4	-4.7	3
Zimbabwe	15.3	6.9 and 8.6	-50	-28	0.5	4



<sup>1</sup> BOD data from World Development Indicators (World Bank, 2004) for the years 1990 and 2000 except for Pakistan and Zimbabwe (1990-1996) and for Czech Republic for which there are no data after 1993. In this case the data were data from the country report.

<sup>2</sup> The score is subjective. It is based on a country's effort to monitor industrial discharges and to enforce environmental regulations. The government commitment to undertake these activities is significantly influenced by the industrial sector.

Sources: UNIDO (2003a and b) for economic data; ILO for employment data; IEA for CO<sub>2</sub> and WDI for BOD.

The impacts of Chile's industrial sector place it within the grouping of three countries with moderate performance. MVA increased more than in the other two countries and MVA per capita moved from below to above the regional average for Latin America. However, its performance was below that of the other two countries in terms of increasing manufactured exports, manufactured goods in total exports and medium- and high-technology goods in merchandise exports. Manufacturing employment as a percentage of total employment was comparable to Turkey. Female workers constituted a significant portion of the labour force in manufacturing and their participation increased during the 1990s. Increases in CO<sub>2</sub> and BOD pollutant loadings were the highest among the seven countries. The government's commitment to industrial environmental management is classified as moderate because – with some notable exceptions - there was no comprehensive monitoring of industrial pollutants or systematic attempt to bring industry into compliance with environmental norms.

The impacts of Tunisia's industrial sector place it in the grouping of three countries with moderate performance. It might even stand out within this grouping if global data on employment were available to assess social (employment) changes. MVA increased significantly (more than in Turkey), MVA per capita at the end of the time period was above the regional average and growth of manufactured goods was impressive except for the relatively small percentage of medium- and high-technology goods in merchandise exports. The industrial sector's social impact cannot be compared to other countries in the absence of ILO data, but national data indicate that employment in manufacturing increased significantly during the Ninth Five-Year plan (1997-2001). Environmentally, global data showed a modest increase in CO<sub>2</sub> emissions and a relatively high percentage increase in BOD effluent. The government's commitment to industrial environmental management is ranked as moderate. Monitoring of industrial pollutants and enforcement of environmental standards are insufficient. Environmental considerations are not adequately integrated into the major national programme for industrial upgrading.

The impacts of Turkey's industrial sector also place it in the grouping of three countries with moderate performance. It stands out within the grouping because of its achievements in all three categories of sustainability. MVA and MVA per capita increased significantly, MVA per capita was higher than the regional average for West Asia, manufactured exports grew rapidly and medium- and high-technology goods constituted a significant share of exports. The labour force in the manufacturing sector increased, although the share of manufacturing in total employment decreased slightly.

The participation of females in the manufacturing work force was high compared to other countries. CO<sub>2</sub> and BOD discharges increased modestly. The government's commitment to industrial environmental management is characterized as moderate because it sporadically monitors industrial pollutant discharges and has required the installation of pollution control technology at least for all new industrial estates.

The impacts of Pakistan's industrial sector on sustainable development were limited. MVA increased, but less than in the developing economies mentioned above and in other countries in South Asia. MVA per capita increased only slightly. Exports of manufactured goods increased only moderately and were dependent primarily on one sub-sector (textiles and garments). Also, both the percentage change in and absolute value of the share of medium- and high-technology goods in merchandise exports were limited. Employment in the industrial sector declined and accounted for only a low percentage of total employment. Female workers constituted only a small percentage of the labour force in manufacturing during the 1990s. CO<sub>2</sub> emissions increased whereas BOD effluent may have decreased significantly (latest data were for 1996). The government's commitment to industrial environmental management is considered to be limited: it only started an industrial environmental monitoring effort in 2000 and only a few firms have been required to install pollution control equipment.

The impacts of Zimbabwe's industrial sector on sustainable development were limited due to a great extent to the political and overall economic situation. MVA and MVA per capita declined. Exports of manufactured goods increased only slightly, but manufactured exports constituted a reasonable share of total exports; the share of medium- and high-technology goods seems high, but there will be few high-tech goods in this category. Manufacturing employment increased and manufacturing employment as a percentage of total employment was high compared to other countries in the Sub-Saharan African region. The participation of female workers in manufacturing, while low compared to other four countries for which ILO data are available, improved during the 1990s. CO<sub>2</sub> emissions and BOD effluents decreased, most likely due to the contraction in economic activity. The government's commitment to industrial environmental management is characterized as limited: it relied mainly on donor-developed projects to bring about industrial compliance with environmental norms.

## 5. CONCLUSIONS

This paper has shown that, with regard to the policy integration needed to enhance the contribution of industry to sustainable development, the seven countries did not make great advances in the 1990s.<sup>vii</sup> The countries undertook only a limited number of efforts, summarized in Table 1 and briefly described below, to coordinate policy domains and to implement cooperative programs and projects. Only three countries made tentative efforts to find convergence among policies in support of sustainable development and none of these countries systematically attempted to formulate a sufficient number of coordination and cooperative measures or to align the existing ones in support of a coherent vision for sustainable development. With regard to the effectiveness of policy domains, two countries appear to have relatively effective policy domains and two countries appear to have relatively ineffective policy domains. With regard to the actual

contribution of industry to sustainable development, there were only two countries - China and the Czech Republic – where industry made substantial positive contributions to socio-economic development while its potential adverse impact on the environment was reduced.

The country reports identified specific coordination efforts between industrial (and industry associations) and environmental ministries, most notably in China, the Czech Republic and Turkey. Even these efforts might be questioned because the authors of all three reports stated that there is either insufficient or minimal coordination among ministries. The Chinese report for example characterizes cooperation between the relevant ministries and leading government agencies as weak and awareness of sustainability issues among government employees as low.

Most of the country reports identified two types of cooperative programs and projects. One program is the establishment of CP centers, whose mission is to assist firms in reducing pollutant discharge in ways that generate financial benefits. National Cleaner Production Centres associated with UNIDO/UNEP provide CP advice to SMEs in China, the Czech Republic, Tunisia and Zimbabwe. A CP centre supported by the Government operates in Chile and sub-sector CP centres supported by various donors operate in Pakistan. The other programme is industrial extension services, whose primary mission is to enhance firm level productivity. Their technical advice normally addresses resource use and pollution prevention and control issues. The National Program for Industrial Upgrading in Tunisia appears to be the most comprehensive program of this type among the seven countries. Industrial extension services in China, Chile and Turkey offer technical assistance, which includes an environmental component.

Only three country reports identified on-going efforts that could be classified as steps towards policy coherence in support of sustainable development. The more recent industrial development policies of China include measures that support environmental goals, and the environmental policies include industrial restructuring as a complement to traditional environmental management measures. The State Environmental Policy of 2001 and the National Strategy for Sustainable Development in the Czech Republic, attempt to combine industrial and environmental policies to achieve a broader objective. The National Strategy is the most comprehensive, but it still has to be approved by the Government. The Eighth Five Year Development Plan (2001-05) of Turkey promises to combine industrial and environmental policies into a complementary effort to meet common objectives, but this has yet to happen. However, in none of these three countries is there a reasonably complete set of internally consistent cooperation and coordination measures supportive of the emerging national visions for sustainable development.

An overall comparison of the effectiveness of three policy domains in the seven countries suggests some country groupings. First two countries, the Czech Republic and Turkey, are highly ranked among the seven countries for all three-policy domains, which indicate that there exist strong positive stimuli for industry to contribute positively to sustainable development. Second, two countries, Pakistan and Zimbabwe, are lowly ranked among the seven countries, which indicates that there are only weak policy stimuli for industry to contribute positively to sustainable development. Third, three countries, Chile, China and Tunisia, have mixed rankings, sometimes similar to the countries with higher rankings and in one case (China on environmental performance) similar to those countries with lower rankings. The latter case, the process indicator for China's

environmental performance, contradicts the outcome indicator described in the following paragraph, which only goes to illustrate the limitations of the proposed process measures.

Comparing their positions in 1990 and 2000, the industrial sectors in two countries, China and the Czech Republic, clearly made positive contributions to sustainable development, i.e., adding significantly to economic and social development and reducing the discharge of industrial pollutants. The industrial sectors in another three countries, Chile, Tunisia and Turkey, had moderate positive impacts on sustainable development, with some considerable differences among the countries. Lastly, the industrial sectors in two countries, Pakistan and Zimbabwe, contributed only in a limited way to sustainable development because of major macro economic problems and political instability.

A comparison of the policy domains and the measures of country success suggests that there is to some correspondence between those countries with the more complete and consistent policy domains and those where industry made the greater contribution to sustainable development in the 1990s. Three countries (China, Czech Republic and Turkey) have put in place the more comprehensive policy domains for pursuit sustainable development. Two of these countries (Czech Republic and Turkey) have relatively more effective policy domains and the third (China) is certainly effective in terms of industrial development policy. Two of these countries (China and Czech Republic) have experienced the greatest positive impact of industry on sustainable development and the third (Turkey) has experienced a reasonably positive impact of industry on sustainable development.

This finding adds support to the argument put forward by Carley and Christie (2000) and others that the best summary reason for the failure to achieve sustainable development is the failure of governments to carry out their basic role, which is to support the process of designing and implementing sustainable development strategies. The process of sustainable development strategy formulation (appropriate policies and programs) must precede the product. The product, defined in scientific and economic terms, is not yet known. One essential step that must be made to achieve this is to improve the awareness and know-how about sustainability issues within ministries and government think tanks and coordination among them. Additionally, policies for sustainable development should not only have clear long-term objectives; there should also be a program for achieving those objectives in measurable short and medium term-steps which ensure coordination and cooperation among the relatively participants.

More specifically government support for the process of sustainable development requires institutional arrangements that can accomplish three tasks:

- Generate information about the positive and negative aspects of the industrial sector;
- Involve the industrial sector in the preparation of a sustainable development strategies; and
- Design and implement a sufficient number of coordination and program measures to move towards a shared vision of sustainable development.

For the most part government support for these tasks is lacking in the seven countries reviewed in this article as well as the other 11 countries that were included in the survey

on industry and sustainable development planning in transition and developing economies (Luken, 2005).

## REFERENCES

- Ali C, Hesp P, Luken R, Robinson A. 2003. Pakistan. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA; 118-143.
- Angel D, Rock M. 2001. *Policy Integration: Environment and Development in Asia*. Paper written with support from the United States Asia Environmental Partnership, Washington.
- Carley M, Christie I. 2000. *Managing Sustainable Development*, Earthscan: London, UK and Sterling, USA.
- Center for International Earth Science Information Network. 2002. *Environmental Sustainability Index*, [www.ceisin.columbia.edu](http://www.ceisin.columbia.edu) [6 October 2004]
- Cetindamar D, Erer S. 2003. Turkey. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA; 165-190.
- Dalal-Clayton B, Swiderska K, Bass S (eds). 2002. *Stakeholder Dialogues on Sustainable Development Strategies: Lessons, Opportunities and Developing Country Case Studies*. International Institute for Environment and Development: London.
- Dodgson M. 2000. Policies for Science, Technology and Innovation in Asian Newly Industrializing Economies. In Linsu K, Nelson RR (eds). *Technology, Learning and Innovation*. Cambridge University Press: Cambridge, UK; 229-268.
- Gomez S, Guarjena R. 2003. Zimbabwe. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA; 165-190.
- Hettige H, Huq M, Pargal S, Wheeler D. 1996. Determinants of Pollution Abatement in Developing Countries: Evidence from South and Southeast Asia. *World Development*, vol. 24, (Issue No. 12): 1891-1904.
- IEA. 2002. *Energy Statistics of Non-OECD Countries 1999-2002*. IEA: Paris.
- ILO. 2000. *Yearbook of Labour Statistics*. ILO: Geneva.

- ILO. 2002. *Yearbook of Labour Statistics*. ILO: Geneva.
- ILO. 2003. *Yearbook of Labour Statistics*. ILO: Geneva.
- Kaufmann D, Kraay A, Zodio-Lobaton P. 1999. *Governance Matters*. Policy Research Working Paper No. 2196. World Bank: Washington.
- Kovanda J, Moldan B. 2003. The Czech Republic. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham, UK and Northampton, USA; 77-117.
- Lafferty W, Meadowcraft J (eds). 2000. *Implementing Sustainable Development Strategies and Initiatives in High Consumption Societies*. Oxford University Press: Oxford, UK.
- Lall S, Albaladejo M. 2002. *Indicators of the Relative Importance of IPRs in Developing Countries*. Working Paper 85, QEH Working Paper Series, Oxford.  
<http://www.qeh.ox.ac.uk/pdf/qehwp/qehwps85.pdf> [6 October 2004]
- Luken R, Alvarez J, Hesp P (eds). 2002. *Developing Countries' Industrial Source Book*. First Edition. V.01-89605. UNIDO: Vienna. [www.unido.org/wssd](http://www.unido.org/wssd). [6 October 2004]
- Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA.
- Luken R. 2005. Where is Industry in Sustainable Development Planning? *Sustainable Development*, forthcoming.
- Nafti R, Van Oyen L. 2003. Tunisia. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA.
- OECD. 1997. *Reforming Environmental Regulation in OECD Countries*. OECD: Paris.
- OECD. 2001. *The DAC Guidelines: Strategies for Sustainable Development: Practical Guide for Development Cooperation*. OECD: Paris.
- OECD/UNDP. 2002. *Sustainable Development Strategies: A Resource Book*. OECD and UNDP: Paris and New York.
- Sercovich F et al. 1999. *Competitiveness and the World Economy*. Edward Elgar: Cheltenham UK and Northampton, USA.
- UN. 2002. *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August - 4 September 2002*. UN: New York.

www.johanneburgsummit.org [6 October 2004]

UNDESA. 2001. *Indicators of Sustainable Development: Guidelines and Methodologies*. UNDESA: New York. www.un.org/esa/sustdev/isd [6 October 2004]

UNDESA. 2002a. *Report of an Expert Forum on National Strategies for Sustainable Development*. Meeting held in Accra, Ghana, 2001. UNDESA: New York. www.johanneburgsummit.org [6 October 2004]

UNDESA. 2002b. *Guidance in Preparing a National Sustainable Development Strategy: Managing Sustainable Development in the New Millennium*. Background Paper No. 13. UNDESA: New York. www.johannesburgsummit.org [6 October 2004]

UNIDO. 1999. *Industry in Development: Why it Matters—Wherefore it Suffers—What it Needs*. Statistics and Information Networks Branch, UNIDO: Vienna. p49.

UNIDO. 2002. *Industrial Development Report 2002/2003: Competing through Innovation and Learning*, UNIDO: Vienna.

UNIDO. 2003a. *International Yearbook of Industrial Statistics*. Edward Elgar: Cheltenham, UK and Northampton, USA.

UNIDO. 2003b. *Industrial Statistics Database*. UNIDO: Vienna.

Urzua O, Alvarez-Arenas J. 2003. Chile. In Luken R Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA; 19-42.

Wang H, van der Tak C. 2003. China. In Luken R, Hesp P (eds). 2003. *Sustainable Development and Industry? Reports from Seven Developing and Transition Economies*. Edward Elgar: Cheltenham UK and Northampton, USA; 43-75.

World Bank. 2002. *World Development Indicators 2002*. World Bank: Washington.

## Annex One

### Industrial Performance Index

Rank	Country	Index	Rank	Country	Index
1	Singapore	0.883	44	Russian Fed	0.077
2	Switzerland	0.751	45	Tunisia	0.068
3	Ireland	0.739	46	Venezuela	0.06
4	Japan	0.696	47	Chile	0.056
5	Germany	0.632	48	Guatemala	0.056
6	US	0.564	49	India	0.054
7	Sweden	0.562	50	Indonesia	0.054
8	Finland	0.538	51	Zimbabwe	0.052
9	Belgium	0.495	52	El Salvador	0.051
10	UK	0.473	53	Morocco	0.048
11	France	0.465	54	S Arabia	0.047
12	Austria	0.453	55	Colombia	0.041
13	Denmark	0.443	56	Mauritius	0.041
14	Netherlands	0.429	57	Egypt	0.038
15	Taiwan	0.412	58	Peru	0.035
16	Canada	0.407	59	Oman	0.032
17	Italy	0.384	60	Pakistan	0.031
18	S Korea	0.37	61	Ecuador	0.025
19	Spain	0.319	62	Kenya	0.025
20	Israel	0.301	63	Jordan	0.024
21	Norway	0.301	64	Honduras	0.023
22	Malaysia	0.278	65	Jamaica	0.022
23	Mexico	0.246	66	Panama	0.022
24	Czech Rep	0.243	67	Albania	0.021
25	Philippines	0.241	68	Bolivia	0.021



26	Portugal	0.24	69	Nicaragua	0.017
27	Hungary	0.239	70	S Lanka	0.017
28	Slovenia	0.221	71	Paraguay	0.015
29	Australia	0.211	72	Mozambique	0.013
30	H Kong	0.204	73	Bangladesh	0.011
31	N Zealand	0.186	74	Algeria	0.009
32	Thailand	0.172	75	Cameroon	0.008
33	Brazil	0.149	76	Senegal	0.008
34	Poland	0.143	77	Zambia	0.007
35	Argentina	0.14	78	Nepal	0.006
36	C Rica	0.129	79	Nigeria	0.006
37	China	0.126	80	Tanzania	0.005
38	S Africa	0.108	81	CAR	0.003
39	Turkey	0.108	82	Madagascar	0.003
40	Greece	0.102	83	Malawi	0.003
41	Romania	0.095	84	Uganda	0.003
42	Bahrain	0.089	85	Ghana	0.001
43	Uruguay	0.087	86	Yemen	0.001
			87	Ethiopia	0

#### Technology Effort index

Rank	Country	Index	Rank	Country	Index
1	Japan	0.8649	44	Saudi Arabia	0.0009
2	Switzerland	0.7858	45	Ecuador	0.0009
3	USA	0.7709	46	Panama	0.0008
4	Sweden	0.5957	47	Jordan	0.0008
5	Germany	0.4151	48	China	0.0006
6	Finland	0.4099	49	Jamaica	0.0006

7	Denmark	0.3434 50	Philippines	0.0006
8	Taiwan	0.3173 51	Indonesia	0.0005
9	Netherlands	0.2743 52	Thailand	0.0005
10	France	0.2716 53	Colombia	0.0004
11	Israel	0.2712 54	India	0.0004
12	Belgium	0.2645 55	Guatemala	0.0003
13	Canada	0.2488 56	Honduras	0.0003
14	Norway	0.2344 57	Sri Lanka	0.0002
15	S Korea	0.2225 58	Bolivia	0.0002
16	Austria	0.2022 59	Mauritius	0.0002
17	UK	0.1926 60	Morocco	0.0002
18	Singapore	0.1738 61	Tunisia	0.0002
19	Australia	0.1470 62	Egypt, Arab Rep.	0.0001
20	Ireland	0.1191 63	Peru	0.0001
21	Italy	0.0986 64	Algeria	0.0001
22	N Zealand	0.0835 65	Nicaragua	0.0001
23	H Kong	0.0829 66	Kenya	0.0001
24	Slovenia	0.0541 67	Nigeria	0.0000
25	Spain	0.0431 68	Pakistan	0.0000
26	Czech Republic	0.0200 69	Albania	0.0000
27	Hungary	0.0135 70	Bangladesh	0.0000
28	S Africa	0.0121 71	Cameroon	0.0000
29	Greece	0.0103 72	CAR	0.0000
30	Portugal	0.0096 73	El Salvador	0.0000
31	Brazil	0.0087 74	Ethiopia	0.0000
32	Argentina	0.0067 75	Ghana	0.0000
33	Malaysia	0.0065 76	Madagascar	0.0000
34	Russian Federation	0.0062 77	Malawi	0.0000
35	Poland	0.0055 78	Mozambique	0.0000
36	Chile	0.0047 79	Nepal	0.0000

37	C Rica	0.0041 80	Oman	0.0000
38	Venezuela	0.0033 81	Paraguay	0.0000
39	Turkey	0.0029 82	Senegal	0.0000
40	Bahrain	0.0024 83	Tanzania	0.0000
41	Mexico	0.0022 84	Uganda	0.0000
42	Uruguay	0.0020 85	Yemen	0.0000
43	Romania	0.0015 86	Zambia	0.0000
			87 Zimbabwe	0.0000

---

<sup>i</sup> Sercovich et al. (1999) point out that:

A distinction needs to be made between industrial policy, which is aimed at changing the sectoral allocation of resources through short-term redistribution measures such as subsidies, import restrictions and credit allocation, on the one hand and industrial development policy, which is aimed at increasing the productivity of resources in the medium- and long-run through capacity building, on the other hand.

<sup>ii</sup> According to Dodgson (2000), science, technology and innovation policies are different in spite of overlaps and blurred boundaries:

Science policy aims at increasing and improving the capacity of nations to create and respond to new scientific opportunities and options, and technology policy aims to develop specific technological resources information technology and biotechnology and infrastructure. By contrast, innovation policy is considered to be those efforts by governments that encourage the accumulation, diffusion and creation of new products, processes and services by firms.

<sup>iii</sup> Similar criteria with slightly different terminology have been put forward by OECD DAC in their description of what most governments do to integrate policies. These are coordination, consistency and more rarely coherence. Most governments, and certainly all of those in the OECD, have institutions and management mechanisms for policy coordination. Officials will have familiarity with the inter-ministerial or inter-agency machinery in which an entity with primary responsibility for a policy decision will bring together others that could be affected by or have an interest in it, to iron out a common position. Such coordination often involves whittling down an original

---

proposal to obtain consensus, in lowest-denominator fashion. Policy consistency has more to do with the design and implementation of policies of several ministries or agencies to support an overall objective, usually defined and articulated at a high political level. Poverty reduction is such an objective. The key idea behind consistency lies in the avoidance of policies that conflict in reaching for the defined goal. Policy coherence aims still higher. It too operates to achieve politically defined goals, but looks beyond the removal of policy contradictions to a more creative enterprise that harnesses all relevant policy actions to enhance the achievement of the objective. It stresses a notion of cumulative value added from the contributions of different policy communities, thus moving beyond mere consistency to a more positive, stronger vision of how objectives can be achieved (OECD/UNDP, 2002) pp.280-281.

<sup>iv</sup> On the basis of their assessment of environmental and development policies in Asia, Angel and Rock (2001 ) concluded that policy coherence is the most cost effective approach to the twin goals of poverty reduction and environmental improvement. They found ‘few good examples of policy integration in action’.

<sup>v</sup> Organic water pollutant discharges are estimate by the World Bank (World Bank, 2002). They are measured in terms of biochemical oxygen demand (BOD), which refers to the amount of oxygen that bacteria will consume in breaking down waste. The measure of BOD effluent comes from an international study of manufacturing effluents from 13 countries (Hettige et al. 1996). An econometric analysis of the plant and subsector level data from the 13 countries found that the ratio of BOD to employee for each industrial subsector is about the same across countries. The estimated BOD loading per employee was multiplied by UNIDO subsector employment estimates to generate subsector effluent discharge by country. The current data are based on updating the original estimates through 1999, providing yearly BOD pollutant loadings data for the period 1980 to 1999.

<sup>vi</sup> The International Institute for Sustainable Development homepage lists approximately 500 national and local indicator efforts ( [www.iisd.org](http://www.iisd.org)). Under the UN Statistics Office, indicator monitoring systems are being set up in many developing countries (see [www.undp.org/mdgs](http://www.undp.org/mdgs)). The Paris 21 group on development cooperation has a Task Team on Improved Statistical Support for Monitoring Development Goals with two projects on the Millennium Declaration indicators system: one on country reports, looking at national data sources and ways of improving national capacities to support the indicators, and the second on international statistics for the indicators and ways of improving harmonization and links to national sources ( [www.paris21.org/htm/TT\\_impmdg.htm](http://www.paris21.org/htm/TT_impmdg.htm)).

<sup>vii</sup> Lafferty and Meadowcraft (2000) state that high consumption societies have also only made limited advances in policy integration in the 1980-1998 timeframe and often the so-called policy integration was superficial. So the difficulties of integration are not those of developing and transition economies (pp.433-5).