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on

Impact of Enhancing Environmental Standards on International Trade of South Asian Countries

Project Report

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Contents

Foreword

The linkages between trade and environmental measures in promoting sustainable development have been a matter of concern for the developing countries especially in the context of WTO. One important concern of the South is the stringent environmental standards put forward by the developed countries. These environmental standards are seen as non- tariff barriers against trade with the developing countries.

In order to study this in detail, RIS launched a project entitled, "The Impact of Enhancing Environmental Standards on International Trade of South Asian Countries" sponsored by the Perez-Guerrero Trust Fund (PGTF) of G-77. The specific objective of the project was to study the effect of increased product based environmental standards adopted by the developed countries on the trade of South Asian economies and also to analyse the nature and composition of environmentally sensitive industries of South Asia. The additional concern was to find out if such industries are migrating from countries having higher environmental standards. The concluding section of the report examines how best external assistance in the region can help in coping up with these pressures.

As is clear from the report, some of the South Asian countries have experienced losses in exports because of difficulties in complying with certain product specific environmental or health related standards in developed countries. The WTO Agreements on Sanitary and Phyto-sanitary (SPS) Measures and Technical barriers to Trade (TBT), through harmonisation of standards, aim to ensure that these standards and regulations do not cause adverse impact on trade. However, due to absence of adequate mechanisms for disseminating procedural information and other details and provisions for substantial financial and technical assistance, these countries have not been able to avoid adverse impact of the environmental standards. Thus, in the context of SPS and TBT measures new initiatives are urgently needed for improving access to information on the constraints faced by the developing countries and also for providing technical and financial assistance in meeting these standards.

The project was conducted by RIS, and a network of researchers and institutions of South Asia.

At RIS, the project was led by Dr. Nagesh Kumar, Deputy Director General, RIS. Dr. Sachin Chaturvedi, Research Associate and Ms. Gunjan Nagpal Research Assistant were members of the team. Shri S. K. Mohanty, Research Associate, RIS and Dr. T. R. Manoharan, Consultant, RIS provided useful inputs in the implementation of the project.

V. R. Panchamukhi
Director General, RIS

ACRONYMS

APTPMA	All Pakistan Textile Processing Mills Association
BIDS	Bangladesh Institute of Development Studies
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CITES	Convention on International Trade in Endangered Species
CREM	Consultancy on Research and Environmental Management
CP	Cleaner Production
EPR	Extended Producer Responsibility
EMS	Environmental Management System
EMAS	Environmental Management & Audit Schemes
EPA	Environment Protection Agency
EPB	Export Promotion Bureau
ESGs	Environmentally Sensitive Goods
EST	Environmentally Sound Technologies
ETBs	Environment Related Trade Barriers
ETPI	Environment Technology Program for Industries
EU	European Union
FPCCI	Federation of Pakistan Chambers of Commerce and Industries
GMO	Genetically Modified Organisms
GPP	Greener Public Purchasing
GSP	General System of Preferences
HACCP	Hazard Analysis Critical Control Point
IISD	International Institute for Sustainable Development
MEAs	Multilateral Environmental Agreements
MRAs	Mutual Recognition Agreements
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
NTM	Non Tariff Measures
OECD	Organization for Economic Cooperation and Development
PEPC	Pakistan Environmental Protection Council
PETF	Provincial Environmental Trust Funds
POPs	Persistent Organic Pollutants
PSMA	Pakistan Sugar Manufacturers Association
PSST	Pakistan Society Of Sugar Technologists
PPPBMA	Pakistan Paper & Pulp Board Manufacturers Association
PTA	Pakistan Tanners Association
PPM	Production and Process Methods
PCP	Pentachlorophenol
PGTF	Perez-Guerrero Trust Fund
PVC	Polyvinyl chloride
RIS	Research and Information System

SDPI	Sustainable Development Policy Institute
SMEs	Small and Medium Enterprises
SIDA	Swedish International Development Agency
SPS	Sanitary and Phyto-Sanitary Measures
TBT	Technical Barriers to Trade
TCP	Tetrachlorophenol
UNEP	United Nations Environment Program
UNCTAD	United Nation Conference on Trade and Development
UNCED	United Nations Conference on Environment and Development

1 Introduction

Nagesh Kumar*
Sachin Chaturvedi**

As the liberalization of tariff and quantitative restrictions on trade in agricultural, food and other products has progressed, there has been an increased concern about the impact of technical measures on the exports of these products. In this regard, one important concern of the South is the stringent environmental standards put forward by the North. The technical standards such as food safety regulations, labeling requirements and quality and compositional standards have proliferated. Though empirical evidence on this, in the literature, is extremely limited, some developing countries have experienced losses in exports because of difficulties to comply with certain sanitary and phyto-sanitary (SPS) measures in the import markets.

WTO Agreements on SPS measures and TBT aim to ensure that these standards and regulations do not cause adverse impacts on trade. Enhancing understanding of constraints faced by the developing countries in meeting the standards set by the developed countries is of key importance in the context of SPS and TBT measures.

The trade impacts of SPS measures can be grouped into three categories. First, they can prohibit trade by imposing trade ban on the product or on the inputs used for its production. Second, they can divert trade from one trading partner to another by laying down regulations that discriminate across potential supplies. Third, they can reduce overall trade flows by increasing costs or raising barriers for all potential suppliers. In certain cases, stricter SPS measures are applied to imports than domestic supplies. Hence, the exports from developing countries lose their competitiveness due to the higher costs they face. Environmental and health related standards and regulations in the developed country markets have the potential to create barriers to trade. The problem has become more complicated as the distinction between environmental, health and quality standards is gradually becoming very blurred. For

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instance, in the food sector what may be described as quality standard for food may also fall in the category of environmental standards. It is now widely believed that these technical measures impede trade of the developing countries, either implicitly or explicitly.

A broader indication of impact of SPS requirements on South Asian exports of agricultural and food products is provided by data on rejections of exports from this region. At present such a data is available only for United States. This data for August 2000 to July 2001 shows the considerable problems that South Asian countries have in meeting basic food hygiene requirements. The table also shows that these countries also have a problem meeting the stringent labeling requirements of United States. More than 15 percent of total agricultural imports from India and Sri Lanka were rejected because of their failure to meet these requirements. Other than that inadequate food additives, presence of pesticide residual and heavy metals and low acid canned foods are commonly cited reasons for contravention.

More sophisticated monitoring and testing facilities, and therefore more costly procedures, are required for meeting these regulations. On top of that, the cost of rejection at the border can be considerable, as it includes loss of product value, transport and other export costs and product re-export or destruction. A number of agricultural products of South Asia are facing SPS related problems. In case of products like peanuts, other nuts and milk, EC has introduced high level of protection by reducing the maximum level of presence of Aflatoxin in these products. The level of protection proposed by EU is substantially higher than that provided under Codex recommendations. In the case of peanuts, the EU argument has been that the risk involved is of persons contracting cancer in a population of one billion. This is extremely unreasonable because EU population is less than one third of a billion. So the level of SPS protection is not in relation to the extent of risk involved.

It was in this context, that RIS launched the project, "The Impact of Enhancing Environmental Standards on International Trade of South Asian Countries" sponsored by the Perez-Guerrero Trust Fund (PGTF) of G-77 aimed to address these issues. The specific objectives of the project was to study the effect of increased product based environmental standards adopted by the developed countries on the trade of South Asian economies to analyse the nature and composition of environmentally sensitive industries of South Asia

with a view to understanding as to whether such industries are migrating from countries having higher environmental standards; and to examine the impact of and scope for external assistance in the region on environmentally sensitive commodities.

The project was being conducted through a network of institutions in South Asia led by RIS. Overall coordination- and national focal point for India was Research and Information System for the Non-Aligned and Other Developing Countries (RIS), New Delhi. Dr Zaid Bakht, Director, Bangladesh Institute of Development Studies (BIDS), Dhaka, coordinated the project for Bangladesh while Dr Shaheen Rafi Khan and her colleagues from Sustainable Development Policy Institute (SDPI) Islamabad worked for Pakistan. In Nepal we had Dr Mohan Manali from Nepal Forum of Environmental Journalist, Kathmandu. Dr Sampat Jayasinghe of Institute of Policy Studies, Colombo, and Dr Prabhat Pankaj of Shembtse College, Kanlung were our team members from Srilanka nad Bhutan respectively. Mr S K Mohanty, Research Associate, RIS and Dr T R Manoharan, Consultant, RIS have presented an important and interesting paper which has been included in the project report.

2 Trade in Environmentally Sensitive Goods, Environmental Standards and Relocation of Industries: An Inventory of Issues

Sachin Chaturvedi*
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2.1 Introduction

This paper is an effort to invertorise the various issues in this debate. The focus of this paper is on the objectives of the project, that is, to study the impact of increased product based standards on the trade of South Asian countries, to examine if there is any migration of environmentally sensitive industries into South Asia, and to examine the scope of external assistance.

2.2 Trade in ESGs

The term Environmetally Sensitive Goods (ESGs) has been defined differently by different authors. According to the conventional approach, industries that have incurred high level of abatement expenditure per unit output are identified as dirty industries (Tobey, 1991 and Low & Yeats, 1992). Another approach is to select sectors, which rank high on actual emissions intensity (emissions per unit output) (Mani and Wheeler, 1997). The third and least commonly used approach is based on the effects of the product on large-scale conversions or degradation of natural areas or loss of biodiversity. In this case, the product may not necessarily create any environmental damage during its consumption or disposal in the importing country but it can cause long-term economic losses in the exporting country through irreversible damage to the ecosystem

Recently, widespread concerns have been expressed about the relationship between international trade of environmentally sensitive goods and environmental regulations. Various authors have made effort to examine whether the pattern of export performance of environmentally sensitive goods underwent systematic change. Low and Yeats (1992) examined the trade in ESGs for selected developed and developing countries, for the years 1965 to 1988. The study is limited to very few ESGs. According to them industrial countries accounted for approximately three quarters of trade in these products, with almost 40 percent of world exports originating from

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EEC. In contrast, developing countries account for only about quarters of global exports of ESGs, with about one third of these shipments originating from South East Asia. Low and Yeats also examined the secular global trend of trade in ESGs and found that while there was a drop of 6 percentage points in the value of shipments originating in North America the share of South East Asia more than doubled.

A similar study was done by Xu Xinpeng (1999) for 34 countries, which included 25 OECD countries and some developing countries. The idea of the study was to get a full picture of the changing trade patterns of ESGs for year 1965-98. The 34 countries accounted for nearly 80 percent of world exports in ESGs in 1995. It was therefore to be expected that this analysis would provide a full picture of changing performance of ESGs over time. Two different means to break down the export performance data of ESGs, using a histogram and time series pattern, were employed. The study concludes that export performance of ESGs for most countries remained unchanged between the 1960s and the 1990s, despite the introduction of stringent environmental regulation in most developed countries in 1970s and 1980s. However, a similar study done for the South Asian countries by Chaturvedi and Nagpal (2001) shows that while the environment related standards are proliferating, at the same time the trade in ESGs is also increasing. Their study empirically shows that there is a significant rise in exports originating from the South Asian countries. This has become further more clear by the work of Sorsa (1994). He argued that there has been little systematic relationship between trade performance and increases in environmental standards or expenditures. He analysed trade flow data in "environmental-sensitive" goods (based on pollution abatement costs in US, 1988) and environmental expenditures in seven OECD countries. The study compared world trade shares in the sensitive goods from 1970 with those from 1990. It also calculated the revealed comparative advantage indexes for those industries in the various countries. The share of environmentally sensitive goods in total national exports fell for all the sampled countries, and for industrial countries overall. Sorsa (1994) comments that the world market shares in environmentally sensitive goods have not changed dramatically over past two decades, despite the introduction of higher environmental standards in most industrial countries. He pointed out that over 70 per cent of world imports of environmentally sensitive goods continue to originate in industrial countries.

Tobey (1990) sets up a Hecksher-Ohlin Vanek (HOV) multifactor, multicommodity model. Tobey regresses the net exports of five pollution intensive industries on the stocks of productive factors, including the environment. He found no evidence that the introduction of environmental control measures has caused trade patterns to deviate from the HOV predictions. Grossman and Krueger (1993) investigate empirically the environmental impacts of NAFTA. They find that though traditional determinants of trade are significant, the alleged competitive advantages created by lax pollution controls in Mexico play no substantial role in motivating trade flows.

Another important aspect of trade in ESGs is the argument related to the Multilateral Environmental Agreements (MEAs). The debate on the role of MEAs viz a viz trade has been highly polarised[1]. However, authors like Rutgeerts(1999) have found it reconcilable by stating that free trade may lead to such negative effects (externalities) as described by environmentalists only if appropriate environmental polices are not pursued. MEAs are considered to have trade and competitiveness effects. However, Sorsa (1992) observes that it is difficult to impose any kind of trade restrictions against any member or a non member violating these treaties in the present format international trade rules.

There are very few studies which have made an effort to quantify the implications of international treaties such as Basel Convention; CITES or Montreal Protocol on trade of developing countries. According to Jha et al (1999) the effects are more significant on the developing country because the overall difference in income levels would make the relative cost of adjustment more expensive for the developing nations. Also, the growth and the export pattern of countries tend to be such during the early stages of industrialization they may be more reliant on the export of products, which are banned or restricted by MEAs. The Convention on International Trade in Endangered Species (CITES) regulates commercial trade in endangered and other species. CITES could also result in unintended trade and competitiveness effects on some parties. Zimbabwe, for example, as a party to CITES, reports significant trade losses with regards to crocodile farming and the ivory trade. Zimbabwe is said to have an estimated stock pile of US$12 million worth of ivory that it cannot legally sell. Intal (1994) has shown that timber exports by the Philippines could be significantly affected by the agreements based on principles of sustainable development.

2.3 Environmental and other standards

The issue of environmental regulation and international competitiveness has led to increasing debates on harmonization of standards. According to Pearson (2000) the major objection to internationally harmonized or uniform standards is that economic, social and environmental conditions differ from one country to another, and what is appropriate in one set of circumstances may be inappropriate in another. Bhagwati (1996) discuss if harmonisation on policies among nations is a pre-condition for free trade. Leebron (1996) provides justification for harmonization of standards for free trade. The study points out that harmonisation between to jurisdiction might appear necessary to make certain transactional activities possible, but in most cases it will simply be more efficient. However, according to Esty D, and.Damien Geradin (1998), the belief that harmonization and imposition of welfare-reducing uniform environmental standards are the only regulatory tools available to address competitive issues is wrong.

The emergence of global marketplace has resulted in debate on the possible impact of environmental standards and regulations on national trade competitiveness. In the developed countries, the major worry is that the introduction of more stringent environmental regulations in the domestic market would result in loss of competitiveness vis-à-vis industries in countries where standards are less stringent. Developing countries, on the other hand, are concerned that increasingly stringent regulations in developed countries could adversely affect market access for their export products.

Markandya (1999) discuss the link between trade and the environment related standards and suggests that developing countries have to adjust their production process in response to changing environment requirements in the developed countries. The case in point is of meat and drug production facilities, which European importers emphasise to visit. This gives chance to get involved in the process of production and is against the spirit of Article III of GATT which forbids imposition of process standards on trading partners. These issues are discussed giving special attention to developing and transition countries where the relationship between trade and the environment has a major impact.

It is indicated that effect of environmental requirements on trade and export competitiveness of developing countries depends on factors, such as destination of exports, cost structures, basis for export competitiveness, relationship with foreign firms, availability of raw materials and other inputs, technology, and information. The study points out that firm size is of particular importance. The environmental effects of changes in production patterns in developing countries resulting from trade liberalisation differ by country, by sector and by commodity. Pearson (2000) approaches the competitiveness question from the perspective of advanced industrial countries, and mostly use U.S. pollution or pollution-abatement cost data. The principle conclusion is that there is little or no evidence that strict environmental controls result in any significant loss of international competitiveness.

The new Agreements on TBT and SPS measures were added to the WTO, with an idea that no country should be prevented from taking measures necessary to ensure the quality of exports, or for the protection of human, animal or plant life, or health of the environment, or for the prevention of deceptive practices, at the level it considers appropriate. However, barriers in the name of technical regulations line the boundaries of internationally trading nations. The TBT and the SPS measures have been a major source of non-tariff barriers. Various studies have addresses the issue of SPS measures and developing country exports. More theoretical work has demonstrated that developing countries find it difficult to trade with the developed countries due to differences in quality requirements, which in turn reflect prevailing consumer or the nature of government regulation (Murphy and Shleifer, 1997). Saqid (2000) examines some examples of measures perceived as non-tariff barriers by the Indian exporters, which are disguised under the logic based on various grounds like, quality, manufacturing process, certification, testing methods, environment etc. However, some of the studies like CUTS (1995) have been focussed on sectoral implications of standards. This study particularly looked into textiles and garments.

Maskus et al (2000) have evolved a framework to analyse the quantification of trade barriers in terms of their impact. The paper also outlines the strengths and weaknesses in Mutual Recognition Agreements (MRAs). This is amodel of regulatory harmonisation first developed as part of internal market reform in the European Community in late 1980s. Some application on this line has come from Otsuki et al (2000), who have used gravity equation model to estimate the impact of changes in food related EU standards on African exports. They did a survey of

trade and regulatory data for 15 European countries and 9 African countries between 1989-1998. The results suggest that the implementation of the new aflatoxin standards in the EU will have a negative impact on African exports. The EU standards, which would reduce health risk by approximately 1.4 deaths per billion a year, will decrease these African exports by 64 per cent or US$ 670 million. Apart from this very few studies have made an effort to quantify the impact of SPS measures on trade of developing countries. Cato (1998) attempts to quantify the costs of compliance with SPS measures by developing countries. This study assesses the costs of upgrading sanitary conditions in the Bangladesh frozen shrimp industry to satisfy EU and US hygiene requirements. It is estimated that $ 17.6 million was spent to upgrade plants over 1997-98. This gives an average expenditure per plant of $283,000. The total industry cost required to maintain HACCP is estimated to be $ 2.2 million per annum. Finger and Schuler (1999) examined the costs of SPS requirements in the developing countries. They found that the cost of achieving disease and pest free status to enable Argentina to export meat, fruit, and vegetables is reported to have been $82.7 million over the period 1991-1996. Mutasa and Nyamandi (1998) assess the degree to which SPS requirements impede exports of agricultural and food products from African countries. Of the African countries, 57 percent indicated that exported products had been rejected within the previous two years. The main reason was microbiological contamination.

Some standards evolved in the developed countries, as voluntary benchmarks for importing goods have become mandatory standards for the developing countries. Eco-labelling is one of them. It has generated many concerns in developing countries. They argue that the voluntary eco-labelling programmes are of discriminatory nature and are thus inconsistent with free trade principles of the WTO (Tietje, 1995). Since they are designed to differentiate products on the basis of their environmental features, they can have a major influence on conditions of competition in a market. Adverse trade effects may arise, first of all, from lack of transparency of product selection, criteria development and threshold - setting processes. Exporters may have difficulty gaining information about theses measures. In addition, the process of obtaining labels or ensuring compliance may pose greater difficulty for foreign producers. Moreover, there is the potential for market fragmentation arising from various eco-labelling schemes. (Chang 1997). Eco-labelling may also have an impact on cost competitiveness and on the attractiveness of the product in the market. (Vossenoar and Jha (2000)).

A case study on Malaysia by Markandya (2000) states that mandatory and voluntary labelling requirements have had an adverse effect on exports though the study does not give an estimate of the size of this impact. Another study on Thailand estimates the impact of Eco-labelling schemes as negligible in the key markets such as North America, East Asia and Europe. The study notes, however, that in the case of one eco-label developed in Germany to apply to textiles, Thai producers are adversely affected. Wyatt (1997) discusses the consequences of a number of voluntary environmental measures on the exporters of developing nations.

However, certain developing countries have attempted to absorb these voluntary standards as official standards for exports, for instance, in India, the government has launched an Eco-labelling scheme for various products. However, a study by Jha et el (2000) reports that Indian exporters are not interested in subscribing to international eco-labelling schemes. These studies show that most producers do not feel that the evolving eco-labelling schemes have affected there exports significantly yet. However, it is widely acknowledged that these measures could potentially have a detrimental affect on the exports of developing countries.

Various cases have been brought under the WTO's new Dispute Settlement Understanding with SPS or TBT dimension. Hufbauer et. el (2000) discusses some SPS disputes that have gone through the entire WTO Dispute Settlement Mechanism in 1999. The cases discussed include EC- Beef Hormones from US and Canada; Australia- Salmon from Canada; and Japan- Varietals from U.S. In the Australia- Salmon from Canada, Australia continues its 1960s era ban against the import of fresh salmon from Canada, citing old evidence. The Appellate body, after a detailed analysis, found that the ban was not consistent with the level of sanitary and phytosanitary precautions applied to domestic salmon. The WTO website provides the details of various trade related environmental disputes. One of the TBT cases is the 'shrimp-turtle' case brought by India, Malaysia, Pakistan and Thailand against the US. In early 1997, a joint complaint was made against a ban imposed by US on the importation of certain kind of shrimp and shrimp products. Under the US Endangered Species Act of 1973, the US required its shrimp trawlers use 'turtle excluder devices' (TEDs) and hence, the exporters had to follow similar requirements. It banned exports from the south Asian countries and provided countries in the

western Caribbean technical and financial support and longer transition periods. The US lost this case because it was discriminating between WTO members in pretext of environment protection.

Robertson, D. and Kellow, A. (2000) explore the aspects of risk with special reference to the WTO, where national instruments to reduce risks may conflict with international trade rules. Quarantine regulations, technical/product standards and environmental legislation in some circumstances may conflict with trade rules and principles, and result in trade disputes. WTO treatment of risk is also important in the context of agreement on SPS and TBT. The authors conclude that the WTO has no role in assessing scientific risk, especially when environment is involved.

Similarly, there are a number of issues that arise in the context of WTO rules with respect to genetically modified products and their labeling. The first is whether naturally fruits and genetically engineered fruits should be regarded as 'like products' in the context of WTO rules. One argument advanced is that, as genetically engineered fruits may not reproduce at the end of their life span, the final product characteristics are affected by the process and production method, therefore they cannot be regarded as 'like products'. At the same time as the end use of GMOs may be same as naturally grown products, they could be regarded as 'like products'. Another related issue that is particularly relevant in the context of the Biosafety Protocol relates to the labelling of products using GMOs. While some countries believe that such labelling would be entirely consistent with WTO rules on the grounds of public health concerns, other countries argue that their exports may be affected by such labelling.

2.4 Relocation of Industries

Another concern is that differences in the stringency of environmental process standards may induce industries located in high-standard jurisdiction to relocate to low standard jurisdiction. A number of studies are available in the literature on the impact of environment on industrial relocation. Majority of the studies addressed the issue in the context of developed countries, particularly United States. These studies have generally defined the polluting industries on the basis of pollution abatement cost and other expenditures. The definition of dirty industries is crucial to the analysis, but varies from one study to another. This problem is not that serious, as

several different definitions seem to yield similar lists of dirty industries. Given below is a table, which shows what all industries are identified as dirty industries by various authors.

Kalt (1988) was one of the first to test the 'pollution haven' hypothesis. He examined US net exports in 1977 and studied the relationship between the level of compliance costs and the change in net exports. He concluded that there is some evidence of a negative effect of environmental regulation on US net exports (a validation of the 'pollution-haven' hypothesis), but the relationship is statistically weak. Han and Braden (1996)

Author	**Dirty industries as identified by the author**
Kevin Gallagher and Frank Ackerman	Iron & Steel; Non-ferrous metals; industrial chemicals; pulp and paper; Non- metallic minerals. (3-digit SITC level)
Raman Letchumanan	Chemicals; Primary metals; Paper; Plastics; Fabricated metals; Leather.
Low & Yeats	Iron & Steel; Non- ferrous metals; Refined Petroleum; Metal manufactures; Paper and Articles.
The World Bank (1998b, p.113)	Iron & Steel; Non-ferrous metals; industrial chemicals; petroleum refineries; nonmetallic mineral products and pulp and paper products.
Tobey	Mining; primary metals; paper and pulp; and chemicals. (3-digit SITC level)
Xinpeng Xu	Iron & Steel; Cement; Chemicals; newsprint paper; Non-ferrous metals.

expanded and updated the Kalt study, examining 19 manufacturing industries in the US between 1973 and 1990. They looked for the relationship between pollution abatement costs and net exports over time. Their regression results show pollution abatement expenditure having statistically significant negative effect on net exports. Han and Branden also analyzed the elasticities of net exports with respect to pollution abatement expenditures for the 19 industries. Large elasticities would imply that added abatement expenditure would lead to a substantial marginal decrease in net exports. The industries shown to have large elasticities and large abatement costs were paper and allied products, chemicals, and primary metals. Many industries, including furniture, printing, leather and allied products, fabricated metals, petroleum and coal products, had elasticities close to zero. Over the 18-year period, the elasticities declined in almost all industries. The author concludes overall that there has been a negative effect on net manufacturing exports due to environmental regulations. Letchumanan (1999) empirically tested the 'pollution-haven' hypothesis by analyzing the current pattern of cross-border industrial

location. This was done by correlating FDI flows with pollution intensity of each industrial sector, with the pollution intensity of each industrial sector, for a number of developed and developing countries. The results proved beyond doubt that the 'pollution-haven' hypothesis is not empirically valid.

A 1991 OECD analysis observed that some shift of competitive advantage to countries with lower environmental standards in pollution-intensive textile and leather tanning industries had occurred. A 1993 OECD study concluded that some environmentally dirty activities, particularly in the resource-based sectors, had migrated to lower income countries with weaker environmental standards, and that the result was a geographical shift in production capacity within sectors with a consequent acceleration of industrial pollution intensity in developing countries. Xing and Kolstad (1998) conducted an empirical study to examine the effect of the laxity of environmental regulation on FDI. They examined foreign direct investment in 22 countries by the US chemical industry, the US electrical industry and US non-electrical industry in 1985-1990. The authors use measured sulfur emissions as the proxy for stringency of environmental policy, reasoning that there is a direct relationship between policy measures and the measure of pollution. Their statistical analysis shows that the laxity of environmental regulations in a host country is a significant determinant of FDI from the US chemical industry, though not from less polluting industries. Furthermore, the more lax the regulations in the host country, the more likely it is to attract the investment capital of US industry. Eskeland and Harrison (1977) investigate whether inward FDI in developing countries is concentrated in polluting industries. The study covers investments into Mexico, Venezuela, Cote d'Ivoire and Morocco during the 1980s, with the first two countries receiving most of their investments from United States and other two from France. No evidence was found to suggest that the investments in these countries are biased towards polluting industries.

Low and Yeats (1992) analysed the effect of environmental policies on the industrial location. The analysis concludes that the increase in developing countries RCA was far greater than that of the industrial countries and dirty industries account for an increasing share of export of developing countries.

Lucas et al (1992) analysed the data for 80 countries from 1960 to 1988 to examine how the relocation of dirtier industries do occur at least on the basis of broad differences in trends of environmental regulation across differing time periods. Results suggest that stricter regulation of pollution-intensive production in OECD countries have led to significant locational displacement, with consequent acceleration of industrial pollution intensity in developing countries. However, the authors pointed out that the observed phenomenon merely reflects dispersion or industry expansion, as opposed to displacement. The paper finds only a composition effect, so there is no evidence that the industry has been uprooted from industrial countries.

A World Bank research (Mani and Wheeler, 1997) extended this research further using international data on industrial production, trade, and environmental regulation for 1960-1995. This research examines shifts in trade and production patterns in the main trading regions of the world economy in relation to changes in other factors, such as income growth, land prices, energy prices, and environmental regulation over the 35-year period. The authors conclude that their cross-country analysis has found a pattern of evidence, which does not seem consistent with "pollution haven" hypothesis. Pollution-intensive output as a percentage of total manufacturing has fallen consistently in the OECD and risen steadily in developing world. Moreover, the periods of rapid increase in net exports of pollution-intensive products from developing countries coincided with periods of rapid increase in the cost of pollution abatement in the OECD economies.

Abimanyu (1996) examined the different ways in which international trade and trade agreements affect the environment of a country within a regional co-operation effort, and the ways these effects pertain to international environmental policy. The focus is on regional APEC. Results show that dirty products have expanded faster in developing countries than the average of all industrial countries over the past decade.

Pearson (1987) surveyed several studies, all of which tend to support the conclusion regarding insufficient evidence for industrial flight to developing countries. Duerksen and Leonard (1980) determined whether ECC differentials have led to industrial flight towards LDCs by employing trade and investment data. The important results that came to light were: host countries which

received the most overseas investments in pollution-intensive chemical, paper, metals and petroleum refining were other industrial countries (not LDCS) and the percentage of US FDI in pollution-intensive industries in LDCs compared to DCs did not increase significantly. Leonard (1988) presented case studies of FDI in Ireland, Spain, Mexico and Romania arguing that the industrial flight and pollution-haven hypothesis, are based on static idea of comparative advantage. Examining aggregate trade and investment statistics, Leonard sees no evidence of large-scale industrial flight as a response to US environmental regulations.

The available studies generally agree with the fact that the dirty (polluting) industries have grown faster in developing countries. South Asia is said to be particularly vulnerable due to rather weak environmental standards. The preliminary findings at RIS indicate that the developing countries share of exports in the environmentally dirty products is increasing. It is argued that many dirty industries have already migrated from developed countries to this region (Bharucha, 1994). Mollerus (1994) examined the issue of migration of dirty industries with special reference to SAARC. Export data was examined to identify whether there have been significant changes of world trading patterns of products manufactured by polluting industries for the period 1982-92. Dirty industries in SAARC are identified on the basis of pollution abatement and control expenditure of US manufacturing industries. The results indicate that half of the polluting industries products exported from the SAARC countries represent a decline in world trade in which the products of the SAARC polluting industries are gaining in market share. This shows the significance of dirty industries in the SAARC region.

Tobey (1990) tested a similar hypothesis, this time across countries, using a Heckscher-Ohlin model of international trade. He chose 24 pollution-intensive industries (defined as those that in the U S have abatement costs) at the three-digit SITC level in mining, primary metals, pulp and paper, and chemicals. Using an ordinal approach to measure regulatory stringency, countries' environmental stringency were ranked on scale of 1 to 7. Three types of regression analysis are used to look for the impact of environmental standards on international trade flows of these across countries, using data from 1970 and 1984. Tobey concluded that the effect of measure of stringency of environmental policy on changes in net exports is insignificant statistically. However in chemical industry in particular this relationship is positive. His results are confirmed by a similar analysis by Beers and van den Bergh (1977) for 1992.

Gallagher and Ackerman (2000) found no empirical data to support the pollution haven hypothesis. They developed a simple, partial equilibrium model to analyse the effects of a change in a trade policy. Their model analyzes the relative concentrations of "clean" and "dirty" industries in two nations or regions, before and after the policy change.

Clark, Marchese and Zarrilli (2000) investigates whether the cost of environmental regulation influences the international location of polluting industries. Industries that operate production facilities in developing countries are identified through their use of the offshore assembly provisions in U.S tariff code. Pollution intensity of industrial output is found to significantly reduce the probability of conducting offshore assembly in developing countries. This finding contradicts the argument that developing countries are becoming pollution havens as a result of offshore assembly.

Sarmila Banerjee and Sudeshna Chattopadhyay (2000) did a study to check if trade liberalization in India has encouraged our country to specialize in pollution intensive industries and see if the benefits bought by trade liberalization exceed the cost of additional environmental degradation. They have done so by finding the ration of pollution content of Indian exports to that of Indian imports at three different points of time: 1985, 1992 and 1996. The pollution content of the export or the import bundle is defined, as the total abatement cost implicit in the export or import bundle. They have estimated total pollution content of a commodity in terms of total abatement cost involved in the entire process. Though they are conceptually correct, however the use of United States' pollution abatement could have lead to misleading results.

2.5 Impact of standards and capacity building

In the existing literature it is generally acknowledged that developing countries have had to adjust their production processes in response to changing environmental regulations in the developed countries. Measures such as pesticide residue levels permitted in foodstuffs, emissions standards for machines, and packaging requirements have exerted pressure on the exporters. However, what remains to be seen is whether these measures have had any significant impact on trade. The emergence of global marketplace has resulted in debate on the possible impact of environmental standards and regulations on national trade competitiveness. In the developed countries, the major worry is that the introduction of more stringent environmental regulations in

the domestic market would result in loss of competitiveness vis-à-vis industries in countries where standards are less stringent. Developing countries, on the other hand, are concerned that increasingly stringent regulations in developed countries could adversely affect market access for their export products. Kim (2000) has analyzed how assistance to cope up with international environmental agreements may become more useful for the developing countries. Various studies indicate that the increasing environmental regulations have increased the cost of compliance faced by developing nations. As a result, the competitiveness of these countries facing high compliance cost is said to be reduced.

Most of the studies on competitiveness and environmental standards are based on ECC. Parikh et al (1993) analysed the effects domestic environmental policies of foreign countries on India's exports focussing on two sectors: leather and shellfish. The results indicated that the increasingly stringent export standards have contributed to a rise in the cost of production, especially in the leather sector, where costs using the more environmentally friendly methods are nearly three times higher. Fasih Uddin Mahtab (2000) examines the prospect of leather industry in Bangladesh. He points out that the environmental costs arising from production of leather are not to enormous in Bangladesh and stresses the need of Government and industry to focus on environmental problem areas. The study by Murty and Prasad, (1998) conducted a sample survey of factories belonging to water-polluting industries in India to analyze the environmental consequences of trade. It reveals that most of them have not made adequate expenditures to realize the standards and the expenditures needed to do so can heavily affect the present cost structure. Vasantha Bharucha (2000) conducted a detailed questionnaire-based survey with number of industry representatives and institutions in tea, dyes, agriculture products and processed foods, marine products, leather, textiles, and the refrigeration and air- conditioning industry in India.

The main conclusion emanating from the studies is that compliance with external eco-standards often necessitated the import of inputs and technology, which were likely to raise the cost of production and price of output. Since competitiveness of many Indian exports is based on price factors, such price rise could hamper India's competitiveness Jha and Vossenaar (2000) point out that the competitiveness effects of increased environmental compliance costs largely depend on the share of corresponding cost categories in total production costs. Thus low valued products

may be relatively vulnerable. For example, packaging requirements may have more significant effects on certain fruit and vegetables than on high-value added products. They also give the example of textile industry in India. They estimate that average raw material, of which dyes are a significant proportion, represent around 60 per cent of the cost of production. Thus, switching to more expensive environment-friendly dyes may have a significant bearing on the production costs.

Several studies have stressed the need for access to and transfer of environmentally sound technologies (ESTs). Veena Jha and Ana Paola Teixeira (1998) discuss the number of constraints that stand in the way of transfer of EST. The paper points out that the single most important factor inhibiting the transfer of EST to developing countries is its cost, exacerbated by difficulties in obtaining credit and foreign exchange. Apart from direct costs of acquiring there are a number of indirect costs. There are also concerns about the viability of ESTs if applied to only the export sector.

The paper also identifies difficulties that arise from attempting to directly apply EST designed in OECD countries to the conditions that prevail in the developing countries; the barriers posed by the standard setting in OECD countries that does not take sufficient account of needs of exporting firms in the developing countries; the cost of patents and of purchasing or licensing EST; and the difficulties associated with foreign direct investment. According to the paper, OECD countries prefer technology transfer on commercial terms with some financial assistance, while the developing countries claim that the transfer of EST should be made on a preferential and concessional basis.

Achanta, Dadhich, Ghosh and Noronha(1998) discuss the transfer of EST with special reference to India. They point out the importance of transfer of EST to Indian industry and need for institutional and policy changes needed to accelerate the transfer. Saqib and Kaushik (2001) discuss the scope of exporting environmentally friendly products for organic farming in India. Though organic farming has a tremendous scope in India, there exist a number of bottlenecks for farmers who are interested in organic farming and for the industry who want to process and export these products. These impediments are in the area of production, marketing and infrastructure. Certification is seen as a barrier to the small growers due to its costs. Standards

are too high and are creating unfair barrier to production and trade. India has no local certification systems for organic products and farmers have to depend on foreign certification like IFOAM and SKAL. This is very expensive and is feasible for big holdings only.

The Advanced Technology Assessment (ATAS) in 2000 examines the role publicly funded research and publicly owned technologies in transfer and diffusion of ESTs, with particular attention to developing countries. In the volume, Upendra Tripathy examined this issue in case of India. He points that the privately funded R&D organizations may not like to part with ESTs hence, in the coming decades publically funded ESTs will be the only source of affordable and accessible technology to most firms that are not capable of importing appropriate ESTs. The study found that there are many ESTs in the public sector domain. In certain industry sectors, such as the pollution prone Small-scale sector, ESTs are spreading fast because of state intervention. But the spread is limited in the heavy industries sector, where large capital inputs may be required. The informal sector poses a daunting problem as no policies are in place to spread ESTs and policy focus is required. The paper also discusses the financial aspects of transfer of ESTs. It points out that external funding has been instrumental in transferring ESTs from the developed to selected industrial sectors. Some of these transfers have focussed on ESTs appropriate to those segments of the economy covered by multilateral agreements such as the Montreal Protocol and agreements to reduce the emissions of gases with global warming potential. The Government of India also provides special assistance, including finance on concessional terms, for activities that contribute directly to improvement of technology. Akhtar Hasan Khan (2000) studies the scope for technical assistance for production of environmentally friendly production in Pakistan.

2.6 Concluding Remarks

The effect of environmental measures on trade has become a matter of concern for the proponents of trade liberalization. As the liberalization has taken place, there has been a global proliferation of technical measures, particularly in developed nations. There has also been a rise in the number of studies that recognize these technical as a barrier to trade, either implicitly or explicitly. The literature has shown that it is difficult for developing countries to trade with the developed countries, due to differences in quality requirements.

The proliferation of environmental and other technical standards is accompanied by rise in trade of environmentally sensitive goods. A number of studies indicate that, environmental standards of North have affected the trade prospects in certain important export oriented sectors of developing countries.

As far as migration of pollution intensive industries is concerned, existing literature fails to throw much light. Although there seems to be plenty of anecdotal evidence that policy makers and industrialist take industrial flight seriously, there is only a limited amount of empirical evidence that industrial flight exists.

The debate about competitiveness effects of environmental regulations has focussed on the costs of compliance. While the compliance costs at this level appear higher in a static analysis, dynamic analysis shows lower costs since cleaner technologies may result in cost savings over the long term. Gradual introduction, exceptions, and rebates mitigate the effects of international competitiveness and trade. Complete or partial financing of research into ESTs and direct cash grants to developing countries may contribute to the dynamic adjustment of firms in developing countries to higher standards.

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End Notes

[1] Anderson et al'(1995); Schlagenhof (1995) Pearce (1994).

3 Analysis of Environment related Non-Tariff Measures in the European Union: Implications for South Asian Exports

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3. 1 Introduction

A major issue relating to trade and environment is the manner in which developed countries use "environment" as a protectionist measure in international trade. Such protectionist measures usually called "Green Protectionism" has many dimensions in trade (Esty, 1994). It is argued that while tariffs have declined as a result of liberalisation process, the environmentally related non-tariff measures (NTMs) and other technical standards have emerged as significant factors in determining world trade.

There are three important consequences of "green protectionism" on trade prospects of developing countries. First, many of their export commodities will face entry barriers to important markets in the form of higher environmental regulations, process and production methods (PPMs) or certification schemes. Second, adjusting to higher environmental standards will make their economies less competitive in overseas markets since the ability of developing countries to implement environmental standards set by foreign markets are limited either by financial and technical constraints or by the size of the domestic demand for environmentally friendly products. Third, differences in environmental standards will cause relocation of "dirty industries' from developed (with higher environmental standards) to developing (with lower environmental standards) countries.

The United Nations Conference on Environment and Development (UNCED) –Rio Earth Summit- held in 1992 fully recognised the role of trade in economic development but cautioned about the damaging effect of trade due to the unsustainable utilisation of natural resources and environment (UNCED,1992). The Earth Summit influenced the process of trade liberalisaiton during the Post-Rio Period. The establishment of Committee on Trade and Environment (CTE) is an important decision taken in the Ministerial Meeting of UR held at Marrakesh in 1994. When WTO was established in 1995, both environment and trade communities were very much keen to know the work programme and activities of CTE. The committee held discussions on it's identified 10 items on trade and environment but could not come up with any amicable solution so far. The CTE noticed that the issues on trade and environment are complex. Subsequently, the discussions at CTE were based on "cluster approach" under the two themes of (i) Market Access and (ii) the linkages between the multilateral environment and trade

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agendas (WTO,1999). India and many other developing countries opposed any attempt to include non-trade issues such as environment and labour in the negotiating framework. However they had to compromise this with EU and other developed countries in the fourth Ministerial Meeting of WTO held at Doha in 2001 when the decision was taken to begin negotiation on selected issues on trade and environment.

Market access is an important issue of the developing countries. The environmental standards in developed countries are very high. Further, many of them have increased their environmental standards and other measures in the recent past. The higher environmental standards in developed countries are not found to be adversely affected their trade. But it is a matter of concern for the developing countries especially for Small and Medium scale Enterprises (SMEs) in those countries. The problems include additional costs and lack of environmentally friendly technology in complying such standards.

Of various studies available on trade and environment, a few of them have addressed the issue of environmentally related non-tariff barriers in developing countries trade (Dean et.al. 1992, Jaffee et.al. 1995, Manoharan et.al 2000). Sorsa (1994) while analysing environmentally sensitive products found that between 1970 and 1990, the developing countries' share in the imports of environmentally sensitive commodities (ESCs) has declined in the selected European countries. UNCTAD initiated a number of case studies in the developing countries to understand the linkages between trade and environment. Such studies pointed out that environmental standards affected adversely to many export oriented sectors such as textiles, chemicals, leather, marine products. The small and medium scale enterprises (SMEs) face more difficulties when compared to big companies and multinational corporations (MNCs) (Jha, 1997).

3.1.1 NTMs in the European Union and South Asia's trade: some key questions

The formation of the European Union (EU) in the early Nineties created high hopes among developing countries including South Asian countries that the new regional trading arrangement (RTA) would improve market access of extra-regional countries in view of the expanding market of the Union. Against such expectations, the net increase in the levels of trade of the South Asian countries with the EU has been dismal. It is the feeling of the regional countries of the South Asian that the persistence of peak tariff, specific tariff, tariff escalation and non-tariff measures (NTMs) have significantly eroded the prospects of the South Asian exports to the EU. Besides these measures the environmentally sensitive NTMs have to a large extent constrained the market access of South Asian countries in the EU. The complexities involved in both trade and non-trade barriers raise number of issues for discussion in the context of trade prospects of South Asian countries in the EU. The possible concerns in this regard are:

- Is the tariff structure of the EU invariably low across the product groups or the average level of tariff in different product groups varies significantly from one sector to another, thus, allowing for discrimination in the level of protection between sectors ?

- To what extent imports of the Union are protected by NTMs and the role played by environment-related NTMs in affecting export prospects of South Asian exports in the Union.
- What is the coverage of specific tariff in the customs tariff of the EU?
- Is it the case that the specific tariffs combined with NTMs have downsized the level of market access of extra-regional trading partners including South Asian countries in the EU?
- What are the prospects of improving South Asian exports to the EU by giving priority to regional countries over its competitors in the trade of those commodities, which are subject to environment-related NTMs?

The important issues faced by the exporters of developing countries on market access, as reported by UNCTAD are: lack of timely and accurate information, lack of scientific data for specific thresholds or limit values, inconsistent application of procedures, uncertainty due to rapidly changing environmental and sanitary requirements in overseas markets, varying standards and regulations in different markets and the costs and difficulties of testing and verification procedures

The main objectives of the present study are the following:

(i) To examine the coverage of the environment-related NTMs in different product groups of the EU's imports, and the role of other NTMs in limiting the market access of developing countries.

(ii) To analyse the structure of ad valorem tariff and specific tariff in different product categories of the EU.

(iii) To examine the linkages between TBs and NTMs in protecting the EU market and its implication on the export prospects of South Asian countries.

3.2 Environment related NTMs

Developed countries have imposed a number of environment related NTMs to regulate trade. The analysis of such NTMs is difficult because the available sources such as TRAINS data base of UNCTAD, do not provide information on environment related NTMs as a distinct category. IThe list of NTMs provided by TRAINS is too aggregate in many countries especially USA where only four NTMs are provided in the list. This makes difficulty in identifying and analyzing environment related NTMs. Therefore, we have restricted our study only to European Union and carried out the analysis on the basis of available information from TRAINS data base.

In this study we have selected EU because of two reasons. First, EU market is a major and important market for the South Asia. Second, the availability of data base on some of the environment related NTMs, is better in the case of EU.

Of the available information on 16 NTMS in EU, three are seen to be imposed exclusively for environment purposes . They are: (i) Prior authorisation as per CITES (code:110), (ii) Quota in relation to Montreal Protocol (code:113) and (iii) Prohibition for environmental protection (code: 114). Therefore, these three are taken as

environment NTMs in the present study. NTM for product characteristic requirements for health (116) is also taken into consideration because health and environment are closely interrelated. A description on these NTMs is given in the Table1.

The first two ENTMs are based on Multilateral Environmental Agreements (MEA) viz., Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Montreal Protocol.

3.2.1 CITES

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was concluded in 1973 and entered into force in 1 July 1975. Having the current membership of 132 countries, it established the legal framework for regulating trade in endangered and other species globally.

The four Appendices to the convention form the basis for implementation of the treaty. The first three Appendices list species for different levels of trade restriction on each category. Appendix IV makes provision for the issue of permits for international trade in the species listed on the three Appendices. The Appendices are amended at least in every two years, in accordance with procedures and criteria set forth in the treaty and through resolutions adopted by the Conference of the Parties at their biennial meetings.

Appendix I shall include all species threatened with extraction that are or may be affected by trade. Trade in specimens of these species must be subject to particularly strict regulation in order to endanger further their survival and must only be authorised in exceptional circumstances. Appendix I contained about 450 species in the majority being well known endangered animals such as Elephant, Lion, Tiger, Cheetah, Leopard and Sloath bear.

Commercial trade in Appendix I species is prohibited and non- commercial trade is allowed only in exceptional circumstances provided it will not damage their chances for survival. For all transactions in the Appendix I species an export permit from the country where the wildlife originates or re-export certificate from the re-exporting country, and an import permit from the recipient country is required. The import permit must be issued before any transaction involving the Appendix I species can occur.

The import permit can be granted only if. (a) the importation will not be for purposes detrimental to the specie's survival, (b) the importation will not be primarily commercial and (c) if live wildlife is involved, the specimen be assured of a suitable home.

The export permit can be issued only if (a) the wildlife was obtained legally, (b) the wildlife will not be harmed during shipping and (c) an import permit has already been granted.

Appendix II shall include: all species that although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict

regulation in order to avoid utilisation incompatible with their survival; and other species that must be subject to regulation in order that trade in specimens of certain species referred to in the above sub- paragraph may be brought under effective control.

CITES permits commercial trade in Appendix II species only if the country of origin has issued an export permit or a re-export permit unless the proper government agency has certified that the export will not be detrimental to the species survival. Import permits are not required. Appendix II is much larger than Appendix I and contains more than 2300 animal's species and over 24,000 plant species. The larger size of Appendix II is because whole families of species are listed in the Appendix where as in Appendix I individual species are listed.

Appendix III shall include all species that any Party identified as being subject regulation within its jurisdiction for the purpose of preventing or restricting exploitation, and as needing the co-operation of other parties in the control of trade.

Thus CITES gives parties the option of listing under this Appendix native species that are already protected within their own borders. Operation in enforcing their own wildlife trade regulations. So if a country lists species under Appendix III and which is not listed under any other Appendices it then implies that trade in that particular species is regulated in that country and import of that species or its parts from that country is illegal without a CITES export permit issued by the Management Authority of that Country. Trade in Appendix III species thus requires an export permit from the listing country or a certificate of origin when the specimen is exported from other countries. The parties shall not allow trade of specimens included in the three Appendices except in accordance with the provisions of the Convention.

3.2.2 Montreal protocol

The Montreal Protocol on Substances that deplete the ozone layer was finally agreed upon o 16^{th} September 1987 at the Head Quarters of the International Civil Aviation Organisation in Montreal, and came into force on January 1^{st}, 1989. Currently , 172 countries have signed the Protocol.

The basic objective of the Protocol to protect ozone layer through control of. substances that deplete ozone layer in a manner that is likely to result in adverse effects on human health and the environment. The measures taken for this purpose should be based on relevant scientific knowledge, taking into account technical and economic considerations.

In this regard, the developmental needs of the developing countries is also taken care of. Article 2 of the Protocol describes about control measures to be taken against global emissions of selected chloroflurocarbons (CFCs) and other substances such as halons, carbontetrachloride, trichloroethance, hudrochloroflurocarbons and methyl bromie listed in Annexes A,B, C and E. Annexure A provides eight substances of which 5 in Group I and the remaining in Group II. The ozone depleting potential is also given in the annexures. The ozone depleting potentials are estimates based on existing knowledge and

will be reviewed and revised periodically. Annexure B contains a total of 12 substances in three groups of which twelve are in Group I and the remaining two are distributed one each in the other two groups. Annexure C contains 74 Substances of which 40 are listed in Group I and the remaining in group. Annexure E has one substance which is methyl bromide having ozone depleting potential of 0.6.

Annexure D provides list of products containing controlled substances specified in Annexure A. About six product categories are given in this Annexure. They are:

1. Automobile and truck air conditioning units (whether incorporated in vehicles or not)
2. Domestic and commercial refrigeration and air-conditioning / heat pump equipments. (Examples Refrigerators, Freezers, Dehumidifiers, Water coolers, Ice machines, Air conditioning and heat pump units, etc.)
3. Aerosol products except medical aerosols
4. Portable fire extinguisher
5. Insulation boards, panels and pipe covers
6. Pre-polymers

In the case of CFCs, Article 2A1 says: " Each part shall ensure that for the twelve month period commencing on the first day of the seventh month following the date of entry into force of this Protocol and in each twelve month period thereafter, its calculated level of consumption of the controlled substances in Group I of Annexure A does not exceed its calculated level of consumption in 1986. By the end of the same period each party producing one or more of these Substances shall ensure that its calculated level of production of the substances does not exceed its calculated level of production in 1986, except that such level may have increased by no more than ten per cent based on the 1986 level". For developing countries," such level may have increased by no more than ten per cent based on the 1986 level".

The second, fourth , seventh and ninth meetings of the Parties of Montreal Protocol took more stringent measures on emission levels. Para 4 of Article 2A says" Each party shall ensure that for the twelve month period commencing on 1st January 1996, and in each twelve month period level of consumption thereafter, its calculated level of consumption of the controlled substances in Group I of Annex A does not exceed zero. Each party producing one or more substances shall, for the same periods, ensure that its calculated level of production of the substances dies not exceed zero". For developing countries, considering their domestic needs, the calculated level of production may exceed that limit by up to fifteen per cent of its calculated level of production in 1986.

The non-tariff measures applied by EU on the basis of Montreal Protocol will be covered for more products in the coming years. Though developing countries have given special provision in the Protocol, the effect of the Protocol on trade prospects of developing countries needs to be fully addressed.

While the NTMs on the basis of Montreal Protocol and CITES are imposed as a result of Multilateral Environmental Agreements, a number of restrictions and prohibitions are

made on several important product categories on the basis of environmental grounds. This Includes restrictions on the use of certain chemicals, packaging requirements, etc.

3.2.3 Prohibition for environmental protection

EU imposed import prohibition for a variety of products for environment protection. Imports of ozone depleting substances such as CFCs and Halons from countries which are not parties to Montreal Protocol are prohibited. A number of chemicals and other substances which affect public health and environment are prohibited. This include PCBs and PCTs (concentration exceeding 0.005% of weight), Benzidine, 4-nytrobiphenyl, 4-aminobiophenyl, paints which contain neutral anhydrous carbonate, lead hydrocarbonate and lead sulphates, certain antifouling paints containing mercury compounds, arsenic compounds, and organostannic compounds and wood preservatives.

EU prohibited the use of cadmium and its compounds as pigment or stablizer in the products such as packaging material, fittings for furniture, clothing and accessories, etc. Similarly, the marketing and use of all plant protection products is prohibited. Imports of skins of certain animals such as beaver, otter, wolf etc and the products derived from those skins are also prohibited.

3.2.4 Product characteristic requirement for health

EU has taken various measures for health and sanitary conditions for the products imported. For instance, imports of fresh, chilled, frozen meat/fishery products to the EU should meet certain health and hygiene standards. These imports should come from EU-approved establishments (premises where products are prepared, processed, chilled, frozen, packaged or stored). The imports should bear an animal health certificate and public health certificate drawn by an EU-approved official veterinary authority of the exporting country. Meat products should bean a "Health Mark". Imports of these products as well as of fresh fruits and vegetables are subject to inspection upon arrival in to EU. A number of health and quality conditions are made for food products and non-food products having direct influence on human health. A good number of products such as soap, cosmetics, toilet preparations, fertilizers, pesticides, detergents, medicines, plastic packaging for food etc. are subject to these requirements.

3.3 Methodology

In view of the broad objectives of the study we have used TRAINS database for the empirical analysis. The study requires data pertaining to different types of NTMs (separate for environment-related, trade related and health-related), MFN *ad valorem* tariffs and specific tariffs in the EU.

For the present study, we are using trade, ad valorem tariff, specific tariff and NTMs of the EU for examining the relationship between these variables in providing effective protection to the domestic sector of the Union. While NTMs, ad valorem tariff and specific tariffs are presented at the national lines, bilateral trade data are given at the HS

sub-heading level. The level of desegregation associated with national lines varies from one country to another. The EU defines its national lines at 8-and 10-digit level. Combining both 8-to 10-digit HS level products, the EU has as many as 14251 national lines. While most of the products are defied at 8-digit HS level, some of them are defined at more desegregated level of 10-digit level. However, bilateral exports of the EU are given at 6-digit level. In 1997, the EU imported as many as 5106 products at 6-digit level from the global economy.

It is evident from the literature that the level of NTMs increased by many-folds, particularly in the post-Uruguay Round period in comparison with the pre-negotiation period. We are unable to examine the position of pre-and post-Uruguay situations due to lack of information regarding NTMs during the pre-URTN period. Therefore, our analysis is mostly restricted to cross-section analysis, based on most recent year data. We have used TRAINS, winter 1998, UNCTAD, CD for the present study. While the latest trade data is available for 1997, NTMs, ad valorem tariff and specific tariffs are given for the year July 1998. Despite of data constraints, we have taken the latest data available for this study. The individual member countries in the EU use several NTMs and many of them are neither consistent regionally nor compatible to the WTO framework[1].

It is an intricate task to combine trade, NTMs and customs tariff in one place because the reported data are not provided by the UNCTAD or any other Multilateral Agencies at a given level of aggregation. While data on TBs and NTMs are available at national lines, trade data are in HS 'sub-heading level. Moreover aggregation of custom tariff rates may be unrealistic for negotiation purpose and the underlined danger of lose of information. However we have tries to combine trade, tariff (both ad valorem and specific) and NTMs in a single spread sheet. However, attention has been made to minimise loss of information. The purpose of this exercise is to analyse the extent to which environment-related NTMs affecting export prospects of South Asia in the markets of the EU.

In the first place we have attempted to map EU's tariff, specific tariff and NTMs at the most desegregated product level (both at 8-and 10-digit level), since these variable are defined at the national lines. It is found that many products at the national lines are subject to either single or multiple NTMs.

The TRAINS[2] database provides information for sixteen types of NTMs, for the EU. From the total of sixteen[3], three of them are environment-related, one is health-related and remaining eleven are trade related NTMs. All the three environment-related NTMs are WTO compatible. They are: a) Prohibited under CITES (code 110); b) Prior authorisation required under Montreal Protocol (code 113) and; c) prohibited due to

[1] Such measures have adversely affected trade prospects of South Asian countries. For example Germany required for the use of a specific type of dye in carpet for import, and this unilateral policy had adversely affected export prospects of some of the South Asian countries. We are, in fact, looking for such type of NTMs for the study. Due to lack of information on specific NTMs, we are restricting our analysis only to the available information.

[2] We refer to Winter 1998 version of TRAINS, UNCTAD.

[3] A detailed discussion on the nature of NTMs in the EU is given in Section 2.1

environmental reasons (code 114). The number of products falling under CITES is relatively much larger than those of other two types of environment-related NTMs.

We have analysed information provided in the TRAINS database in two phases. In the first phase, we have mapped ad valorem tariff, specific tariff and NTMs for each national line separately. Occurrences of both environment-related, health-related and trade-related NTMs across the product lines are mapped separately. For these groups of NTMs, frequency[4] ratios are estimated separately.

In order to converge TBs and NTMs data with the trade data, we have taken aggregated figures of the NTMs and tariff data at the 6-digit level. We have estimated frequency ratios[5] and average tariff for each product line at 6-digit HS level. Very often, we find difficulty in computing average tariff for each product at 'sub-heading' level because of 'specific tariffs'. We have also estimated frequency ratios separately for environment-related NTMs, health-related and Trade-related NTMs.

3.4. Results

In the post-Uruguay Round of Trade Negotiations, the agricultural sector continued to be one of the most protected areas of trade[6] in developed countries, and this has been more so in the European Union. The protection of the agricultural sector is not only significant in terms of coverage of products but also in terms of intensity[7] of protection. The incident of NTMs is relatively much higher in the agricultural sector than that of the industrial sector. It is observed that both environment-related and health-related NTMs are more predominantly present in the primary sector as compared to the manufacturing sector. About half of total number of agricultural products and one tenth of total manufacturing products are subject to one or other forms of NTMs as shown in Figure 1. While 1910 product lines are subject to single or multiple NTMs out of 4043 agricultural products, only 1016 product lines are subject to NTMs out of 10208 manufacturing products.

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[4] The frequency of NTMs of a HS product line indicates number of times different NTMs are against a product invoked by the importing country. For example, against the national line "bromochloromethane" (HS 2903498010), the EU imposes two environment related NTMs namely, Montreal protocol and prohibition in 1996. Therefore the frequency of the product line is equal to two. For other product lines, Frequency lines are estimated in a similar manner.

[5] Frequency ratio of a broad product (at 6-digit level) is the ratio of number of micro-products (at national level) subject to one or more NTMs to total number of micro-product lines (at national level) falling under the same broad product (at 6-digit level).

[6] Protection is referred here to denial of market access through different forms of NTMs, but not to customs tariff.

[7] When a specific product is covered by one type of NTMs, the import of the product is restricted to some extent by the importing country. But when the same product is subject to several types of NTMs, the possibility of import of the same product is severely affected. In other words, market access of the specific product is denied by multiple conditions attached in the form of one or another NTM. Therefore intensity of NTMs increases when more number of NTMs are invoked for one line of product. The possibility of having market access declines when intensity of NTMs increases.

The extent to which different product groups are affected by the NTMs is examined by the frequency ratio. Table 2 presents number of national lines subject to environmental, trade and health related NTMs and the frequently ratios in the EU. It is interesting to note that both environmental and trade related NTMs are simultaneously invoked in both agricultural and industrial sectors, but the health related NTMs are imposed in the agricultural sector. In terms of coverage of products, both environment-related NTMs and health related NTMs are mostly concentrated in the agricultural sector. The number of products under each of these broad group of NTM is quite substantial in comparison with total number of products imported in the agricultural sector. Total number of products covered by environment related and health related NTMs constitutes almost two third of total number of products subject to trade related NTMs in the agricultural sector. The situation in the manufacturing sector is different from that of agricultural sector. The number of lines subject to the environmental related NTMs constitutes almost one third of that of trade related NTMs in the manufacturing sector.

In the literature, frequency ratio in very often used as an index for measuring the extent of protection conferred to import through NTMs. The effectiveness of a specific NTM, particularly in terms of import restraining capacity, may be difficult to ascertain. It may vary from one type of NTM to another in an importing country.

Therefore, ordering of NTMs on the basis of there effectiveness in a country is generally not seen in the literature. In the absence of quality-related NTMs analysis, frequency ratio is very often used to examine the coverage of the products in different sectors.

It is estimated that the overall frequency ratio of the EU is 20.5 per cent in 1998, thereby indicating that one fifth of the EU's National lines (for imports) is subject one or multiple NTMs. The results show that the level of frequency ratio varies (overall frequency ratio and environment related frequency ratio) significantly from one sector to another (for details see Figure 2.)

In agriculture, all the broad categories except animal and vegetable fats and oils (HS Section III) are extensively protected by NTBs. In the industrial sector only three broad product categories are strongly protected, and those broad groups are: raw hides and skins, leather, etc. (HS Section VIII), footwear, headgear and umbrella (HS Section XII), and base metals & its associated products (HS Section XV). The recent study of Mohanty (2001a, 2001b), Mehta and Mohanty (1999) shows that most of these products are of interest to India's export to the EU.

Decomposition of overall frequency ratio into environment-related, trade-related and both environmental & trade-related indices shows interesting results. It is observed that against large number of products, both environmental and trade related NTMs are invoked simultaneously in the agricultural sector. There are about 275 such products which are identified in the agricultural sector. On the contrary, only 197 items in the same sector are subject to only environmental NTMs.

Though environment-related NTMs are WTO-compatible, but they are very often being used as an effective instrument to restrict market access other countries in the EU. Detailed results by HS chapters are presented in Table 3.

As mentioned earlier, out of the three types of NTMs concerning environment-related issues, CITES covers more than 97 per cent of total number of ES-NTM products as shown in Table 4. It is interesting to note that simultaneous application of various ES-NTMs on individual commodities has been very few in number. The results indicate that the quota under Montreal protocol and other environment-related prohibition are jointly triggered against twenty chemical products. The trade control under CITES are invoked against other group of products which are both in the agricultural and manufacturing sectors. Out of 739 products subject to CITES, about 85 per cent of them are concentrated in only four major product groups (HS sections). The CITES are very frequently used in product groups like live animal & animal products (section I), vegetable products (section II), raw hides and skins (section VIII), and footwear, headgear, umbrellas, etc. (section XII).

The disaggregated analysis shows that environment-related NTMs is mostly concentrated in few broad product groups as identified in Table 4. The detailed analysis on the concentration of environment-related NTMs is presented in Table 5. As mentioned earlier, agricultural sector is more protected than manufacturing sector, and within the agricultural sector, some broad product segments are more heavily protected than others. Some of the heavily protected areas in the agricultural sector are: live animal (Chapter 1), meat and edible meat offal (Chapter 2), fish and crustaceans (Chapter 3), live trees and other plant bulb (Chapter 6) and preparation of meat and fish (Chapter 16). Among the non-primary product categories, some of the highly protected product segments by the environmentally related NTMs are raw hides and skins (other than furskins) (Chapter 41), articles of leather (Chapter 42), furskins and artificial fur (Chapter 43), wood and articles of wood (Chapter 44) and footwear, gaiters etc. (Chapter 64). These products constitute more than 88 per cent of total number of products subject to CITES related NTMs In total, 11 chapters are affected by environmental NTMs is the agricultural sector and, 18 chapters are affected in the manufacturing sector.

The customs tariff of the EU indicates that 87.5 per cent of the total product (national) lines is subject to ad valorem tariff. The simple average MFN tariff of the Union is about 5.9 per cent in 1998. The results indicate that specific tariffs are very often triggered for imports in the EU. In every eight-product (at national line), one line is subject to specific tariff. Both in terms of ad valorem tariff and specific tariff, agricultural sector is overwhelmingly protected than that of the industrial sector as shown in Table 6. The average tariff rate of the agricultural sector was 12 per cent as against 6 per cent for the industrial sector in 1998[8]. It may be noted that all the broad agricultural product groups are strongly protected by unprecedentedly high tariffs and specific tariffs[9]. Another

[8] For details about India, see Mohanty (2002).

[9] UNCTAD has made an attempt to estimate ad valorem tariff equivalence of specific tariffs for the year 1996. The results show that average ad valorem tariff equivalence of specific tariff is much higher than average ad valorem tariff of similar product groups in the EU. For details see Mehta and Mohanty(1999).

important observation emerges from the results that average tariffs of selected product groups have been very high and several product groups have witnessed high incidence of specific tariffs within these product ranges. However, product groups having high average tariff rate coupled with specific tariffs, are mostly seen in the agricultural sector.

The results show that average tariff of broad product groups are not only alarmingly large in agricultural sector but also in the manufacturing sector. Such broad product groups having significant average tariff are: live animals and animal products (section I) vegetable products (section II), animal and vegetable fats and oils (section III), prepared food-stuffs and beverages (section IV), plastics and articles thereof (section VII), textiles (section XI) and footgear, headgear and umbrella (section XII). Similarly, specific tariffs are mostly concentrated in primary products and select manufacturing products, such as chemicals (section VI), articles of stone, plaster and cement (section XIII) and optical, photography and cinematography (section XVIII). A detailed results concerning *ad valorem* tariffs and specific tariffs are presented in Table 7. The import of primary sector products is not only protected by tariffs but also by the specific tariffs. Out of 25 chapters in the primary sector, the average *ad valorem* rate of products is more than 10 per cent in case of 12 HS chapters. The products in these chapters constitute about 64 per cent of total number of lines in the primary sector. The manufactured tobacco (Chapter 24) is the product group, which is subject to maximum average tariff of 48.2 per cent in 1998. In the manufacturing sector, average MFN tariffs is very close to 10 per cent in some product groups.

The chapters, where average MFN tariffs of chapters are exceeding 10 per cent, are made up fabrics and apparel (chapter 60-63). Average tariff of these group of products is 11.8 per cent. The product lines in these chapters constitute about 37.3 per cent of the total number of products in textiles and textile articles (section XI). Some of the non-textile product groups witnessing high tariff (more than 6 per cent) are footwear (chapter 64), aluminum articles (chapter 76) and vehicles other than railway or train (Chapter 87). However, some of the chapters have witnessed 'nil' duty for imported products such as ores, slag and ash (chapter 26), pharmaceutical products (chapter 30), pulp of wood or of other fibrous material (chapter 47), vegetable plaiting materials and works of art and collector's pieces (chapter 97).

In the EU, specific tariffs are combined with environment related NTMs and other NTMs in the agricultural sector as shown in Table 8. Except for animal and vegetable fats and oils (Section 3), other broad product groups are subject to both specific tariff and NTMs in the agricultural sector. The environment sensitive NTMs combined with specific tariffs has affected only one sector, i.e. live animals products (Section 1). To be more specific, environmental protection is mostly affecting products like live animal (Chapter 1), meat (Chapter 2) and fish preparation (Chapter 16). For details see Table 9.

3.5. Conclusions

The EU market is largely protected by the TBs and NTMs. The agricultural sector is more protected than the manufacturing sector. So far as NTMs are concerned, primary

sector is five firms more protected than the manufacturing sector. The environment sensitive NTMs have further intensified the level of protection in the Union. In every four products subject to any type of NTM, one product is subject to environmentally sensitive NTM.

We have used frequency ratio to examine the level of protection. It is found that all broad agricultural products are having high frequency ratio except for products like fats and oils.

In the manufacturing sector, some of the important product groups are subject to large number of environment sensitive NTMs and South Asian countries have export interest in those products. Some of these broad product segments are hide & skin, leather, other manufactures, etc. Even the average tariffs for these product segments have been very large as compared to overall average tariff of the Union. The export prospects of South Asian is largely affected by the use of multiple NTMs, peak tariff and specific tariff on specific products where the region has its current and future export interest.

Table-1: Selected Non-tariff measures applied by the European Union

Reference code (as per TRAINS) (3 digit)	**Non-tariff measures**
	(A) Environment related
110	Prior Authorisation (CITES)
113	Quota in relation to Montreal Protocol
114	Prohibition for environmental protection
116	Product charct. .requirements (health)
	(B) Others
101	Tariff Quota
102	Seasonal tariff rates
103	Variable charges n.e.s
104	Antidumping investigations
105	Antidumping duties
106	Automatic licensing requirements
107	Import monitoring
108	Retrospective surveillance
109	Non-automatic licence
111	Quotas
112	Bilateral quota
115	Import monopoly

Source: TRAINS 6.0, UNCTAD

Note: The classification "Environment related" is made for the purpose of this study.

Figure 1

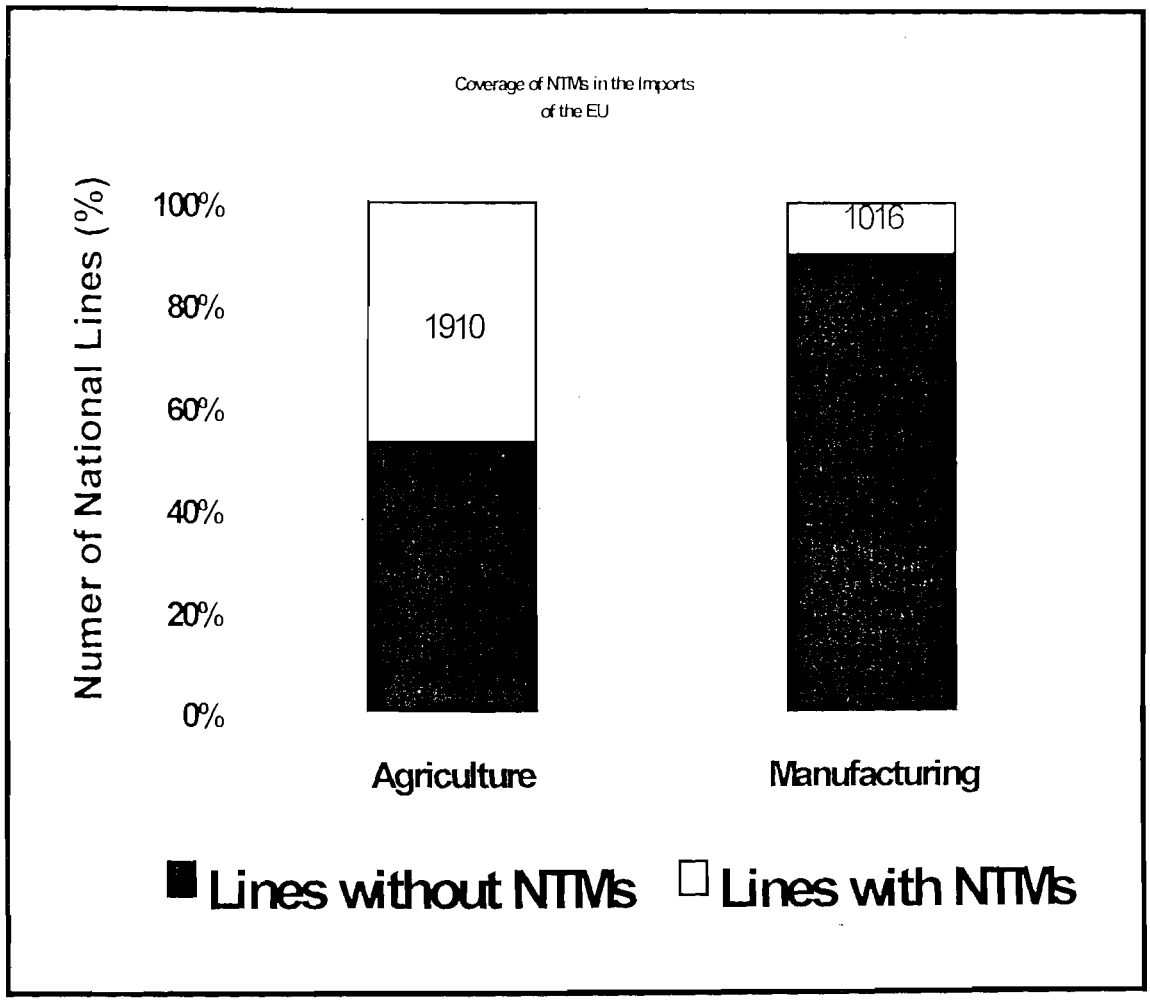
Coverage of NTMs in the Imports of the EU
Numer of National Lines (%)
100%
80%
60%
40%
20%
0%
1910
1016
Agriculture
Manufacturing
Lines without NTMs
Lines with NTMs

Figure 2

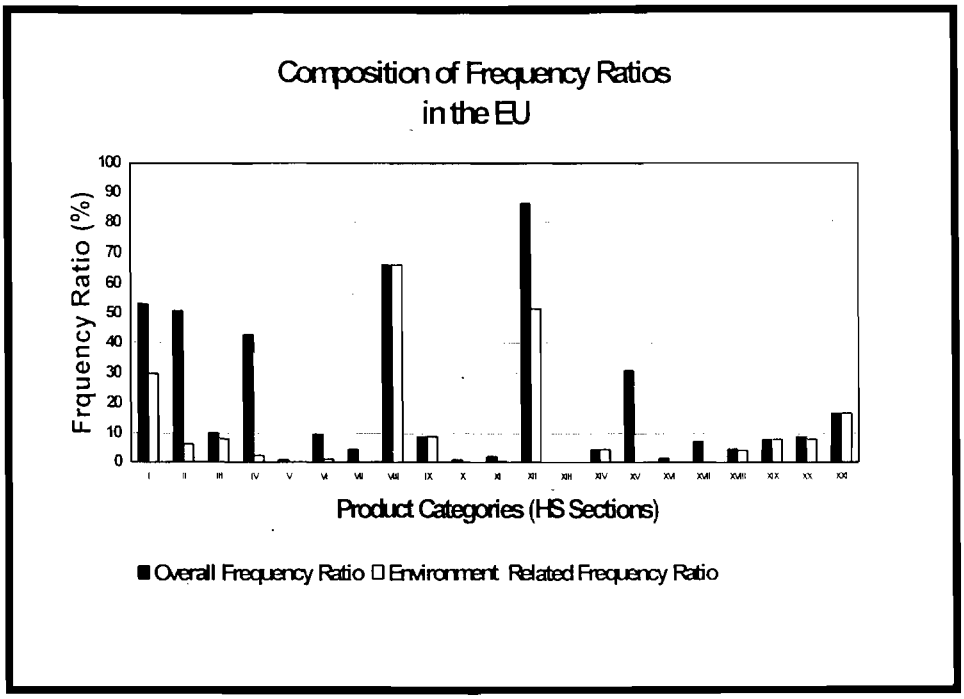
Composition of Frequency Ratios
in the EU
Frquency Ratio (%)
100
90
80
70
60
50
40
30
20
10
0
Product Categories (HS Sections)
Overall Frequency Ratio
Environment Related Frequency Ratio

Table 2: Pattern of Environmental and Trade related NTMs in the EU: Section-wise Analysis (1996).

Section	Product Description	Total HS Lines	Lines Affected by NTMs	Frequency Ratio (Total)	Frequency Ratio (Env.)	Frequency Ratio (Other)	No. of Lines covered by Env. NTMs	No. of lines covered by other NTMs	
								Trade	Health
I	Live Animals and Animal Products	1159	617	53.2	29.8	41.3	345	69	410
II	Vegetable Products	1293	659	51.0	6.3	48.6	82	628	0
III	Animal or veg. fats & oils	148	15	10.1	8.1	2.0	12	3	0
IV	Prepared foodstuff & Beverages,	1443	619	42.9	2.3	41.8	33	557	46
V	Mineral Products	251	2	0.8	0.0	0.8	0	2	0
VI	Products of the Chemicals	1796	174	9.7	1.1	8.6	20	154	0
VII	Plastics & Articles thereof	620	27	4.4	0.0	4.4	0	27	0
VIII	Raw Hides & Skins, Leather	157	104	66.2	66.2	0.0	104	0	0
IX	Wood & articles of wood	201	18	9.0	9.0	0.0	18	0	0
X	Pulp of wood or of other Fibers	252	2	0.8	0.0	0.8	0	2	0
XI	Textile & Textile Articles	1789	39	2.2	0.2	2.0	4	35	0
XII	Footwear, headgear, Umbrellas	184	159	86.4	51.6	83.7	95	154	0
XIII	Articles of stone, Plaster, Cement	271	0	0.0	0.0	0.0	0	0	0
XIV	Natural/cultured pearl, Jewellery	69	3	4.3	4.3	0.0	3	0	0
XV	Base Metals & Articles	1255	387	30.8	0.0	30.8	0	387	0
XVI	Mach. & Mechanical Appliances	2350	34	1.4	0.0	1.4	0	34	0
XVII	Vehicles, Aircraft, Vessels	277	20	7.2	0.0	7.2	0	20	0
XVIII	Optical, Photograph, cinem.	446	21	4.7	4.3	0.4	19	2	0
XIX	Arms & ammunition	25	2	8.0	8.0	0.0	2	0	0
XX	Misc manufactured Articles	259	23	8.9	8.1	0.8	21	2	0
XXI	Works of Art Collectors' Pieces	6	1	16.7	16.7	0.0	1	0	0
	Total	14251	2926	20.5	5.3	21.0	759	2076	456

Source of Data : UNCTAD, Trade Analysis and Information System, Winter 1998.

Table 3: Pattern of Environment and Trade related NTMs in the EU: Chapter-wise Analysis (1996)

HS Chapter	Product Description	Total HS Lines	Lines affected by NTMs	Frequency Ratio (Total)	Frequency Ratio (Env.)	Frequency Ratio (Other)	No. of Lines covered by Env. NTMs	No. of lines Covered by other NTMs	
								Trade	Health
1	Live Animal	78	64	82.1	66.7	79.5	52	0	62
2	Meat and edible meat offal	336	207	61.6	45.8	50.6	154	6	164
3	Fish & crustaceans, molluses	506	138	27.3	24.9	10.3	126	52	0
4	Diary produce, birds, eggs	216	198	91.7	1.4	90.3	3	11	184
5	Products of animal orgin	23	10	43.5	43.5	0.0	10	0	0
6	Live trees and other plants bulb	94	81	86.2	86.2	54.3	81	51	0
7	Edible vegetables & certain roots	366	186	50.8	0.0	50.8	0	186	0
8	Edible fruits & nuts: peel or melon	476	326	68.5	0.0	68.5	0	326	0
9	Coffee, tea, mate and spices	59	6	10.2	0.0	10.2	0	6	0
10	Cereals	79	52	65.8	0.0	65.8	0	52	0
11	Products of the milling industry	89	1	1.1	0.0	1.1	0	1	0
12	Oil seeds and leoginous fruits	82	6	7.3	0.0	7.3	0	6	0
13	Lac; gums, resins & other vegetable	36	0	0.0	0.0	0.0	0	0	0
14	Vegetable plaiting materials	12	1	8.3	8.3	0.0	1	0	0
15	Animal or vegetable fats & oils	148	15	10.1	8.1	2.0	12	3	0
16	Preparations of meat and fish	192	55	28.6	13.5	24.0	26	0	46
17	Sugars and sugar confectionery	51	0	0.0	0.0	0.0	0	0	0
18	Cocoa & cocoa preparations	42	0	0.0	0.0	0.0	0	0	0
19	Prep. of cereals, floor, starch, etc.	133	0	0.0	0.0	0.0	0	0	0
20	Prep. of vegetables, fruit, nuts, etc.	552	335	60.7	0.0	60.7	0	335	0
21	Miscellaneous edible preparations	111	27	24.3	4.5	19.8	5	22	0
22	Beverages, spirit & vinegar	248	157	63.3	0.0	63.3	0	157	0
23	Residues & waste from food industries	73	20	27.4	2.7	24.7	2	18	0
24	Tobacco & manufactured tobacco	41	25	61.0	0.0	61.0	0	25	0
25	Salt, sulphu, earths & stone plaster, etc.	99	0	0.0	0.0	0.0	0	0	0
26	Ores, slag and ash	40	0	0.0	0.0	0.0	0	0	0
27	Mineral fuels mineral oils & products	112	2	1.8	0.0	1.8	0	2	0
28	Inorganic chemicals compounds, etc.	299	19	6.4	0.0	6.4	0	19	0
29	Organic chemicals	890	84	9.4	2.2	7.2	20	64	0
30	Pharmaceutical Products	81	0	0.0	0.0	0.0	0	0	0
31	Fertilisers	36	16	44.4	0.0	44.4	0	16	0
32	Tanning or dyeing extracts	80	1	1.3	0.0	1.3	0	1	0
33	Essential oils & resinoids	59	0	0.0	0.0	0.0	0	0	0
34	Soap, organic surface active agents	31	0	0.0	0.0	0.0	0	0	0
35	Albuminiodal substance; modified	40	0	0.0	0.0	0.0	0	0	0
36	Expolosives: pyrotechnic products	10	0	0.0	0.0	0.0	0	0	0
37	Photographic or cinematographic goods	65	0	0.0	0.0	0.0	0	0	0
38	Miscellaneous chemical products	205	54	26.3	0.0	26.3	0	54	0
39	Plastics and articles thereof	517	27	5.2	0.0	5.2	0	27	0
40	Rubber and articles thereof	103	0	0.0	0.0	0.0	0	0	0
41	Raw hides & skins (other than furskin)	56	50	89.3	89.3	0.0	50	0	0
42	Articles of leather, saddlery & ham	55	21	38.2	38.2	0.0	21	0	0
43	Furskins and artificial fur	46	33	71.7	71.7	0.0	33	0	0
44	Wood & articles of wood	180	18	10.0	10.0	0.0	18	0	0
45	Cork and articles of cork	9	0	0.0	0.0	0.0	0	0	0
46	Manufactures of straw, of esparto, etc.	12	0	0.0	0.0	0.0	0	0	0
47	Pulp of wood or of other fibrous materials	20	0	0.0	0.0	0.0	0	0	0

48	Paper and parperboard	208	2	1.0	0.0	1.0	0	2	0
49	Printed books, newspapers, pictures	24	0	0.0	0.0	0.0	0	0	0
50	Silk	50	0	0.0	0.0	0.0	0	0	0
51	Wool, fine or coarse animal hair	72	4	5.6	5.6	0.0	4	0	0
52	Cotton	316	30	9.5	0.0	9.5	0	30	0
53	Other vegetable textile fibers; paper	58	0	0.0	0.0	0.0	0	0	0
54	Man-made filaments	119	0	0.0	0.0	0.0	0	0	0
55	Man-made staple fibres	186	3	1.6	0.0	1.6	0	3	0
56	Wadding, felt and non-wovens; special	123	0	0.0	0.0	0.0	0	0	0
57	Carpets & other textile floor covering	56	0	0.0	0.0	0.0	0	0	0
58	Special woven fabrics; tufted textile	83	0	0.0	0.0	0.0	0	0	0
59	Impregnated, coated, textile fabrics	59	0	0.0	0.0	0.0	0	0	0
60	Knitted or crocheted fabrics	49	0	0.0	0.0	0.0	0	0	0
61	Articles of apparel & clothing knitted	193	0	0.0	0.0	0.0	0	0	0
62	Articles of apparel & cloth not knitted	281	0	0.0	0.0	0.0	0	0	0
63	Other made up textile articles	144	2	1.4	0.0	1.4	0	2	0
64	footwear, gaiters & like; parts of article	154	154	100.0	58.4	100.0	90	154	0
65	Headgear & parts thereof	14	1	7.1	7.1	0.0	1	0	0
66	Umbrellas, sun umbrella, walking-stick	8	3	37.5	37.5	0.0	3	0	0
67	Prepared feathers & down & articles	8	1	12.5	12.5	0.0	1	0	0
68	Articles of stone, plaster, cement, etc.	65	0	0.0	0.0	0.0	0	0	0
69	Ceramic products	55	0	0.0	0.0	0.0	0	0	0
70	Glass and glassware	151	0	0.0	0.0	0.0	0	0	0
71	Natural or cultured pearls, Jewellery	69	3	4.3	4.3	0.0	3	0	0
72	Iron and steel	467	347	74.3	0.0	74.3	0	347	0
73	Articles of Iron or steel	354	29	8.2	0.0	8.2	0	29	0
74	Cooper and articles thereof	75	0	0.0	0.0	0.0	0	0	0
75	Nickel and articles thereof	17	0	0.0	0.0	0.0	0	0	0
76	Aluminiumand articles thereof	84	0	0.0	0.0	0.0	0	0	0
77	(Reserved for possible future use)	0	0	0.0	0.0	#DIV/0!	0	0	0
78	Lead and articles thereof	13	0	0.0	0.0	0.0	0	0	0
79	Zinc and articles thereof	13	0	0.0	0.0	0.0	0	0	0
80	Tin and articles thereof	9	0	0.0	0.0	0.0	0	0	0
81	Other base materials; cermets; articles	84	9	10.7	0.0	10.7	0	9	0
82	Tools, implements, cultery, spoon, etc.	91	0	0.0	0.0	0.0	0	0	0
83	Miscellaneous articles of base metal	48	2	4.2	0.0	4.2	0	2	0
84	Nuclear reactors, boilers, machinery	1016	7	0.7	0.0	0.7	0	7	0
85	Electrical machinery & equp & parts	1334	27	2.0	0.0	2.0	0	27	0
86	Railway or tramway locomotives	37	0	0.0	0.0	0.0	0	0	0
87	Vehicles other than railway or tram	162	20	12.3	0.0	12.3	0	20	0
88	Aircraft, spacecraft & parts therof	38	0	0.0	0.0	0.0	0	0	0
89	Ships, boats & floating structures	40	0	0.0	0.0	0.0	0	0	0
90	Optical, photographic, cinematograph, etc.	327	4	1.2	0.6	0.6	2	2	0
91	Clocks and watches and parts	88	6	6.8	6.8	0.0	6	0	0
92	Musical instruments; parts & access	31	11	35.5	35.5	0.0	11	0	0
93	Arm & ammunition; part & access	25	2	8.0	8.0	0.0	2	0	0
94	Furniture; bedding, mattresses	104	0	0.0	0.0	0.0	0	0	0
95	Toys, games & sports, requisite	86	5	5.8	5.8	0.0	5	0	0
96	Misc Manufactured articles	69	18	26.1	23.2	2.9	16	2	0
97	Works of art, collectors' pieces	5	1	20.0	20.0	0.0	1	0	0
	Total	14250	2926	20.5	5.3	17.8	759	2076	456

[Source of Data - UNCTAD, Trade Analysis and Information System, Winter 1998.

Table 4: Distribution of Environment-sensitive NTMs in the EU: Section-wise Analysis (1996).

Section	Product Description	CITES	Montreal Protocol(Quota)	Prohibition	CITES and Monetary Protocol	Montreal Protocol And Prohibition	All the three Types of NTMs
I	Live Animals and Animal Products	345	0	0	0	0	0
II	Vegetable Products	82	0	0	0	0	0
III	Animal or veg fats & oils	12	0	0	0	0	0
IV	Prepared foodstuff, Beverages, etc.	33	0	0	0	0	0
V	Mineral Products	0	0	0	0	0	0
VI	Products of the Chemicals	0	0	0	0	20	0
VII	Plastics & Articles thereof	0	0	0	0	0	0
VIII	Raw Hides & Skins, Leather	104	0	0	0	0	0
IX	Wood & articles of wood	18	0	0	0	0	0
X	Pulp of wood or of other Fibers	0	0	0	0	0	0
XI	Textile & Textile Articles	4	0	0	0	0	0
XII	Footwear, headgear, Umbrellas	95	0	0	0	0	0
XIII	Articles of stone, Plaster, Cement	0	0	0	0	0	0
XIV	Natural or cultured pearls, Jewellery	3	0	0	0	0	0
XV	Base Metals & Articles of Base Metal	0	0	0	0	0	0
XVI	Machinery & Mechanical Appliances	0	0	0	0	0	0
XVII	Vehicles, Aircraft, Vessels	0	0	0	0	0	0
XVIII	Optical, Photograph, cinematographic	19	0	0	0	0	0
XIX	Arms & ammunition	2	0	0	0	0	0
XX	Misc manufactured Articles	21	0	0	0	0	0
XXI	Works of Art Collectors' Pieces	1	0	0	0	0	0
	Total	739	0	0	0	20	0

Source of Data : UNCTAD, Trade Analysis and Information System, Winter 1998.

Table 5. Distribution of Environment-sensitive NTMs in the EU: Chapter-wise Analysis (1996)

Section	Product Description	CITES	Montreal Protocol (Quota)	Prohibition	CITES and Montreal Protocol	Montreal Protocol and Prohibition	All the three Types of NTMs
1	Live Animal	52	0	0	0	0	0
2	Meat and edible meat offal	154	0	0	0	0	0
3	Fish & crustaceans, molluses	126	0	0	0	0	0
4	Diary produce: birds, eggs	3	0	0	0	0	0
5	Products of animal orgin	10	0	0	0	0	0
6	Live trees and other plants bulb	81	0	0	0	0	0
7	Edible vegetables & certain roots	0	0	0	0	0	0
8	Edible fruits & nuts: peel or melon	0	0	0	0	0	0
9	Coffee, tea, mate and spices	0	0	0	0	0	0
10	Cereals	0	0	0	0	0	0
11	Products of the milling industry	0	0	0	0	0	0
12	Oil seeds and leoginous fruits	0	0	0	0	0	0
13	Lac; gums, resins & other vegetable .	0	0	0	0	0	0
14	Vegetable plaiting materials	1	0	0	0	0	0
15	Animal or vegetable fats & oils	12	0	0	0	0	0
16	Preparations of meat and fish	26	0	0	0	0	0
17	Sugars and sugar confectionery	0	0	0	0	0	0
18	Cocoa & cocoa preparations	0	0	0	0	0	0
19	Prep. of cereals, floor, starch, etc.	0	0	0	0	0	0
20	Prep. of vegetables, fruit, nuts, etc.	0	0	0	0	0	0
21	Miscellaneous edible preparations	5	0	0	0	0	0
22	Beverages, spirit & vinegar	0	0	0	0	0	0
23	Residues & waste from food industries	2	0	0	0	0	0
24	Tobacco & manufactured tobacco	0	0	0	0	0	0
25	Salt, sulphu, earths & stone plaster, etc.	0	0	0	0	0	0
26	Ores, slag and ash	0	0	0	0	0	0
27	Mineral fuels mineral oils & products	0	0	0	0	0	0
28	Inorganic chemicals compounds, etc.	0	0	0	0	0	0
29	Organic chemicals	0	0	0	0	20	0
30	Pharmaceutical Products	0	0	0	0	0	0
31	Fertilisers	0	0	0	0	0	0
32	Tanning or dyeing extracts	0	0	0	0	0	0
33	Essential oils & resinoids	0	0	0	0	0	0
34	Soap, organic surface active agents	0	0	0	0	0	0
35	Albumminodal substance; modified	0	0	0	0	0	0
36	Expolosives; pyrotechnic products	0	0	0	0	0	0
37	Photographic or cinematographic goods	0	0	0	0	0	0
38	Miscellaneous chemical products	0	0	0	0	0	0
39	Plastics and articles thereof	0	0	0	0	0	0
40	Rubber and articles thereof	0	0	0	0	0	0
41	Raw hides & skins (other than furskin)	50	0	0	0	0	0
42	Articles of leather, saddlery & ham	21	0	0	0	0	0
43	Furskins and artificial fur	33	0	0	0	0	0
44	Wood & articles of wood	18	0	0	0	0	0
45	Cork and articles of cork	0	0	0	0	0	0
46	Manufactures of straw, of esparto, etc.	0	0	0	0	0	0

47	Pulp of wood or of other fibrous materials	0	0	0	0	0	0
48	Paper and parperboard	0	0	0	0	0	0
49	Printed books. newspapers, pictures	0	0	0	0	0	0
50	Silk	0	0	0	0	0	0
51	Wool, fine or coarse animal hair	4	0	0	0	0	0
52	Cotton	0	0	0	0	0	0
53	Other vegetable textile fibers; paper	0	0	0	0	0	0
54	Man-made filaments	0	0	0	0	0	0
55	Man-made staple fibres	0	0	0	0	0	0
56	Wadding, felt and non-wovens; special	0	0	0	0	0	0
57	Carpets & other textile floor covering	0	0	0	0	0	0
58	Special woven fabrics; tufted textile	0	0	0	0	0	0
59	Impregnated. coated, textile fabrics	0	0	0	0	0	0
60	Knitted or crocheted fabrics	0	0	0	0	0	0
61	Articles of apparel & clothing knitted	0	0	0	0	0	0
62	Articles of apparel & cloth not knitted	0	0	0	0	0	0
63	Other made up textile articles	0	0	0	0	0	0
64	footwear, gaiters & like; parts of article	90	0	0	0	0	0
65	Headgear & parts thereof	1	0	0	0	0	0
66	Umbrellas, sun umbrella, walking-stick	3	0	0	0	0	0
67	Prepared feathers & down & articles	1	0	0	0	0	0
68	Articles of stone, plaster, cement, etc.	0	0	0	0	0	0
69	Ceramic products	0	0	0	0	0	0
70	Glass and glassware	0	0	0	0	0	0
71	Natural or cultured pearls, Jewellery	3	0	0	0	0	0
72	Iron and steel	0	0	0	0	0	0
73	Articles of Iron or steel	0	0	0	0	0	0
74	Cooper and articles thereof	0	0	0	0	0	0
75	Nickel and articles thereof	0	0	0	0	0	0
76	Aluminiumand articles thereof	0	0	0	0	0	0
77	(Reserved for possible future use)	0	0	0	0	0	0
78	Lead and articles thereof	0	0	0	0	0	0
79	Zinc and articles thereof	0	0	0	0	0	0
80	Tin and articles thereof	0	0	0	0	0	0
81	Other base materials; cermets; articles	0	0	0	0	0	0
82	Tools, implements, cultery, spoon, etc.	0	0	0	0	0	0
83	Miscellaneous articles of base metal	0	0	0	0	0	0
84	Nuclear reactors, boilers, machinery	0	0	0	0	0	0
85	Electrical machinery & equp & parts	0	0	0	0	0	0
86	Railway or tramway locomotives	0	0	0	0	0	0
87	Vehicles other than railway or tram	0	0	0	0	0	0
88	Aircraft, spacecraft & parts therof	0	0	0	0	0	0
89	Ships, boats & floating structures	0	0	0	0	0	0
90	Optical, photographic, cinematgraph. etc.	2	0	0	0	0	0
91	Clocks and watches and parts	6	0	0	0	0	0
92	Musical instruments; parts & access	11	0	0	0	0	0
93	Arm & ammunition; part & access	2	0	0	0	0	0
94	Furniture; bedding, mattresses	0	0	0	0	0	0
95	Toys, games & sports, requisite	5	0	0	0	0	0
96	Misc. Manufactured articles	16	0	0	0	0	0
97	Works of art, collectors' pieces	1	0	0	0	0	0
	Total	739	0	0	0	20	0

Source of Data : UNCTAD, Trade Analysis and Information System, Winter 1998.

Table 6: HS Section-wise Distrubution of Average Tariff in the EU in 1996.

Section	Product Description	Average* Tariff (per cent)	Number of Lines	
			Tariff	Specific Tariff
I	Live Animals and Animal Products	9.4	622	537
II	Vegetable Products	9.3	865	428
III	Animal or veg fats & oils	7.5	138	10
IV	Prepared foodstuff, Beverages, etc.	17.5	715	728
V	Mineral Products	0.8	247	4
VI	Products of the Chemicals	3.8	1768	28
VII	Plastics & Articles thereof	6.9	620	0
VIII	Raw Hides & Skins, Leather	3.1	157	0
IX	Wood & articles of wood	2.9	201	0
X	Pulp of wood or of other Fibers	4.5	252	0
XI	Textile & Textile Articles	9.2	1786	3
XII	Footwear, headgear, Umbrellas	8.7	184	0
XIII	Articles of stone, Plaster, Cement	4.4	261	10
XIV	Natural or cultured pearls, Jewellery	1.0	69	0
XV	Base Metals & Articles of Base Metal	3.6	1255	0
XVI	Machinery & Mechanical Appliances	2.5	2350	0
XVII	Vehicles, Aircraft, Vessels	4.8	277	0
XVIII	Optical, Photograph, cinematographic	3.0	414	32
XIX	Arms & ammunition	2.9	25	0
XX	Misc manufactured Articles	3.5	259	0
XXI	Works of Art Collectors' Pieces	0.0	6	0
	Total	5.9	12471	1780

Source of Data : UNCTAD, Trade Analysis and Information System, Winter 1998.
Note: *Specific tariffs are not included in the calculation. There are about 1780 product lines (national lines) which are subject to specific tariffs.

Table 7: HS Chapter-wise Distribution of Average Tariff in the EU in 1996

Chapter	Product Description	Average* Tariff	Number of lines
1	Live Animal	3.1	17
2	Meat and edible meat offal	5.8	66
3	Fish & crustaceans, molluscs	10.5	506
4	Diary produce: birds, eggs	6.6	10
5	Products of animal orgin	0.4	23
6	Live trees and other plants bulb	10.4	94
7	Edible vegetables & certain roots	11.1	240
8	Edible fruits & nuts: peel or melon	11.1	330
9	Coffee, tea, mate and spices	3.3	59
10	Cereals	4.0	8
11	Products of the milling industry	13.4	7
12	Oil seeds and leoginous fruits	1.4	79
13	Lac: gums, resins & other vegetable	9.5	36
14	Vegetable plaiting materials	0.0	12
15	Animal or vegetable fats & oils	7.5	138
16	Preparations of meat and fish	17.9	175
17	Sugars and sugar confectionery	13.3	3
18	Cocoa & cocoa preparations	7.6	8
19	Prep. of cereals, floor, starch, etc.	14.8	12
20	Prep. of vegetables, fruit, nuts, etc.	19.5	405
21	Miscellaneous edible preparations	10.4	62
22	Beverages, spirit & vinegar	11.8	9
23	Residues & waste from food industries	2.1	33
24	Tobacco & manufactured tobacco	48.2	8
25	Salt, sulphu, earths & stone plaster, etc.	0.3	95
26	Ores, slag and ash	0.0	40
27	Mineral fuels mineral oils & products	1.6	112
28	Inorganic chemicals compounds, etc.	4.8	299
29	Organic chemicals	3.3-	885
30	Pharmaceutical Products	0.0	81
31	Fertilisers	3.8	36
32	Tanning or dyeing extracts	5.8	80
33	Essential oils & resinoids	3.2	57
34	Soap, organic surface active agents	3.0	31
35	Albuminiodal substance; modified	5.2	30
36	Expolosives: pyrotechnic products	6.5	10
37	Photographic or cinematographic goods	5.0	62
38	Miscellaneous chemical products	5.3	197
39	Plastics and articles thereof	7.8	517
40	Rubber and articles thereof	2.5	103
41	Raw hides & skins (other than furskin)	2.3	56
42	Articles of leather, saddlery & ham	4.9	55
43	Furskins and artificial fur	1.7	46
44	Wood & articles of wood	2.8	180
45	Cork and articles of cork	3.2	9
46	Manufactures of straw, of esparto, etc.	3.3	12
47	Pulp of wood or of other fibrous materials	0.0	20
48	Paper and parperboard	5.3	208
49	Printed books, newspapers, pictures	1.6	24
50	Silk	5.5	50
51	Wool, fine or coarse animal hair	6.9	72
52	Cotton	8.4	316

53	Other vegetable textile fibers; paper	4.0	58
54	Man-made filaments	7.9	119
55	Man-made staple fibres	8.3	186
56	Wadding, felt and non-wovens; special	6.7	123
57	Carpets & other textile floor covering	8.1	53
58	Special woven fabrics; tufted textile	9.0	83
59	Impregnated, coated, textile fabrics	7.2	59
60	Knitted or crocheted fabrics	10.2	49
61	Articles of apparel & clothing knitted	12.5	193
62	Articles of apparel & cloth not knitted	12.4	281
63	Other made up textile articles	10.6	144
64	footwear, gaiters & like; parts of article	9.7	154
65	Headgear & parts thereof	3.1	14
66	Umbrellas, sun umbrella, walking-stick	4.6	8
67	Prepared feathers & down & articles	3.4	8
68	Articles of stone, plaster, cement, etc.	1.8	65
69	Ceramic products	5.3	55
70	Glass and glassware	5.3	141
71	Natural or cultured pearls, Jewellery	1.0	69
72	Iron and steel	3.0	467
73	Articles of Iron or steel	4.0	354
74	Cooper and articles thereof	3.6	75
75	Nickel and articles thereof	1.2	17
76	Aluminiumand articles thereof	6.8	84
77	(Reserved for possible future use)	0	0
78	Lead and articles thereof	3.1	13
79	Zinc and articles thereof	3.5	13
80	Tin and articles thereof	0.5	9
81	Other base materials; cermets; articles	4.0	84
82	Tools, implements, cultery, spoon, etc.	3.8	91
83	Miscellaneous articles of base metal	2.5	48
84	Nuclear reactors, boilers, machinery	2.0	1016
85	Electrical machinery & equp & parts	3.0	1334
86	Railway or tramway locomotives	2.4	37
87	Vehicles other than railway or tram	6.9	162
88	Aircraft, spacecraft & parts therof	2.0	38
89	Ships, boats & floating structures	1.2	40
90	Optical, photographic, cinematgraph, etc.	2.7	327
91	Clocks and watches and parts	4.2	56
92	Musical instruments; parts & access	3.7	31
93	Arm & ammunition; part & access	2.9	25
94	Furniture; bedding, mattresses	2.7	104
95	Toys, games & sports, requisite	4.2	86
96	Misc. Manufactured articles	3.8	69
97	Works of art, collectors' pieces	0.0	6
	Total	5.95	12471

Source of Data : UNCTAD, Trade Analysis and Information System, Winter 1998.
Note : Specific tariffs are not included in the calculation. There are about 1780 product lines (national lines) which are subject to specific tariffs.

Table 8: Pattern of Specific tariffs and Environment-related NTMs in the EU: Section-wise Analysis

Section	Product Description	No. of Lines: Specific Tariff	No. of Lines: Nominal Tariff	Env. NTMs with Specific Tariff	Other NTMs with Specific Tariff	Total No. Of Lines
1	Live Animals and Animal Products	537	622	171	381	1159
2	Vegetable Products	428	865	0	307	1293
3	Animal or veg fats & oils	10	138	0	0	148
4	Prepared foodstuff, Beverages, etc.	728	715	2	317	1443
5	Mineral Products	4	247	0	0	251
6	Products of the Chemicals	28	1768	0	0	1796
7	Plastics & Articles thereof	0	620	0	0	620
8	Raw Hides & Skins, Leather	0	157	0	0	157
9	Wood & articles of wood	0	201	0	0	201
10	Pulp of wood or of other Fibers	0	252	0	0	252
11	Textile & Textile Articles	3	1786	0	0	1789
12	Footwear, headgear, Umbrellas	0	184	0	0	184
13	Articles of stone, Plaster, Cement	10	261	0	0	271
14	Natural or cultured pearls, Jewellery	0	69	0	0	69
15	Base Metals & Articles of Base Metal	0	1255	0	0	1255
16	Machinery & Mechanical Appliances	0	2350	0	0	2350
17	Vehicles, Aircraft, Vessels	0	277	0	0	277
18	Optical, Photograph, cinematographic	32	414	0	0	446
19	Arms & ammunition	0	25	0	0	25
20	Misc manufactured Articles	0	259	0	0	259
21	Works of Art Collectors' Pieces	0	6	0	0	6
	Total	1780	12471	173	1005	14251

Source of Data : UNCTAD, Trade Analysis and Information System (TRAINS), Winter 1998.

Table 9: Pattern of Specific tariffs and Environment-related NTMs in the EU: Chapter-wise Analysis

Chapter	Product Description	No. of Lines: Specific Tariff	No. of Lines: Nominal Tariff	Env NTMs with Specific Tariff	Other NTMs with Specific Tariff	Total No. Of Lines
1	Live Animal	61	17	45	48	78
2	Meat and edible meat offal	270	66	126	140	336
3	Fish & crustaceans, molluscs	0	506	0	0	506
4	Diary produce: birds, eggs	206	10	0	193	216
5	Products of animal orgin	0	23	0	0	23
6	Live trees and other plants bulb	0	94	0	0	94
7	Edible vegetables & certain roots	126	240	0	109	366
8	Edible fruits & nuts: peel or melon	146	330	0	146	476
9	Coffee, tea, mate and spices	0	59	0	0	59
10	Cereals	71	8	0	48	79
11	Products of the milling industry	82	7	0	1	89
12	Oil seeds and leoginous fruits	3	79	0	3	82
13	Lac; gums, resins & other vegetable	0	36	0	0	36
14	Vegetable plaiting materials	0	12	0	0	12
15	Animal or vegetable fats & oils	10	138	0	0	148
16	Preparations of meat and fish	17	175	2	15	192
17	Sugars and sugar confectionery	48	3	0	0	51
18	Cocoa & cocoa preparations	34	8	0	0	42
19	Prep. of cereals, floor, starch, etc.	121	12	0	0	133
20	Prep. of vegetables, fruit, nuts, etc.	147	405	0	106	552
21	Miscellaneous edible preparations	49	62	0	5	111
22	Beverages, spirit & vinegar	239	9	0	156	248
23	Residues & waste from food industries	40	33	0	15	73
24	Tobacco & manufactured tobacco	33	8	0	20	41
25	Salt, sulphu, earths & stone plaster, etc.	4	95	0	0	99
26	Ores, slag and ash	0	40	0	0	40
27	Mineral fuels mineral oils & products	0	112	0	0	112
28	Inorganic chemicals compounds, etc.	0	299	0	0	299
29	Organic chemicals	5	885	0	0	890
30	Pharmaceutical Products	0	81	0	0	81
31	Fertilisers	0	36	0	0	36
32	Tanning or dyeing extracts	0	80	0	0	80
33	Essential oils & resinoids	2	57	0	0	59
34	Soap, organic surface active agents	0	31	0	0	31
35	Albuminiodal substance; modified	10	30	0	0	40
36	Expolosives; pyrotechnic products	0	10	0	0	10
37	Photographic or cinematographic goods	3	62	0	0	65
38	Miscellaneous chemical products	8	197	0	0	205
39	Plastics and articles thereof	0	517	0	0	517
40	Rubber and articles thereof	0	103	0	0	103
41	Raw hides & skins (other than furskin)	0	56	0	0	56
42	Articles of leather, saddlery & ham	0	55	0	0	55
43	Furskins and artificial fur	0	46	0	0	46
44	Wood & articles of wood	0	180	0	0	180
45	Cork and articles of cork	0	9	0	0	9
46	Manufactures of straw, of esparto, etc.	0	12	0	0	12
47	Pulp of wood or of other fibrous materials	0	20	0	0	20
48	Paper and parperboard	0	208	0	0	208
49	Printed books, newspapers, pictures	0	24	0	0	24

50	Silk	0	50	0	0	50
51	Wool, fine or coarse animal hair	0	72	0	0	72
52	Cotton	0	316	0	0	316
53	Other vegetable textile fibers; paper	0	58	0	0	58
54	Man-made filaments	0	119	0	0	119
55	Man-made staple fibres	0	186	0	0	186
56	Wadding, felt and non-wovens; special	0	123	0	0	123
57	Carpets & other textile floor covering	3	53	0	0	56
58	Special woven fabrics; tufted textile	0	83	0	0	83
59	Impregnated, coated, textile fabrics	0	59	0	0	59
60	Knitted or crocheted fabrics	0	49	0	0	49
61	Articles of apparel & clothing knitted	0	193	0	0	193
62	Articles of apparel & cloth not knitted	0	281	0	0	281
63	Other made up textile articles	0	144	0	0	144
64	footwear, gaiters & like; parts of article	0	154	0	0	154
65	Headgear & parts thereof	0	14	0	0	14
66	Umbrellas, sun umbrella, walking-stick	0	8	0	0	8
67	Prepared feathers & down & articles	0	8	0	0	8
68	Articles of stone, plaster, cement, etc.	0	65	0	0	65
69	Ceramic products	0	55	0	0	55
70	Glass and glassware	10	141	0	0	151
71	Natural or cultured pearls, Jewellery	0	69	0	0	69
72	Iron and steel	0	467	0	0	467
73	Articles of Iron or steel	0	354	0	0	354
74	Cooper and articles thereof	0	75	0	0	75
75	Nickel and articles thereof	0	17	0	0	17
76	Aluminiumand articles thereof	0	84	0	0	84
77	(Reserved for possible future use)	0	0	0	0	0
78	Lead and articles thereof	0	13	0	0	13
79	Zinc and articles thereof	0	13	0	0	13
80	Tin and articles thereof	0	9	0	0	9
81	Other base materials; cermets; articles	0	84	0	0	84
82	Tools, implements, cultery, spoon, etc.	0	91	0	0	91
83	Miscellaneous articles of base metal	0	48	0	0	48
84	Nuclear reactors, boilers, machinery	0	1016	0	0	1016
85	Electrical machinery & equp & parts	0	1334	0	0	1334
86	Railway or tramway locomotives	0	37	0	0	37
87	Vehicles other than railway or tram	0	162	0	0	162
88	Aircraft, spacecraft & parts therof	0	38	0	0	38
89	Ships, boats & floating structures	0	40	0	0	40
90	Optical, photographic, cinematgraph, etc.	0	327	0	0	327
91	Clocks and watches and parts	32	56	0	0	88
92	Musical instruments; parts & access	0	31	0	0	31
93	Arm & ammunition; part & access	0	25	0	0	25
94	Furniture; bedding, mattresses	0	104	0	0	104
95	Toys, games & sports, requisite	0	86	0	0	86
96	Misc. Manufactured articles	0	69	0	0	69
97	Works of art, collectors' pieces	0	6	0	0	6
	Total	1780	12471	173	1005	14251

Source of Data : UNCTAD, Trade Analysis and Information System (TRAINS), Winter 1998.

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4 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of India

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4.1 Introduction

The debate on the impact of trade liberalization has intensified with a growing literature on the effects of international trade patterns on the environment. Many participants in the trade and environment debate, in particular, have feared that there could be conflicts between trade liberalization The issues of environmental regulation and international competitiveness revolves round the question of harmonization of standards[1] and that competitve deregulation could lead to downward harmonization of environmental standards. In the context of WTO, the nature of linkage between trade and environmental measures in promoting sustainable development has become a major concern for the developing countries. An added dimension to this debate pertains to the national technical regulations and standards pertaining to environment. These environmental standards, often resorted to by Northern developed countries, are seen as non-tariff barriers against Southern trade. Further, the distinction between environmental standards and health and quality standards is gradually becoming very blurred. Though empirical evidence on this in the literature is extremely limited, some developing countries have experienced losses in exports because of difficulties to comply with certain sanitary and phyto-sanitary (SPS) measures in the import markets.

Generally, the trade impacts of SPS measures can be grouped into three: First, they can prohibit trade by imposing trade ban on the product or on the inputs used for its production. Second, they can divert trade from one trading partner to another by laying down regulations that discriminate across potential supplies. Third, they can reduce overall trade flows by increasing costs or raising barriers for all potential suppliers.

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[1] Nordstrom *et al* (1999), Bhagwati (1996) and Pearson (2000)

As the liberalization of tariff and quantitative restrictions on trade in agricultural and food products has progressed, attention has focussed on technical measures such as food safety regulation, labeling requirement and quality standards. The Agreement on Sanitary and Phyto-Sanitary (SPS) measures seeks to protect consumers by providing rules for food safety and animal and plant health. In certain cases, stricter SPS measures are applied to imports than domestic supplies. Given the nature and depth of existing regulatory structures in case of SPS in developed countries, developing countries often find a difficult to comply with such standards. At times, it seems that, SPS measures may impede trade in agricultural and food products since in many instances they are incompatible with prevailing systems of production and marketing. The developing countries often lack appropriate scientific and technical expertise to deal with such standards. Moreover, the multiplicity of standards in the developed country markets has further compounded the problems being faced by developing country exporters.

It has been agreed at the recently held WTO Ministerial Conference at Doha that negotiations on issues relating to SPS measures will be addressed on priority basis in the next ministerial conference. In this regard, the Committee on Trade and Environment (CTE) has been instructed to give particular attention to the effect of environmental measures on market access and trade. This has become relevant in light of the fact that the past decade has seen a global proliferation of environment and health related standards along with a rise in the trade in environmentally sensitive goods. Since the inception of WTO, some 2300 notifications have been received and almost 11 per cent of them are related to environment[2]. The critics of increasing regulations have protested that stringent environmental regulations force manufactures of pollution-intensive products overseas. It is feared that differences in environmental regulations across the globe is leading to relocation of industries from countries with high environmental process standards to countries with relatively less stringent environmental regulations.

This paper aims at examining these emerging issues in the Indian context. Section II takes a stock of trends in the trade of environmentally sensitive goods and India's position in the South Asian context. Section III is an attempt to analyse the whole issue of translocation of dirty industries to India on the basis of available evidence. In the section IV, we have tried to identify

[2] Nordstrom and Vaughan (1999)

certain emerging challenges while the last section gives the concluding remarks and policy recommendations.

4.2 Environment related Non Tariff Barriers (ETBs) and India

Environmental and health related standards and regulations in the developed country markets have the potential to create barriers to trade. However, now it is clear that The ETBs generally cover all barriers that have been introduced by the importing country to protect the environment, as well as the health and safety of wildlife, plants, animals and humans. The developing countries have had to adjust their production processes in response to changing environmental regulations in the developed countries. Measures such as pesticide residue levels (MRL) permitted in foodstuffs, emissions standards for machines, and packaging requirements have exerted pressure on the exporters. However, what remains to be seen is the extent of impact of these measures on trade. It is now widely believed that these technical measures impede trade of the developing countries, either implicitly or explicitly.

There are very few studies, which have quantified the impact of Environment related Trade Barriers (ETBs) on global trade in general and fewer for South Asia, in particular. The issue of compliance cost is equally concerning for the developing countries, for instance, the costs of upgrading sanitary conditions in the Bangladesh frozen shrimp industry to satisfy EU and US hygiene requirements is estimated to be $ 17.6 million in 1997-98[3]. The total industry cost, that is required to maintain Hazard Analysis Critical Control Point (HACCP), is $2.2 million per annum. The European standards are more stringent than HACCP methods. In the case of marine products, EU regulations concerning implementation of food safety systems, additive requirements and other process controls are of very high order. As a result, many of the Indian companies were required to upgrade their facilities, which amounts to a huge expenditure and a number of companies were also forced to close down their factories for a long duration to enable them to upgrade their facilities with heavy investments. Currently, only 90 out of 404 plants in India are approved for fishery exports to EU[4].

[3] Cato (1998)
[4] ibid.

Bharucha (2000) conducted a detailed questionnaire-based survey with number of industry representatives and institutions in tea, dyes, agriculture products and processed foods, marine products, leather, textiles, and the refrigeration and air- conditioning industry in India. This study points out that the competitiveness of these exportables is likely to be impaired by the introduction of stringent environmental standards in OECD member-country markets. The main conclusion emanating from the study is that compliance with external eco-standards often necessitated the import of inputs and technology, which were likely to raise the cost of production and price of output. Since competitiveness of many Indian exports is based on price factors, such price rise could hamper India's competitiveness Jha and Vossenaar (2000) further point out that the competitiveness effects of increased environmental compliance costs largely depend on the share of corresponding cost categories in total production costs. Thus low valued products may be relatively vulnerable. For example, packaging requirements may have more significant effects on certain fruit and vegetables than on high-value added products. They also give the example of textile industry in India. They estimate that average raw material, of which dyes are a significant proportion, represent around 60 per cent of the cost of production. Expensive environment-friendly dyes may have a significant bearing on the production costs. However, no substantial studies are available where this impact has been quantified.

4.2.1 Indian Exports

Indian exports have registered a strong growth over the past decade. It has grown from $ 18,477 million in 1990-91 to $ 21,588 million in 2001-2002 (Table 1). The growth of exports over the decade was spread across all the major commodity categories. India's exports of agricultural and allied products have increased by about $40 million from 1998 to 2001. However, the share of agriculture in total exports has fallen from about 18 per cent in 1998-99 to 14 per cent in 2000-01. Marine products form a bulk of the exports of agricultural products. More than 3 per cent of India's exports are marine products. In 1999-2001, marine products worth $ 1183 million were exported. Manufactured goods on the other hand form more than 78 per cent of total exports of India. The export of textile fabrics and manufactures are about 31 per cent of total manufactured goods exports. More than 4 per cent of manufactured goods exports comprises of leather manufactures and almost 11 per cent of it comprise of chemicals and allied products.

Table 1: Sectoral Profile of Indian Exports

	1998-99		1999-2000		2000-2001	
	Rs. cr	$ million	Rs. cr	$ million	Rs. cr	$ million
Agricultural and allied products	26104	6205	25016	5773	28535	6246
	18.68	18.68	15.68	15.68	14.02	14.02
Fish and fish preparations	4369	1038	5125	1183	6367	1394
	3.13	3.12	3.21	3.21	3.13	3.13
Meat and meat preparations	788	187	819	189	1470	322
	0.56	0.56	0.51	0.51	0.72	0.72
Fruits, vegetables and pulses	931	221	1247	288	1608	352
	0.67	0.67	0.78	0.78	0.79	0.79
Manufactered goods	109787	26096	127532	29431	160771	35192
	78.56	78.56	79.93	79.93	78.98	78.98
Textile fabrics & manufactures	35581	8457	40178	9272	49831	10908
	25.46	25.46	25.18	25.18	24.48	24.48
Leather & leather manufactures	6847	1580	6890	1590	8914	1951
	4.90	4.76	4.32	4.32	4.38	4.38
Chemicals and allied products	14211	3378	17389	4013	22850	5002
	10.17	10.17	10.90	10.90	11.22	11.23
Total	139752	33218	159561	36822	203571	44560

Source: Economic Survey (2002) Ministry of Finance, Government of India

4.2.2 Nature and Composition of ETBs

As the liberalization of tariff and quantitative restrictions on trade in agricultural and food products has progressed, there has been an increased concern about the impact of technical measures especially the environment-related standards on the exports of products. The technical standards such as food safety regulations, labeling requirements and quality and compositional standards have proliferated, particularly in the developed countries.

Major issue of concern is that the distinction between environmental, health and quality standards is gradually becoming very blurred, for instance, in the food sector what may be described as quality standard for food may also fall in the category of environmental standards (see Box 1). Accordingly some of the recent papers have defined environment related trade barriers (ETBs) at a very broad level. It covers considerations for protection of environment;

protection of wild life; protection of plant health; protection of human health and protection of human safety.[5]

Box 1: Emerging Non-Tariff Barriers

Discussions with exporters provided a glimpse of the various hurdles they face. Case in point is the experience of an Indian company, exporting seedless grapes, to a large chain of departmental stores in Europe. Before exporting this company had to fill an elaborate questionnaire, which covered issues like the status of their employees, facilities available to them, and the working conditions. Thus, the exporters are supposed to meet certain social standards before they could start exporting what the importing company is calling as, '*Socially Responsible Trading*'. This department chain has actually come out with a code for its exporters which covers apart from social issues, building health centres and getting new set of imported instruments for fire extinguishing and evaculation belts, etc. The RIS survey shows that the production cost would go up by 35 to 40 per cent because of compliance with this code.

Apart from this, the grape exporters have to meet the various standards prescribed by *Eurepgap*, which would become mandatory by July 2003. The *Eurepgap* certification itself requires the exporters to meet a number of conditions, in case of training, planning and preparations, pesticide record keeping, disposal and post harvest preparation. The European countries levy import duty of additional 12.5 pre cent on Indian grapes, whereas a number of African country are not levied any duty.

Source: Based on Primary Survey of Industries conducted by RIS (2001-02).

In last few years, consumer movement across the world, especially in the developed countries, has become very strong. The conseiousness for quality products has grown tremendously. This has compelled national governments to take adequate precautions in terms of product specifications for both the domestic producers as well as for the exporters to these economies.

However, it is very important to distinguish between precautionary and protectionist ETBs. The methodology generally adopted to identify product specific ETBs is on the basis of frequency of its appearance in the list of notifications by member countries[6]. That is, greater is the number of

[5] Fontagne (2001)
[6] Ibid

countries notifying a particular ETB for a same product, greater is the probability of this being a precautionary measure rather than a trade restrictive measure. It is assumed that when a single country or a limited number of countries enforce an ETB it is more likely that these countries have simply enforced a non-tariff barrier. However, when a large number of countries adopt this then the likelihood of this being real threat to environment is much greater. The TRAINS database from UNCTAD gives a detailed account of non-tariff trade barriers as all WTO members are supposed to notify non-tariff measures[7]. Annexure 1 gives the list of UNCTAD classification of ETBs. Fontagne (2001) has identified 43 out of 115 effective measures, enforced till 1999 from this database, which may be classified as ETBs. At the global level, selected 185 products have been identified in this paper which face environment related trade barriers at least in one importing country. World Imports in these products amounts to US $ 286 billion of which 49 per cent of the total value are affected by ETBs. The distribution by HS classification is very clear, with exception of chemicals and pharmaceuticals, only agro products are the most affected ones[8]. In case of India, we have tried to work out India's exports of these 185 commodities. These are largely agricultural commodities and constitute almost 62 per cent of India's total agricultural exports. Out of this 26 per cent goes to United States, 7 per cent to European Union and 5 per cent to Japan.

It is clear from the Annexure 3 that standards are important subjects of contention among WTO members. According to the WTO Secretariat, 193 disputes have been notified to the WTO. Of these, 32 have been settled, 34 Appellate Body and Panel Reports have been adopted, and 22 cases are active as of 23 May 2000. The rest of the cases are in a consultative phase between affected parties. There have been 25 cases that reference TBT or SPS provisions – 13 per cent of the whole. In its first year of operation, the DSU saw one fourth - 11 out of 44 – of its cases refer to these two agreements. While the actors have largely been developed countries, the developing countries have also played a role. In fact, the first case resolved in the DSU was brought by a developing country – Venezuela, which won the case – and referenced TBT provisions. Most of these disputes are to do with Agriculture and Textile sector, and hence are of great interest to the developing countries.

[7] Though many countries do not notify all the NTBs, so this database has to be approached with caution.
[8] ITC (2001)

The focus of this section is on selected environmentally sensitive product categories in India viz. agriculture and marine products, leather and textiles related products. The affected sectors due to external environmental requirements are found to be India's vibrant export oriented sectors such as leather and leather products, textiles, chemicals, marine products, tea and other agricultural products. The nature of NTBs faced by these sectors range from technical standards, product content requirements to mandatory labelling, eco-labelling, packaging requirements and other SPS related measures Table 2 shows India's exports of certain environmentally sensitive products and their share in total exports.

Agriculture and Marine Products

The share of agricultural exports in total exports was 30 per cent in 1990-91, which has declined to 22 in 2001-2002. A number of agricultural products of India are facing SPS related problems. Agricultural products are under strict supervision especially in the EU where all imported food products are liable for inspection at the first point of entry for compliance with food laws pertaining to the country of entry. The regulations in the EU also stipulate conditions regarding the labelling of packaging materials used in the imported products. In case of products like peanuts, other nuts and milk, EC has introduced high level of protection by reducing the maximum level of presence of aflatoxin in these products. The level of protection proposed by EU is substantially higher than that provided under Codex recommendations. Aflatoxin problem is prevalent in chilies also. Spain recently detained chilli consignments from India. In the case of peanuts, the EU argument has been that the risk involved is of persons contracting cancer in a population of one billion. This is extremely unreasonable because EU population is less than one third of a billion. So the level of SPS protection is not in relation to the extent of risk involved. Though specific measures have been taken in this regard to help out producers and exporters in terms of UNDP supported projects to produce aflatoxin free peanuts[9]. However, wider attempts are yet to be made to internalize the additional cost of compliance in the production structure.

[9] Basu, M. S and Radhakrishanan, Capacity Building in Peanut farms: A success Story; paper presented at the UNCTAD/World Bank workshop on 11-13 January 2001.

The compliance cost for exporters at times is prohibitively high the investment on infrastructure alone ranges from Rs. 12 to 20 lakhs for high performance liquid chromatography[10].

Table 2 - Top ten Indian agricultural trade partners (2001)

Importing countries	Value of imports (US $ million)	Share in total Indian agricultural exports. (%)
European Union	1865.03	22.23
USA	1051.69	12.54
Japan	770.52	9.18
Bangladesh	468.03	5.58
UAE	458.83	5.47
UK	425.85	5.08
Saudi Arabia	391.9	4.67
Hong Kong	342.08	4.08
Russia	317.74	3.79
Italy	314.93	3.75

Source: India Trade version. 2.0

Some of the quarantine restrictions for fresh fruits and vegetables imposed by many countries are also not based on scientific justification. Some of the countries are not even acknowledging the statistics in terms of pest and disease prevalence in various parts of the world, submitted by international organizations. This happened in case of India when china imposed a ban on the grapes for a mediterranean fruit fly that does not exist in India.[11]

In Japan, the food sanitation law prohibits the import of many citrus fruits from India without any justification.[12] Indian flower industry is facing a whole set of NTBs while exporting to Japan. In recent past, Japan has imposed zero tolerance clauses on insects, on the assumption that these could possibly be present in Indian flowers. This clause is imposed on particular insects, which are already present in abundance in Japan. There is another problem with regard to quarantine of flowers[13]. The plant Quarantine Authorities at Japanese airports take a lot of time in the clearance of flower consignments due to elaborate fumigation procedures because of which it takes 5-9 hours to clear a consignment of flowers, which are highly perishable. Many of

[10] Kittu, C., "Issues on SPS and Environmental Standards for India" paper presented at the UNCTAD/World Bank Conference on 11-13 January 2001

[11] Personal Communication with S. Dave, APEDA.

[12] Based on Primary Survey of Industries conducted by RIS.

[13] APEDA 2001.

the South American suppliers of flowers are allowed to do pre-shipment inspection at the port of dispatch. In that case it is possible for Japan to post their inspectors at exit points of flowers. However the cost of posting inspectors is prohibitively high and would render Indian flowers uncompetitive. Another problem that Indian flower exporter face is that Japanese auction houses bring the Indian roses towards the end of the auction process after entire domestic supply is auctioned and also after flowers from other supplier countries have been auctioned. Since flowers are very perishable, this effects their value in the market. As Table 2 shows India's major agricultural trading destines are European Union (22 per cent) and USA (13 per cent) and Japan (9 per cent) . In India, there are growing concerns that the benefits of free access to the OECD market may be undermined by non-tariff barriers of stringent and some time arbitrary environment- related regulations.

Box 2: Multiplicity of Standards

One of the major challenges Indian exporters are facing relates to multiplicity of products and other standards. Though international efforts have been made to harmonise standards across the board but lot has yet to be achieved. Recently, Italy and Germany have detained Indian spice consignments on the ground of pesticide residue. Both the above countries failed to convince Indian exporters on the changes they made on their existing regulations on microbial contaminations and contamination due to p esticide residue. This is a blatant denial of facilities offered under Article 7 of the SPs regulations and is causing not only difficulties for India in its regular exports but also leading to loss of opportunities elsewhere.

The efforts of European Spice Association (ESA) to lay down uniform standards and code of practices in collaboration with the spice trade associations of individual European countries are yet to find wider acceptance at EC levels. Until a common European regulation and code of practice is established, traders have to follow regulation of individual countries

Source: Kim, C (2001)

Food and agriculture form an important part of exports from India. Recently, attempts have been made to widen the range of exports, resulting in the promotion of high-value added items such as processed agro and marine products on our export basket. There are growing concerns that non-tariff barriers of may undermine the benefits of free access to the OECD market stringent and some time arbitrary environment- related regulations. A broader indication of impact of SPS requirements on South Asian exports of agricultural and food products is provided by data on rejections of exports from this region. At present such a data is available only for United States.

Table 4 shows that, over the period August 2000 to July 2001, there were significant rejections of imports from South Asia due to microbiological contamination and filth. More than 40 per cent of rejections of exports from India was due to this reason. FDA rejected about 36 per cent of Bangladesh's exports because of microbiological contamination. This shows the considerable problems that South Asian countries have in meeting basic food hygiene requirements. The table also shows that these countries also have a problem meeting the stringent labeling requirements of the United States. More than 15 per cent of total agricultural imports from India and Sri Lanka were rejected because of their failure to meet these requirements. Other than that inadequate food additives, presence of pesticide residual and heavy metals and low acid canned foods are commonly cited reasons for contravention. Out of 18 import detentions of Sri Lanka, 9 detentions are because of low acid content in the canned food. More sophisticated monitoring and testing facilities, and therefore more costly procedures, are required for meeting these regulations. On top of that, the cost of rejection at the border can be considerable, as it includes loss of product value, transport and other export costs and product re-export or destruction.

Marine products

Marine products are considered to be the most environmentally sensitive products in the international market. In India, till late seventies, the export of marine products mainly consisted of dried items like dried fish, dried shrimp, shark fins and fish maws etc.[14] However, later there was a decline in the export of dried marine products, and subsequently the exports of processed items continued to make steady progress in the marine trade. The markets for Indian marine foods were mainly confined to Singapore, Sri Lanka and Myanmar etc. Afterwards, when the frozen and canned items increasingly figured in the exports basket, USA, France, Canada, Japan and Australia became the important markets for Indian marine products. During 1980's canned items slowly disappeared and frozen items became the prominent ones in India's seafood trade. USA was the principal buyer of Indian frozen shrimp followed by Japan and Western European countries. The demand from Japan included headless shell or shrimp, USA demanded peeled shrimp meat while the European countries preferred the IQF (individually quick frozen) shrimp frozen and cooked form. During 1998-99, Japan continued to be the single largest buyer of Indian marine products accounting for 22.21 per cent in volume and 49.61 per cent in value,

[14] This is based on series of discussion papers brought out by RIS under this project.

whereas USA accounted for 11.38 per cent of volume and 13.34 per cent of the value of marine products exported. Due to import liberalization, during the same period, South East Asian countries also emerged as another important market account for 56.57 per cent in volume and 24.25 per cent in value. As against this, the share of member countries in the European countries was 17.91 per cent by volume and 14.80 per cent by value. Therefore, the export of marine products had grown significantly as one of the important item of India's export from a few million US$ IN 1961-62 TO US$ 1106.9 per cent million in 1997-98 accounting for approx. 3.32 per cent of the total export from India.

Table 3: Number of Contravention cited for US Food and Drug Administration import detention, August 2000-July2001

Reasons for contravention	India	Pakistan	Sri Lanka	Bangladesh	Nepal
Food Additives	159 (7.4)	12 (1.3)		1 (3.0)	
Pesticide Residues	41 (1.9)				
Heavy Metals	13 (0.6)	4 (0.4)			
Mould	9 (0.4)				
Microbiological contamination	329 (15.3)	49 (5.5)		12 (36.4)	
Decomposition	7 (0.3)				
Filth	568 (26.4)	12 (1.3)	2 (11.1)	12 (36.4)	
Low acid canned foods	87 (4.1)	25 (2.8)	9 (50.0)	3 (9.1)	
Labeling	338 (15.7)	50 (5.6)	3 (16.7)	1 (3.0)	
Others	597 (27.8)	744 (83.0)	4 (22.2)	4 (12.1)	1
Total	**2148**	**896**	**18**	**33**	**1**

Source: U S Food and Drug Administration import detention report, 2001.
Note: Parenthesis gives the per centage share

Food Additives implies the presence of unsafe food additives, unsafe colour or other substance, which feared to cause food adulteration; Pesticide residue: presence pesticide residue to the limits that is unsafe; Heavy metals: Presence of poisonous metals which is injurious to health; *Mould: presence of mould in the article.; *Microbiological contamination refers to presence of poisonous bacteria such as Salmonella and Shigella. *Decomposition refers to decomposition of the article because of being prepared packed or held in insanitary conditions

*Filth implies that the article appears to consist in whole or in part of filthy, putrid, or decomposed substance.
**A low acid canned food implies that food may be injurious to health due to inadequate acidification
*Labeling implies violation of labeling requirements because of its placement, form, and or content statement.

Among the ETBs faced by seafood, shrimps from the major imports from India pertain to the level of pesticides and antibiotics. Various antibiotics and chemicals like oxolinic acid and oxytetracyclines without any given limit are totally banned. Consignments containing DDT, Aldrin and Heptachlor are bound to be rejected. The EU directive has also imposed process standards requiring hygiene during handling, processing and storage of marine products. US ban on Indian shrimp products was a unilateral restriction on environmental reasons. In 1996, US banned shrimps from entry unless harvested by aquaculture caught with turtle excluding devices, or by manual instead of mechanical means or in cold water. US lost the case at WTO when India and other affected countries challenged the ban. However, the ban since 1996 adversely affected Indian shrimp exports.

Textiles

In India, textile exports account for 55 per cent of countries export earnings. As Table 1 shows share of ready made garments in the export basket has hovered around 12 per cent. In 1999-2000 it was 12.9 per cent then was 12.5 per cent in 2000-2001. This went up marginally to 13 per cent in 200-01 but then came down to 11 per cent in 2001-02. It is also the country's net foreign exchange earner as the import content in textile is very little as compared to the other major export products. This sector shares 4 per cent of GDP and 14 per cent of industrial products. It provides employment to 15 million people. Although, the Indian textile industry characterised as powerloom, handloom and mill sectors. In India, major t of the ready made garments exports come from SMEs, which accounts for as much as 63 per cent to the total exports from the textile sector.

Around 40 per cent of India's textiles directed to the European Union, but nowadays the stringent environment conditions in the developed countries pose adverse consequences in India's export performance. In 1993, Germany textile industry introduced two eco-labels viz. *Markenzeichen Schastoffgepruffth Textilien* (MST), which gave norms for consumer goods and indicates a lower content of pollutants, and *Markenzeichen Unweltschonende Textilien* (MUT), a label which sets norms for production processes. It indicates that all processing conditions are analysed with reference to the degree of pollution of air, water and soil. Apart from this, other national and private labels are also developed in Europe. For eg. The Ostereichisches Textil-

Forschungsinstitut has developed the *Oekotex* label relates to both raw material and final product. The European Largest Textile and Apparel Companies (ELTAC) has also undertaken and eco-label initiative. In the textile and clothing sector, Germany has recently introduced the *Eco-Tex* Standard – 100 which lists various criteria for evaluating textiles from an ecological perspectives. Eco-tex standard 100 has been developed by International Association for Research in Eco-Textiles that offers manufacturers for garments and textiles the opportunity for certification of eco-friendly products.

The use of certain dyestuffs such as Cobalt Blue and Sulphur Black has been totally banned in the international market. Though viable substitutes have been explored, but switching over to them again costs higher investment of over US$ 13 million, mainly for the upgradation of the technology and new treatment plants in order to obtain the requisite quality. Likewise opting for non-benzidine dyes viz. Direct Black 38 dye and Direct Black 22 was priced at between $8-10 per kg. Though SMEs contribution to the export basket of India are not available, but one study does estimate that over 60 per cent of production is by small scale enterprises. One can therefore extrapolate that an important part of exports comes from small scale units.

Leather Industry

India, being the largest holding of livestock in the world is expected to play a dominant role in the leather industry. Leather industry is spread over organized as well as unorganized sector. The small scale enterprises (SMEs) account for over 75 per cent of the total production. This industry has been identified as one of the thrust areas of exports. Traditionally, the Indian leather industry has been an exporter of tanned hides and skins. Currently, leather footwear, footwear uppers, leather goods, garments and other leather goods are among the fastest growing export items in India. Footwear sector has been identified as an area of extreme focus. Export from leather sector today account for about 4.3 per cent of India's exports. The export performance of the leather sector has improved considerably during the past decade. The value of exports went up from Rs. 3,036 crore during 1991-92 to Rs. 6,436 crore in 1998-99. Germany is the largest single export market for Indian leather exports. The other important markets are France, United Kingdom and Italy. The composition of the Indian leather industry is so vast as it employs about 1.4 million

people. There are about 2000 tanneries, in different Indian states viz. Tamil Nadu, West Bengal, Maharashtra, UP Karnataka and Rajasthan. Out of the total tanneries, 75 per cent of them fall within the SMEs.

On environmental standards, leather industry faces problems from both domestic and external front. The restrictions on the use of certain chemical dyestuffs and several other mandatory regulations in major export markets pose serious problems to the leather sector. Germany along with the other European countries have already restricted the *benzidine* containing dyes and openly demands benzidine free leather imports. Germany has banned all the imported leather products containing *Pentachlorophenol* (PCP) with the aim to protect its consumer from the possible incidence of cancer. PCP has been in use as a preservatives for raw hides and skins. It also restricts the use of *formaldehyde*. Only products treated with environment friendly chemicals are accepted in Germany and other developed country markets. EC standards for PCP in this regard is high around 1000 ppm or 10mg/kg. The stringent environmental standards imposed by EC has been criticized not only by the developing countries but also certain EU member countries themselves such as Italy and France. It is also to be noted that Italy has a big leather industry where as France is itself a major producer of PCP. Therefore, it is reasonable to believe that the purpose of protest from these two countries on PCP ban is to protect their domestic industries.

Most of the studies on competitiveness and environmental standards are based on environmental capital costs. Parikh et al (1994) analysed the effects domestic environmental policies of foreign countries on India's exports focussing on two sectors: leather and shellfish. The results indicated that the increasingly stringent export standards have contributed to a rise in the cost of production, especially in the leather sector, where costs using the more environmentally friendly methods are nearly three times higher.

However, India, in its efforts to increase its leather exports, banned the production of PCP and accordingly its use in the processing of leather. Government of India has already enforced several environmental regulations such as the Water Act of 1974, the Air Act of 1981 and the Environment Act of 1986 to address environmental problems in the country. For compulsory

provisions for effluent treatment, government has set up common effluent treatment (CET) in new tanneries. Large number of alternatives of PCP exist such as "Busan 30", which is acceptable to the international market. Though in India, PCP was manufactured locally at a cheaper price, where as "Busan 30" need to be imported either from Germany or US. According to some recent estimates the price of this substitute is around ten times higher than the existing price of PCP. For the easy availability of the substitutes, Government of India reduced the import duty from 150 to 50 per cent on these chemicals. Further, Centre Leather Research Institute (CLRI) has also indigenously developed technology to enable local production of TCMTB which is a substitute to PCP.

4.3 Relocation of Dirty Industries

Environmental regulations have proceeded at different pace in different countries of the world. These differences are particularly pronounced between industrialized countries and developing countries. Widespread concerns have been expressed recently about the relationship between international competitiveness of environmentally sensitive goods and environment regulations. Stringent regulations in the developed countries are hypothesized to lead to industrial flight from the developed nations to developing nations.

The developing countries are concerned about how differences in national environmental regulations might induce investors in the developed countries to shift the location of dirty industries to developing countries, which have relatively lower standards. The justification behind this view is that strong environmental regulations increase the production costs. As a result it is in a firm's interest to locate its production facilities in a country with lower production costs, that is, with relatively lax regulations. This argument focuses solely on the cost effect of environmental regulations on polluting industries, and presumes that the production cost differentials are sufficient inducement for a firm to relocate its production site. If there is a strong incentive to relocate pollution intensive production from countries with strict regulations to countries with lax regulations, this will result in a shift of composition of production in developing countries towards more polluting industries. The flight of polluting industries may also cause economic problems such as unemployment in the short run for the country exporting capital and may also expedite environmental degradation of host countries.

There are a number of studies available, in the literature, on the impact of environment on industrial relocation. Majority of the studies addressed the issue, in the context of developed countries, particularly United States. These studies have generally defined the polluting industries on the basis of pollution abatement cost and other expenditures. The definition of dirty industries is crucial to the analysis, but varies from one study to another. This problem is not that serious, as several different definitions seem to yield similar lists of dirty industries. We have made an effort in the table below to identify dirty industries as defined by various authors.

Author	**Dirty industries as identified by the author**
Kevin Gallagher and Frank Ackerman (2000)	Iron & Steel; Non-ferrous metals; industrial chemicals; pulp and paper; Non- metallic minerals. (3-digit SITC level)
Raman Letchumanan (1998)	Chemicals; Primary metals; Paper; Plastics; Fabricated metals; Leather.
Low & Yeats (1992)	Iron & Steel; Non- ferrous metals; Refined Petroleum; Metal manufactures; Paper and Articles.
The World Bank (1998)	Iron & Steel; Non-ferrous metals; industrial chemicals; petroleum refineries; nonmetallic mineral products and pulp and paper products.
Tobey (1991)	Mining; primary metals; paper and pulp; and chemicals. (3-digit SITC level)
Xinpeng Xu (1999)	Iron & Steel; Cement; Chemicals; newsprint paper; Non-ferrous metals.

Kalt (1988) was one of the firsts to test the 'pollution haven' hypothesis. He examined US net exports in 1977 and studied the relationship between the level of compliance costs and the change in net exports. He concluded that there is some evidence of a negative effect of environmental regulation on US net exports (a validation of the 'pollution-haven' hypothesis), but the relationship is statistically weak. Han and Braden (1996) expanded and updated the Kalt study, examining 19 manufacturing industries in the US between 1973 and 1990. They looked for the relationship between pollution abatement costs and net exports over time. Their regression results show pollution abatement expenditure having statistically significant negative effect on net exports. Han and Braden also analyzed the elasticity of net exports with respect to pollution abatement expenditures for the 19 industries. Large elasticity would imply that added abatement expenditure would lead to a substantial marginal decrease in net exports. The industries shown to have large elasticity and large abatement costs were paper and allied

products, chemicals, and primary metals. Many industries, including furniture, printing, leather and allied products, fabricated metals, petroleum and coal products, had elasticity close to zero. Over the 18-year period, the elasticity declined in almost all industries. The author concludes overall that there has been a negative effect on net manufacturing exports due to environmental regulations. Letchumanan (1998) empirically rejected the 'pollution-haven' hypothesis by analyzing the current pattern of cross-border industrial location. This was done by correlating FDI flows with pollution intensity of each industrial sector, for a number of developed and developing countries.

There is a persistent argument in the literature on trade and environment that differential environmental standards result in the relocation of 'dirty' industries in developing countries and expedite environmental degradation in these countries. It is believed transnational locations blatantly by-pass the more stringent environmental regulations in North by setting up their production plants in the third world countries. But the fact is that this is not always the case. In fact, there are many other factors, such as infrastructure, supply of natural resources and availability of cheap labor that influence the choice of a certain location or investment. Multinationals tend to move to locations where cheap labor, abundant raw materials and good transport system and other facilities are available. Environmental costs, which usually forms a relatively small part of total production costs, seldom effect the location decision of the plant.

4.5.1. The Environmental Regulation and Trade

It is important to analyze the share of environmentally sensitive goods in international trade and trends in that share over time. For our analysis we take five most commonly used environmentally dirty products, namely, manufactured metal products, Industrial chemicals, Iron and Steel, pulp and paper, and non-ferrous metals. Table 4 examines the relative importance of dirty goods in global trade. The table shows, trade in environmentally sensitive product, for selected years.

Table-4: The relative Importance of Environmentally Dirty Products in World Trade

Value of exports expressed in US$ billions

Year	Total trade	Metalliferrous ores	Manufactured metal products	Chemicals	Pulp & Paper	Iron & Steel	Non-ferrous metals
1980	2001.9	31.8	37.4	141.3	8.79	75.6	49.9
1985	2103.5	23.8	41.6	177.8	9.61	74.0	36.5
1990	3427.9	36.1	66.1	300.4	14.39	108.0	67.5
1995	5228.4	45.5	104.8	487.5	17.9	145.7	106.1
1998	5400.3	45.6	110.7	512.3	16.6	145.1	108.0

Source: United Nations, *International trade statistic yearbook*, various issues

In 1980, the environmentally sensitive goods accounted for about 17 per cent of total world trade. The relative importance of these goods declined marginally in the period 1997-98. The ferrous and non-ferrous metal accounted for about 36 per cent of trade in these goods and also is a source of over three-quarters of total decline in the World trade share. The share of manufactured metal products has risen marginally from 10 per cent in 1980s to 11 per cent in 1998. The share of paper and pulp manufactures in total trade remained virtually static in the period 1980-1998. Table 5 attempts to determine if there are important changes in the geographic origins of these goods in the period 1980-90. It shows the origin of dirty industry from developed and developing countries. It also provides a further breakdown for developing countries into South America, Eastern Europe and South Asia and the breakdown for developed countries into U.S.A. and EEC.

In case of all environmentally sensitive commodities that we have selected, the share of exports in developed countries has fallen but the share of total exports by developing countries has risen. The developed nations share in value of exports of metalliferous ores accounted for $19.5 billion in 1980, whereas the developing countries accounted for $10.6 billion. By 1998, the developing countries' share increased sharply by 12 per cent and the developed countries' share reduced by 8 points. The manufactured metal products are largely exported from the developed countries. They account for approximately 90 per cent of total exports in 1980 and by 1998 the share of exports have fallen to 73 per cent. In case of chemicals, Iron and steel, and Non-ferrous metals, there has been sharp fall in share of developed nation, over 1980-98. Meanwhile the share of developing countries has increased greatly in these environmentally sensitive goods.

The paper and pulp goods are the only dirty product that has shown only marginal rise in the share of exports of developing countries.

Table 5: Growth Rates of exports in Selected Environmentally Sensitive products

Metalliferous Ores

Year	Developed economies	EEC	USA	Developing economies	South America	Eastern Europe	South Asia
1980-82	-26.2			-20.8	-8.9	257.6	
1982-84	7.6			-8.3	-15.2	-18.6	33.3
1984-86	-9.0			1.3	5.1	-82.3	25.0
1986-88	30.5	80.0	55.6	39.7	29.3	158.8	60.0
1988-90	17.4	14.3	16.7	12.8	24.5	150.0	-9.4
1990-92	-12.0	-9.7	-30.6	-4.1	-3.0	-87.3	6.9
1992-94	10.5	10.8	8.8	7.6	6.2	-19.0	9.7
1994-96	31.9	25.0	13.5	33.1	29.4	138.2	47.1
1996-98	-12.6	-7.8	-16.7		8.0	-19.8	-12.0
Annual Average Growth	2.1	..	..	3.4	4.2	26.5	8.9

Manufactured Metal products

1980-82	6.8			923.1			
1982-84	-4.4			33.6			
1984-86	0.6			-87.7			
1986-88	21.4	24.8	46.2	51.5	45.7	26.2	59.1
1988-90	30.5	33.7	41.0	17.9	38.7	-24.5	17.1
1990-92	10.8	10.4	20.4	26.9	70.0	-2.5	25.6
1992-94	2.8	-4.8	24.6	28.0	29.4	-7.7	32.0
1994-96	25.8	43.7	30.9	30.2	36.4	-16.7	21.3
1996-98	4.3	1.5	14.2	10.5	30.0	30.0	6.1
Average Growth	5.5	9.1	9.8	57.4	20.8	0.4	13.4

Chemicals

1980-82	-9.2			3.4			
1982-84	10.4			21.7			
1984-86	21.7			50.0			
1986-88	41.6	40.3	41.6	56.0	42.9	0.0	85.3
1988-90	18.8	18.4	24.3	35.9	34.0	27.3	33.6
1990-92	11.1	9.0	12.9	23.9	16.4	0.0	41.7
1992-94	38.8	11.5	17.3	34.9	26.9	-7.1	41.1
1994-96	3.6	32.2	20.0	32.9	28.3	30.8	34.7
1996-98	1.9	4.2	10.0	5.6	11.8	5.9	4.4
Average Growth	7.7	9.6	7.0	14.7	13.4	4.7	20.1

Paper and Pulp

1980-82	-10.1			14.0	36.0	-42.9	-12.7
1982-84	30.6			4.1	14.7	175.0	23.2

1984-86	4.9			3.9	17.9	36.4	-3.1
1986-88	12.9	-2.6	16.3	6.6	26.1	6.7	4.9
1988-90	2.1	-4.6	-8.0	5.3	10.3	18.8	-5.3
1990-92	-1.0	0.0	-2.2	4.2	4.7	-36.8	5.9
1992-94	4.1	9.5	8.9	14.5	23.9	225.0	17.6
1994-96	10.9	11.3	13.9	13.0	1.2	66.7	24.4
1996-98	-2.7	-8.0	-0.7	-0.2	9.5	3.1	-5.5
Average Growth	2.9	0.5	1.6	3.6	6.3	23.6	3.5

Iron & Steel

1980-82	-13.6			27.9			
1982-84	-7.0			36.4			
1984-86	10.1			14.7			
1986-88	29.6	30.7	110.0	76.7	67.1	102.6	94.6
1988-90	10.9	18.5	57.1	16.4	20.5	9.1	9.7
1990-92	-3.1	-7.7	12.1	11.3	0.0	-36.9	29.1
1992-94	6.6	2.5	0.0	22.8	9.5	-34.0	31.4
1994-96	12.8	33.7	59.5	38.0	29.0	54.3	48.5
1996-98	-0.6	-1.5	-3.4	0.3	-5.6	27.8	2.0
Average Growth	2.5	6.3	13.1	13.6	10.0	10.2	17.9

Non-ferrous metals

1980-82	-37.8			-29.9			
1982-84	17.2			8.0			
1984-86	0.0			-3.7			
1986-88	60.7	47.8	125.0	91.0	93.9	80.0	123.8
1988-90	11.4	20.6	41.7	12.1	26.6	13.6	-10.6
1990-92	-5.7	-8.1	-3.9	1.2	-8.6	-35.9	33.3
1992-94	7.0	4.9	4.1	23.1	6.8	-33.9	51.8
1994-96	24.4	36.7	33.3	64.4	26.6	20.5	48.2
1996-98	0.0	-1.9	0.0	0.3	-10.0	31.9	1.6
Average Growth	4.3	8.3	11.1	9.2	11.3	6.4	20.7

Over the year 1980-1998, the annual average growth rate of all selected environmentally products is higher in the developing countries than in the developed countries. In case of manufactured metal products, for instance, the annual average growth rate is 5.5 per cent in the developed countries but the developing countries have an annual average growth rate of 57.4 per cent. Among the developing countries this high annual growth rate in export of manufactured metal products is attributed to South America and South Asia. The export of chemicals, which is one of the most pollution intensive product, has also increased in the developing countries over time. The annual average growth of the developing countries in the export of chemicals is about double the annual growth rate of exports by the developed countries. Most of this growth is

attributed to South Asia, which has an annual growth rate of 20.1 per cent. Iron and steel and Non-ferrous products are also considered to be highly pollution intensive as well. In the period 1980-1998, the annual growth rate of exports in Iron and steel products developing countries was 13.6 per cent. Whereas the annual growth rate of developed countries was 2.5 per cent. Similarly, the annual growth rate of exports in non-ferrous products was 4.3 per cent in the developed countries and 9.2 in the developing countries.

The trends provide a clear evidence of relative decline in importance of environmentally sensitive products in industrial countries' exports, while increases in the relative importance of these products in case of developing countries, especially South America and South Asia. It should be borne in mind that these increases in the relative importance of dirty industry trade have taken place against a marginal reduction in the share of environmentally dirty goods in total trade.

4.3.2. The Environment Regulation and Investment

The governance of international capital flows will be one of the key environmental policy issues of the next decade. Given the lack of effective state regulation in developing countries, the explosion of FDI has triggered a hot debate about how to govern global investment. The debate revolves around the environmental impacts of FDI and whether the globalization would induce environmental standards to harmonize upwards or downwards. In recent years, some economists have worried that developing countries may seek to attract foreign direct investment (FDI) by competitively undercutting each other's environmental standards, i.e., race to bottom. The 'dirty industry' migration hypothesis suggests that the countries with less stringent environmental standards attract the increasing fraction of foreign direct investment (FDI) into polluting industries (Leonard, 1988). It is important to examine the extent of foreign direct investment in case of developing nations to conclude that the migration of dirty industries into developing countries is taking place.

The 1990s witnessed a sea change in the pattern of international capital flows. In 1990, official sources accounted for more than half of international capital flows to developing countries. The growth of FDI has been equally dramatic. The volume of FDI flows to developing countries has

nearly quadrupled from 1990-95. The Table 7 gives the total FDI flow into the South Asian region for the period year 1994-99. The share of FDI to India was 0.3 per cent of total FDI to the world in 1994. However, the share of FDI to India has gone down to 0.25 per cent in 1999. While the volume of FDI in the world has grown at the average rate of 27 per cent, the volume of FDI in to India has also increased at the same rate over the period 1994-99. The volume of FDI into Bangladesh has grown at a much faster rate over the same time period.

Table 6: FDI inflows into the South Asian Region (in millions of dollars)

	1994	1995	1996	1997	1998	1999
World	255988	331844	377516	473052	680082	865487
Bangladesh	6	13	11	141	308	150
India	973	2144	2426	3577	2635	2168
Pakistan	419	719	918	713	507	531
Nepal	7	8	19	23	12	132
Sri Lanka	166	66	133	435	206	202

Source: United Nations, World Investment Report, 2000

To study if the foreign investments have moved into polluting industries it is important to examine the sector-wise break-up of foreign direct investment into India. Since it is difficult to get hold of actual figures, we use the approvals instead (Table 7).

Table 7: Per centage share of sector-wise FDI approvals in total FDIs

	1992	1993	1994	1995	1996	1997	1998	1999	2000
METALLURGICAL INDUSTRIES	1.73	14.66	18.08	1.18	6.52	4.58	7.20	4.94	4.81
FUELS	31.51	8.02	17.61	24.68	16.69	48.15	44.54	20.00	15.18
ELECTRICAL EQUIPMENTS	10.65	4.14	8.55	3.41	8.51	4.00	4.63	8.98	33.54
TELECOMMUNICATIONS	3.08	0.12	0.97	55.18	11.93	12.99	10.06	13.75	24.89
TRANSPORTION INDUSTRY	3.85	7.43	8.20	3.95	-3.03	14.10	5.07	21.94	2.68
INDUSTRIAL MACHINERY	2.69	6.49	6.62	0.24	0.53	0.40	0.35	0.95	0.12
FERTILIZERS	0.02	0.01	0.04	0.01	0.67	0.00	0.00	0.00	0.00
CHEMICALS(OTHER THAN FERTILIZERS)	11.67	9.36	11.67	3.85	7.78	5.15	6.43	2.86	0.72
PHOTOGRAPHIC RAW FILM & PAPER	0.18	0.03	0.07	0.03	0.00	0.36	0.00	0.03	0.02
DYE STUFFS	0.00	0.04	0.04	0.06	0.01	0.01	0.24	0.02	0.00
DRUGS AND PHARMACEUTICALS	0.72	0.60	0.76	0.58	0.33	0.33	0.30	0.28	4.28
TEXTILES (INCLUDED, DYED PRINTED)	3.57	4.08	6.11	0.97	1.14	1.08	0.75	1.14	0.61
PAPER & PULP INCLG.PAPER PRODUCT	0.47	0.81	0.82	0.98	2.90	1.25	0.35	2.42	0.43
FERMENTATION INDUSTRIES	0.12	0.84	0.76	1.93	0.23	0.46	0.00	0.01	0.04
FOOD PROCESSING INDUSTRIES	10.23	4.09	9.77	1.04	9.49	3.63	2.05	0.50	0.72
VEGETABLE OILS & VANASPATI	0.17	0.09	0.15	0.04	0.01	0.26	0.00	0.17	0.00
SOAPS, COSMETICS & TOILET PREP.	0.44	0.24	0.32	0.05	0.07	0.30	0.20	0.00	0.00
RUBBER GOODS	0.08	0.19	0.39	0.11	0.97	0.09	1.78	0.44	0.03
LEATHER, LEATHER GOODS & PICKERS	0.65	0.08	0.48	0.12	0.08	0.11	0.16	0.09	0.06
GLASS	0.03	0.89	1.25	0.38	0.85	0.85	0.63	1.50	0.05

On examining the sector-wise distribution of FDI it is observed that over the last decade there is some shift in the pattern of foreign direct investment flows. In 1992, electrical equipments, fuels, chemicals and food- processing were the industries that received the bulk of FDIs. However, telecommunication, drug and pharmaceutical industries have received a large share of total FDI's into India Fuels and electrical equipment continue to attract high level of foreign direct investment but, chemicals and food processing industries are no more receiving a high level of FDIs. The total foreign direct investment approvals into the telecommunication sector has risen from 1324 million to 94631 million rupees. Similarly, there has been a sharp increase in the share of drugs and pharmaceuticals industries in the total FDI. The volume of FDIs into food processing industries declined from 4400 in 1992 to 2755 million rupees. The chemical industry, which is considered to be one of the most polluting industry, also experienced a decline in the investment flows from 5020 million in 1992 to 2727 in the year 2000. From the data it is difficult to imply that the foreign direct investment has increased in the pollution intensive industry. As some of clean industries, such as, telecommunication and drugs and pharmaceuticals have attracted large volumes of FDIs in the recent years.

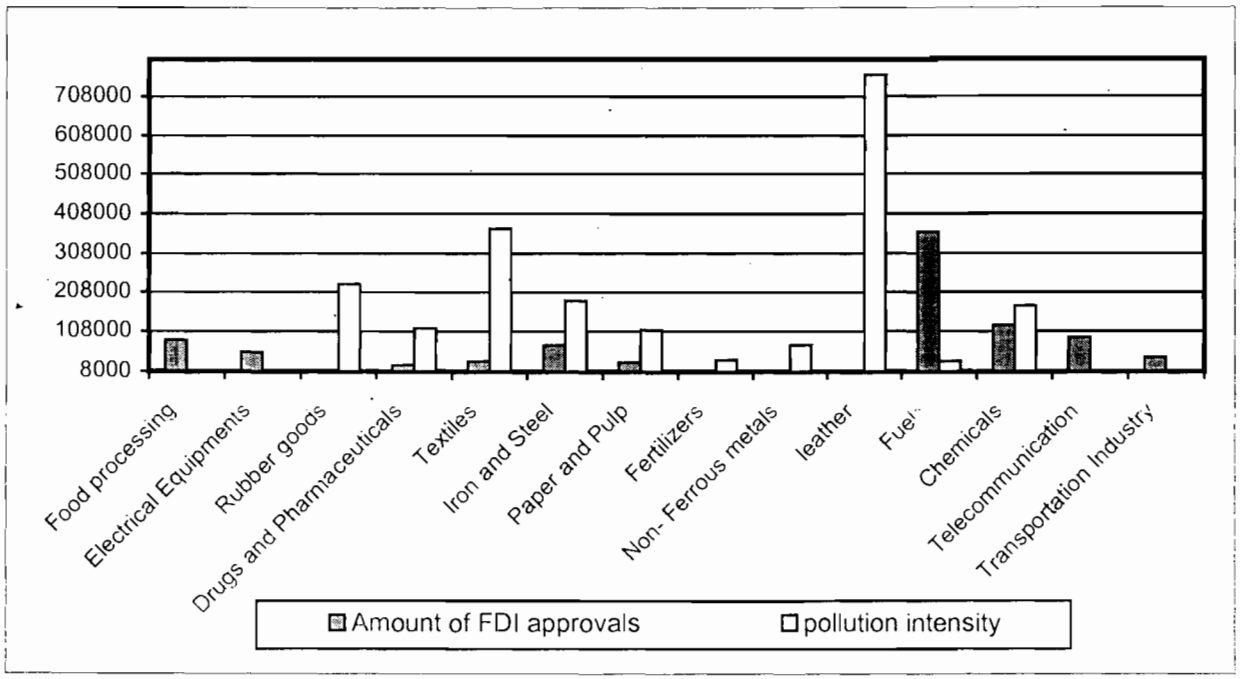
The 'dirty industry' migration hypothesis suggests that the countries with less stringent environmental standards attract the increasing fraction of foreign direct investment (FDI) into polluting industries.(Leonard, 1988). To test this hypothesis for India we correlated the sector-wise distribution of Foreign Direct Investment[15] into India in the period 1991-2000 with pollution intensity of that sector. Pollution intensity is defined as the amount in weight of pollutants released by an industry per unit production of that industry. Since data on sector-wise pollution content is not available in India, the pollution intensity data from United States Environmental Protection Agency's toxic release[16] database is used. It is acknowledged that industrial pollution intensity is location sensitive and varies from country to country. (Ferrantino and Linkins 1999) However, since we are using it to examine the correlation between FDI flows and dirtiness of industries in case of India, this does not pose any major setback to the study.

[15] Source of FDI data is Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India.

The chart-1 gives the comparison of amount of Foreign Direct Investment into various sectors in India and their pollution intensity.

If the 'industrial flight' hypothesis were valid, then large FDI investments would correspond to industries with high pollution intensity. However, it can be seen from the chart-1 that while some highly polluting industries received relatively very low amount of Foreign Direct Investment, some relatively cleaner industries such as food processing, electrical equipments and telecommunication received high level of FDI. The statistical correlation between foreign direct investment flows into India and the pollution content is –0.36. The negative correlation indicates that FDI is occurring in relatively clean industries over this decade.

Chart-1: Correlation between Pollution Intensity and Foreign Direct Investment (1991-2000)



The FDI data provides little empirical evidence to suggest that differences in the stringency of environmental process standards may induce industries located in high standard jurisdiction to relocate to low standard jurisdictions in order to preserve their competitive position

[16] The TRI is a database, which provides information to the public about releases of toxic chemicals from various industries into environment.

4.4 Emerging Policy Challenges

In last decade or so environmental concerns have proliferated, encompassing a large section of trade. This emanates from different international commitments such as Cartegena Biosafety Protocol and Kyoto Protocol. Apart from these protocols there are some emerging issues which are posing severe policy challenges to the governments in the developing countries for instance the growing electronic trade and the subsequent waste being generated out of it. Then is the whole debate on GMOs and their position in the international trade. However, along with these challenges are the emerging opportunities in terms of growing market size of Environment Friendly Products (EFPs). As many of the South Asian economies especially India is still engaged in 'organic production' of agricultural commodities, it is better placed to tap these opportunities. We look into some of these details in this section.

In the wide ranging commentaries on these protocols one finds huge list of possible areas of conflicts with these protocols and the provisions made in various agreements in WTO especially under TBT and SPS[17]. These environmental concerns are affecting trade prospects for developing countries. Some of the industrial organisations have suggested that the Kyoto Protocol's empowerment should be developed to be consistent with the existing WTO disciplines, observing MFN, like product rules and sound science criteria[18]. They have also suggested to avoid discrimination based on methods of processing and production (PPMs) which was at the basis of Kyoto deliberations on behalf of developing countries. Business organisations are also concerned about some forms of domestic implementation which seeks to offset "Carbon leakage" could lead to the establishment of trade barriers in the form of tariffs, border taxes, discrimination and labeling. There are several views about trade of goods, which would be affected by Kyoto protocol. For instance, the study by Montgomeri et.al. 2001 suggest that compliance with the Kyoto Protocol would result in loss of economic welfare to the tune $ 900 million and the cost will not be limited to developed countries. The adoption of Clean Development Mechanism (CDM), which allows developed countries to invest in low cost energy reductions in developing countries, which may reduce cost of compliance. It also refers to an

[17] For details see Zarrilli, 2000, Nielson et. al, 2000.
[18] Please see the Policy Statement from International Chamber of Commerce, October 26, 1999.

emerging division among developing countries themselves as countries like China and India export, energy intensive goods and benefit from energy price increases in developed countries.

4.4.1 Growing E-trade:

The electronic industry was traditionally thought to be a relatively clean industry. But this image has taken a dent with greater realisation of ecological hazards emanating from the sector. The ecological hazards come not only from the processes of electronic commodity production but there are also some increasing worries about the disposal of electronic waste. In this regard, the EU Directives are expected to come into force in 2008 and this will have serious implications on the production processes of component manufactures, exporting to the European Union. The electronic industry is one of the fastest growing industries today. It has emerged as one of the major sectors in India's export basket in recent years. The electronic industry has achieved a cumulative annual growth of 20 per cent in production and over 40 per cent in exports till 1998. The exports from this industry have been growing slowly over the past few years. Total electronic hardware exports were Rs. 11,080 million in the year 1993-94 and went upto Rs. 18,000 million in the year 1998-1999 and then took a dip to Rs. 14, 000 million in the year 1999-2000. The Indian electronic sector comprises of a few large companies, some small and medium size enterprises (SMEs) and a large number of tiny and household enterprises.

Electronic waste is unwanted computers, monitors, televisions, audio equipment, printers, and other home electronic devices. Technological advances for all electronic equipment, particularly computers, quickly render them obsolete. More than 20 million personal computers became obsolete in 1998 in EU. Only about 14 per cent were reused or recycled, while most were disposed of or remain in storage. Electronic equipment contains metals and other materials that can become hazardous to human health and the environment if they are not properly managed. Each year EU ends up with six million tons of electronic waste. The waste stream of electronic and electric equipment has been identified as one of the fastest growing waste streams in the European Union constituting 4 per cent of municipal waste today, increasing by 16-28 per cent every five years. There are increasing concerns in EU about the electronic waste disposal. In order to reduce the amount of electrical and electronic waste disposed the European Commission has adopted a proposal on Waste Electrical and Electronic Equipment (WEEE) and a proposal

for a Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment. The proposed Directives are designed to tackle the fast increasing waste stream of electronic and electrical equipment. The Directive would limit the total waste going to final disposal. Producers will be responsible for taking back and recycling electronic and electrical equipment. In order to prevent the generation of hazardous waste, the proposal for a Directive requires the restriction of use of certain hazardous substances. The wide-ranging directive would require equipment manufacturers to accept and recycle equipment including computers, mobile phones, televisions, refrigerators and washing machine, under "polluter pays" principle. The use of substances such as heavy metals, lead, mercury, cadmium, and hexavalent chromium will be banned and these required to be substituted by various types of brominated flame retardants. All these substitution requirements are to be met by the producers by 1 January, 2008.

The implications of these emerging environmental regulations for companies in the developing countries that export to European markets are potentially very deep. The companies may have to redesign their manufacturing processes. A recent study shows that the so far there is very little awareness amongst the Indian electronic component manufactures about the EU directives and its implications. A lack of environmentally sound technologies could be disastrous for this sector. It would become impossible to sustain production and hence trade if ecologically friendly practices are not imbibed. A lack of information about the various requirements and standards in importing countries could pose very serious hurdle to trade.

4.4.3 Labeling and Genetically Modified Goods:

In recent past biotechnology has posed some serious policy dilemmas before developing counters. European Union, Japan, Australia and several other countries have launched the plans for mandatory labelling of Genetically Modified (GM) foods. EU members have recently voted to require labels for food containing more than 1 per cent of GM material. The Canada and US have complained to the WTO regarding European measures to label GM products as labelling may violate WTO rules. Concern has been expressed by the US that vigilance is needed to ensure the EU plan is not used to bar US imports. In Australia, the deferment of a government

decision regarding the labelling of GMO's is indicative of the uncertainty regarding conflict between eco-labelling and WTO jurisdiction.

It is worth recalling here that the Cartegena Protocol on Biosafety was negotiated under the auspicious of Convention on Biological Diversity (CBD) in 1992. The Protocol was adopted by a large number of countries (64) in 2000. This protocol provides rules for safe transfer, handling, use of and disposal of, living modified organisms (LMOs). The wide objective of the protocol is to address the threats posed by LMOs to biological diversity along with to human health. There are three major areas of concerns which are generally found to be conflicting with the spirit and provisions in the SPS /TBT agreement under WTO.

In terms of its spirit SPS agreement seems to be restrictive in nature while the Biosafety Protocol empowers for even taking grand measures for protection. Though the SPS agreement covers a wide spectrum of issues concerning human health which may affect access for trade of GMOs while the Biosafety Protocol apart from being GMO specific talks of biodiversity and health in general. The whole understanding of precautionary principle under article 5.7 of SPS and article 11.8 of Biosafety Protocol is contradictory in nature. Another area of concern is the acceptable level of risk which may be allowed while trading GMOs. On the areas of risk assessment and management SPS broadly sets the tone for acceptable level of risk at the international level being endorsed by any international institution while Biosafety Protocol refers to an excluvist approach which may be adopted at national level.

Though in last decade the trade in biotechnology products has grown many fold but due to lack of adequate classification of such products there is hardly any evidence from the South Asian region to substantiate this perception. The current estimated biotechnology market size for India is $1475 million.[19] The product range from biotechnology related instruments, drugs and even agricultural and food products containing transgenic traces, commercial field trials of which, has not been permitted in many South Asian countries.[20]

[19] Economist 1st September (2001)

[20] In fact Sri Lanka had to withdraw an official order banning imports of all food items containing GMOs. See RIS Biotechnology and Development Review Vol. 4 No. 1 for more details.

However, in case of US a conscious effort has been made to develop a concept of collecting trade data on Advance Technology Products (ATP) by the US Census Bureau. All of the biotechnology products on the ATP list appear to belong to biologics. This is largely of therapeutic products derived from living organisms these include vaccines, human blood, plasma, proteins and monoclonal antibodies. This definition does not match with the definitions evolved by other countries. The OECD in a separate exercise is attempting to evolve biotechnology statistics at least at the level of OECD countries[21]. The growing resistance within Europe of GM crops has already affected US agricultural exports. Soyabean, where 35% of US output is composed of genetically modified varieties exports to the EU declined from 9 million tons in 1997 to 6 million tons in 1998. Similarly, exports of corn (maize) in 1997 from US to EU was 1.6 million tons which has now declined to 0.3 million tons[22]. The global market for transgenic crops and related products has grown very fast in the last quinquennium. The sales have increased from $ 75 million in 1995 to $ 3 billion in 2000. This is likely to reach $ 25 billion by 2010.[23]

It is fairly possible that a conflict between SPS agreement and biosafety protocol may come up in not such a distant future. Though they have emerged in two different settings but addresses similar issues in contradictory terms. SPS is to address health issues in a wider context while biosafety protocol addresses health in a narrow context of trade in GMOs. The SPS imposes a restrictive regime emmanating from international product standard setting institutions while biosafety protocol allows member countries to evolve their own necessary measures to protect their health and environment. Therefore the protocol has not laid any provisions for addressing disputes while, SPS, being mandatory in spirit, has a backing from a strong Dispute Settlement Provision (DSP).

4.4. 3 Ecolabelling Measures

Along with statuory eco-standards, criteria are also being set in importing countries, through eco-labelling. In EU, several labelling systems already exist which apply to the final output as well as the process and production method itself. An eco-labelling scheme informs consumers that a

[21] OECD 2001
[22] Perdikis et. al. 2001
[23] Zarrilli (2000)

labeled product is environmentally superior than other products in the same category. It is a form of third-party certification, with the certification done by a purely private organization such as Green Seal in the United States, or by a mixed public entity, as in the Canadian System. Eco-labelling schemes help consumers make decisions about the products they buy and whether they are environmentally friendly. There are several existing eco-label schemes around the world including the German Green Spot, the Nordic Swan and the US Green Seal.

Most current eco-label programs are 'cradle to grave', that is, they involve some form of analysis based on the environmental consequences of their manufacture, use and disposal. Eco-labelling schemes already in place, may conflict with the WTO Agreement on Technical Barriers to Trade. WTO rules decree that countries should not discriminate between products based on the environmental consequences of the way something is produced. The ecolabelling issue blends into two other market access obstacles viz. environmentally motivated government procurement and ISO 14000 series.

Discriminatory government procurement is a long-standing non-tariff trade barrier (NTB) regulated to some extent by the WTOs Government Procurement code. In recent years, some governments have added environmental criteria to their procurement policies. The question arises is whether such criteria constitute a new set of NTBs. While green- consumerism in public procurement is not inherently against the interests of exporting countries, the potential for covert trade discrimination and the likelihood of increased costs for exporters are real, especially for smaller suppliers in developing countries. The 14000 series of ISO can also potentially act as an NTB. In 1993, the ISO extended its work to environmental management systems (EMS) in its 14000 series. The ISO 14000 initiative mirrors the broader trade issues of technical regulations, technical standards, and ecolabelling schemes. Though its purpose might be improvement of environmental performance and facilitation of international trade. But unless carefully crafted, the 14000 series can act as a trade barrier. Specifically, if the EMS is prescriptive, detailed and costly to comply with, and if compliance requires strict criteria for subcontractor and suppliers' performance, it will be difficult for firms in developing countries to qualify. If ISO registration becomes a condition for at least some types of international business, the trade barrier potential may be realized.

In order to address the potential trade concerns, activities are taking place in various fora such as, the WTO, OECD, ISO and the Global Ecolabelling Network (GEN). The WTO is determining in what ways does ecolabelling fall within the scope of the WTO's Agreement on Technical Barriers of Trade. GEN is pursuing cooperation, as well as the possible harmonization and mutual recognition among programs. Mutual recognition could involve trading partners accepting each other's established ecolabelling criteria, consequently lowering or eliminating the probability that the criteria would act as barriers to trade among nations. Other types of mutual recognition might include reciprocal acceptance of credibility or the acceptance by one program of another's test procedures and facilities.

As Table 8 explains Germany was the first country to establish an eco-labelling progam in 1977 and now there are about 25 eco-labelling programs around the world. Along with the proliferation of such programs a concern has arisen regarding their potential impact on international trade. Although the motivating force behind eco-labelling program is often domestic environmental improvement, manufactures are concerned that their access to foreign markets may be restricted by the environmental criteria set by programs in those markets.

Just as technical standards may create non-tariff trade barriers, ecolabelling schemes may inadvertently or deliberately create impediments to trade. Product categories eligible for labels may be selected to favor domestic over foreign producer's interest. The criteria for granting labels may also favor domestic over foreign producers. One example of this is the German textile-labelling scheme, The blue Angel, which virtually prefers products, which use artificial dyes produced in Germany to natural dyes. Discrimination may exist in product classification system. Austria imposed a mandatory labelling requirement for tropical timber and products but did not impose similar requirements for temperate forest products. This was later withdrawn after objections from the ASEAN countries. Another way that these eco-labelling requirements may act as a non-tariff trade barrier is the cost of compliance. As with technical regulations, the cost of compliance may be much higher for small export suppliers. They may have to incur cost such as information costs, plant inspection and certification cost and acquisition of approved inputs. In general, the criteria for granting ecolabels under life cycle assessment may be based on

environmental conditions in the importing country and may be inappropriate in the country of production and export.

Indian Eco-Mark

In India, the Government launched the eco-labelling scheme known as "Eco-Mark" in 1991. "Any product which is made, used or disposed of in a way that significantly reduces the harm it would otherwise cause the environment could be considered as Environment – Friendly Product." The criteria of Indian Eco-mark are based on cradle- to grave approach, i.e. from raw material extraction to manufacturing and to disposal. There are three stages involved in the Eco-mark scheme. The first stage is to determine product categories for the scheme, which is done by a steering committee, set up in the Ministry of Environment and Forests. The committee also formulates strategies for promotion, implementation, future development and improvements in the working of the scheme. The second stage involves the identification of a specific product and recommendation of individual criteria to be adopted. A technical committee set up in the CPCB carries this out. Finally the Bureau of Indian Standards (BIS) assesses and certifies the products and draw up a contract with the manufactures.

The Indian Eco-Mark has not achieved the desired results so far. The response from Indian companies for the award of Eco-Mark was very poor. In 1998, M/S Madhya Bharat Paper Mills Limited successfully completed the formalities and received Indian Eco-mark license for producing writing and printing paper. While Eco-labelling in other countries are gaining popularity, the initiatives taken by the Government of India still waiting for a break through. The Government has initiated several steps to tackle the above problems. For instance, a scheme encouraging industries to produce environment –friendly products is in the pipe line. Similarly, in the case of leather products, the pre condition for ISI mark for obtaining Eco-mark is not required for those who are producing a certificate from the buyers in the foreign market. With these initiatives, the number of companies approaching for Eco-Mark is likely to be increased. The problem of obtaining multiple Eco-labelling will be solved through agreement of mutual recognition of Eco-labelling schemes across countries.

However, during the primary data collection exercise at RIS, there were frequent references to the option of the eco-labelling programme of the importing country awarding its own eco-label to products meeting the process-related criteria of the exporting country and the use and disposal criteria of the importing country. In this regard, the life-cycle analysis for eco-labelling could be split into 'cradle to export border' and 'import border to grave'. While mutual recognition could benefit countries, which already have national eco-labelling programmes, in other cases the concept of "equivalencies" was seen as more useful. Establishing such equivalence would take account of comparable environmental objectives, different ways of achieving them and differences in environmental and developmental conditions across countries.

Table 8: Detail of various Ecolabelling Programmes:

Eco-labelling programs	Country	**Year of establishment**	**Products**	**Cost of acquiring**
The Blue Angel	Germany	1977	Paints & varnishes. Paper, cleaning products, construction material, textiles	DM 300
The Nordic Swan	Sweden, Norway, Finland, Iceland	1989	Paper products, detergents, cleaning agents	US$ 2000 + additional testing and verification costs.
Environmental Choice	Sweden	1990	Paper products, detergents, cleaning agents	5000 SEK
EU Eco-label Award Scheme	EU	1990	Detergents, Cleaners, paper and textiles	US$ 660
Environmental Choice Program	Canada	1988	Paper products, construction and home materials	SCAN 10,000
The Green Seal	U.S.A	1990	Paper & newsprint, engine oil products, paints, reusable bags	..
Eco Mark	Japan	1996		
NF Environment	France	1991		20,000 FF

Source: OECD, Ecolabelling: Actual effects of selected programmes, 1997

4.4.4 Opportunities for Environment Friendly Products (EFPs)

It is difficult to define Environment Friendly Products (EFPs) as no product is absolutely environment-friendly. Therefore, it is necessary to ensure that environmental claims are credible take account of consumer interests and support fair competition. Eco-labelling and promotion of environment-friendly products (EFPs) to take advantage of public concerns over environment could generate market opportunities, but could also create barriers to trade. Eco-criteria based on environmental and technological conditions in the importing country might imply significant costs for foreign producers and might also be environmentally less appropriate in the context of the local conditions in the foreign country of production.

The constrains in the export of environmentally friendly products from India has been discussed in Saqib and Kaushik (2001). Though organic farming has a tremendous scope in India, there exist a number of bottlenecks for farmers who are interested in organic farming and for the industry who want to process and export these products. These impediments are in the area of production, marketing and infrastructure. Some of the small growers find certification as a major problem. Standards are too high and are creating unfair barrier to production and trade. India has no local certification systems for organic products and farmers have to depend on foreign certification like IFOAM and SKAL. This is very expensive and is feasible for big holdings only.

As Table 9 shows the United States is the largest single-country market for organic foods, with $4.2 billion in sales for 1997 (Scott). The 1997 organic food market in the EU is estimated to be worth $4.5 billion (Segger). In Europe, Germany ($1.6 billion), France ($508 million), and the United Kingdom ($445 million) have the largest organic retail sales. Consumer commitment to organics is strong throughout the EU, with 20 per cent to 38 per cent regularly or occasionally purchasing organic foods. Retail price premiums in Europe average from 10 per cent to 50 per cent above conventional products. Import shares are highest in Germany and the United Kingdom, which are major food processors, and in the Netherlands, which is a primary re-exporter. Retail sales are lower in Canada ($68 million) and Australia ($60 million), although both countries are active in exporting organics-Australia to Asia and Canada to the United States and Europe. Price premiums in Canada average 30 per cent, but a range from 12 per cent to 65

per cent is found across the states of Australia. Import share is very high in Canada, purchased mostly from the United States, and very low in Australia, consistent with the organic share of total food sales in each country. Japan ($1.7 billion) and China ($1.2 billion) offer large retail markets, with negligible quantity currently supplied by imports. Price premiums in these countries are similar to those in the EU, averaging 15 per cent to 30 per cent. Market participation rates are also similar, between 27 per cent and 36 per cent.

Table 9: Market Size for Organic Products

Country	Approx. Retail Value (US $)	Year[a]	Organic Share of Total Food Sales	Import Share of Organic Sales	Average Retail Price Premium
Austria	$270 million	1997	2.5%	30%	20%-30%
Belgium	$75 million	1997	1.0%	50%	20%
Denmark	$190 million	1997	<3.0%	25%	15%-40%
France	$508 million	1996	0.4%	10%	25%-35%
Germany	$1.6 billion	1997	1.5%	60%	30%
Netherlands	$230 million	1997	1.5%	60%	15%-20%
Sweden	$200 million	1997	2.0%	30%	15%-50%
United Kingdom	$445 million	1997	2.0%	70%	0%-30%
Canada	$68 million	1995	1.0%	80%	30%
Australia	$60 million	1995	0.2%	0%-13%[b]	12%-65%[b]
China[c]	$1.2 billion	1995	6.0%[d]	0%	30%
Japan[c]	$1.7 billion	1997	1.0%	1%	20%-30%

[a] Year given is for retail value data; [b] Varies by state; [c] In this country, organic includes "low chemical."; [d] Based on production value, not retail sales.

Source: American Journal for Agriculture Economics, Vol. 80 No. 5, 1998, pp. 1125-1129.

4.5 Policy Recommendations and Concluding Remarks

In recent past, several issues related to environment have emerged which have serious bearings on multilateral trading agreements. It is important to clear the relationship between eco-labelling and Technical Barriers to Trade (TBT) agreement. In this regard, exploration of the possibility of government participation in such schemes may be a relevant exercise. This may help in ensuring greater transparency in the working. It is important that for transparency automatic notification to all parties should be sent and, in fact, for trade purposes, the *ex-ante* transparency is especially important. The implications of the TBT agreement extended beyond transparency question may include important substantive elements such as, equivalency, mutual recognition, dispute settlement and technical assistance. However, though India has launched an eco-labelling

programme but certainly increased assistance in this area is needed, with focus on technical assistance to help develop and improve certification procedures.

India would also have to upgrade the national system for testing, certification and laboratory accreditation so as to be at par with the global trade demands. In this regard, it is important to focus on capacity building in the private sector. Another related aspect is to closely study the emerging pattern of Mutual Recognition Agreements (MRAs) already underway between couple of OECD countries. The MRAs would start the process of removing duplicative testing and certification requirements in a number of product sectors.

As is clear for various studies that, the exports are facing a number of institutional constraints in meeting the international standards. Apart from this, lack of timely and precise information can be an obstacle to trade. In this regard, small and medium enterprises face innumerable problems. Whilst large firms obtain timely and accurate information directly from the importers in developed country markets and various other sources, SMEs tend to depend on secondary sources, basically government sources, often implying considerable time delays. Creating awareness of regulations and voluntary labels and available eco-friendly technology would require government intervention.

The certification of environmentally friendly products may be costly and confusing, in particular when producers in developing countries depend on the testing and certification bodies in the developed countries. The creation of standardization bodies or the expansion of existing bodies in developing countries and steps contributing to their international recognition are of key importance. Improvements in environmental infrastructure play an important role in reducing the costs of compliance. In India, many government, trade, regulatory and research entities have some responsibility for addressing such measures, but there is no one entity directing and coordinating overall government effort. Some entities' roles and responsibilities regarding these measures are not clearly defined, and these entities have had difficulty coordinating their activities. As far as testing facilities are concerned, our laboratories are poorly equipped in machines and in skilled manpower, which has led to poor reputation of our test results in international markets. Thus exporters resort to multinational testing facilities which are more

expensive. Accreditation of laboratories is voluntary and without any accountability. This has led to a mushrooming up of laboratories that are inappropriately equipped and often resort to issuing fake certificates.

There is limited support from the government of India available to the exporter to meet the increasing requirements. For instance, APEDA provides some assistance to the food exporters. They are given assistance for purchase of specialized transport machinery, setting up of pre-cooling facilities with proper air handling system, provision of facilities for pre-shipment treatment such as fumigation, X-ray screening, hot water dip treatment, setting up of vapour heat treatment, electronic beam processing, assistance for setting up of environment control system and setting up of specialized storage facilities such as high humidity cold storage. These limited assistance schemes are subject to a number of restraints and some of these schemes are also being put to an end. Therefore, a more dynamic and vibrant strategy is required to face ETBs and help out the industry on this front.

As is clear, producers of organic products face several sets of potential constraints related to conversion, production, marketing and government support policies. Constraints on conversion to certified organic agriculture in developing countries include uncertainty about markets and price premiums. Certification costs, technical requirements and sanitary and phytosanitary (SPS) measures might act as obstacles to exports of organic food products from developing countries. Furthermore, organic vegetable and fruit markets tend to rely largely on locally produced food. In this regard governments should support the development of the agriculture sector, in particular the production of high-value products, improvement of quality and better participation in global value chains, by taking fiscal and other measures to attract investment and technologies into new areas. Options may also be explored for providing WTO acceptable support to the agriculture sector, in particular for research and development and quality assurance especially for reducing costs of certification of organic producers in developing countries by setting up local certification systems, promoting small holder certification, and reducing the costs of international accreditation for certifies in developing Countries. In this context there is extreme urgency to develop international mechanisms to develop information channels to provide market information and analysis about these products and strengthen capacity-building initiatives.

The emerging trade and environment debate is highly complicated and interdisciplinary in nature. In India this becomes much more complicated as the number of agencies dealing with different commodities is very large. Moreover the agencies supposed to be doing the coordination often loose track of affected trade as at micro level the magnitude is too small to be taken into account. And there is no mechanism in place to pool data at one place so as to facilitate putting pieces take together and develop a macro-vision out of it. Therefore, there is an immediate need to develop a database in India, profiling trade and environment related cases. Once a sizable set of data is available, attempts may be made to quantify the trade distortion effects of those environment measures, if at all they are there.

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Annexure 1

UNCTAD Classification of Environment related Trade Barriers

1. Finance Measures

4174 Refundable deposit for sensitive product to protect environment

2. Automatic Licensing Measures

5271 Prior surveillance to protect human wealth
5274 Prior surveillance to protect environment

3. Quantity Control Measures

6171 Authorisation to protect human health
6172 Authorisation to protect animal health
6173 Authorisation to protect plant health
6174 Authorisation to protect environment
6175 Authorisation to protect wildlife
6176 Authorisation to ensure human safety

Quotas for sensitive product

6271 Quota to protect human health
6274 Quota to protect environment (Montreal Protocol)

Prohibition

6371 Prohibiton to protect human health
6372 Prohibition to protect animal health and life
6373 Prohibition to protect plant health
6374 Prohibition to protect environment
6375 Prohibition to protect wildlife
6377 Prohibition to ensure human safety

4. Monopolistic Measures

7171 Single channel for imports to protect human health

5. Technical Measures

Product characteristics requirements to protect human health
Product characteristics requirements to protect animal health and life
Product characteristics requirements to protect plant health
Product characteristics requirements to protect environment
Product characteristics requirements to protect wildlife
Product characteristics requirements to ensure human safety

Marketing requirements

8121 Marketing requirements to protect human health
8123 Marketing requirements to protect plant health
8124 Marketing requirements to protect environment
8127 Marketing requirements to ensure human safety

Labelling requirements

8131 Labelling requirements to protect human health
8132 Labelling requirements to protect animal health and life
8133 Labelling requirements to protect plant health
8134 Labelling requirements to protect environment
8135 Labelling requirements to protect wildlife
8137 Labelling requirements to ensure human safety

Packaging requirements

8141 Packaging requirements to protect human health
8142 Packaging requirements to protect animal health and life
8147 Packaging requirements to ensure human safety

Testing, inspection or quarantine requirements

8151 Testing, inspection or quarantine requirements to protect human health
8152 Testing, inspection or quarantine requirements to protect animal health and life
8153 Testing, inspection or quarantine requirements to protect plant health
8154 Testing, inspection or quarantine requirements to protect environment
8155 Testing, inspection or quarantine requirements to protect wildlife
8156 Testing, inspection or quarantine requirements to ensure human safety

Annexure 2: Commodities susceptible to ETBs in India's exports of 1999

Commodity Code	Commodity Name	quantity	value
10410	Sheep	20000	0.2
1051100	Fowls of the species Gallus domestics	1504112	0.49
1051900	Other	1546831	0.37
10600	Other live animals	0	0.01
2011000	Carcasses and half-carcasses of bovine animals, fresh/chilled	2330151	2.04
2012000	Other cuts of bovine animals with bone in, fresh/chilled	1152795	0.92
2013000	Boneless of bovine animals, fresh or chilled	44759811	47.57
2021000	Carcasess and half-carcasses of bovine animals, frozen	983624	0.87
2022000	Other cut meat of bovine animals, frozen with bone in	1078110	1.08
2023000	Boneless of bovine animals, frozen	103651656	111.8
2031900	Other meat of swine, fresh or chilled	33800	0.04
2032100	Carcasses and half-carcasses, frozen	25058	0.03
2032900	Other meat of swine, frozen	48540	0.05
2041000	Carcasses and half-carcasses of lamb, fresh or chilled.	1437235	2.67
2042200	Other cuts with bone in of sheep, fresh or chilled	909116	1.62
2042300	Boneless meat of sheep, fresh or chilled	684559	1.44
2043000	Carcasses and half-carcasses of lamb, frozen	22400	0.04
2044100	Carcasses and half-carcasses of sheep, frozen	180865	0.36
2044200	Other cuts of sheep with bone in, frozen	3081608	7.9
2044300	Boneless meat of sheep, frozen	637422	1.7
20690	Other edible offals, frozen	77960	0.08
2090000	Pig fat free of lean meat and poultry fat (not rendered), fresh, chilled, frozen, salted, in brine, dried or smoked.	36536	0.09
21090	Other, including edible flours and meals of meat or meat offal.	10856	0.14
3011000	Live ornamental fish	19839	0.59
3019900	Other live fish	12028	0.05
3021900	Other salmonidae excluding livers and roes fresh or chilled	14347	0.03
30269	Other fish fresh or chilled excluding livers and roes	2690455	5.1
3032900	Other salmonidae, excluding livers and roes frozen	5000	0.02
3034900	Other tunas excluding livers and roes frozen	5209	0.01
30379	Other frozen fish, excluding livers and roes	0	135.09
3041000	Fish fillets & other fish meat (whether or not minced) fresh or chilled	227598	0.3
30420	Frozen fillets (whether or not minced) frozen	4504685	8.02
3049000	Other fillets(excl. frozen) & other fish meat	2092227	3.53
3053000	Fish filts dried salted/in brin not smoked	366317	0.36
3054900	Other smoked fish including fillets	719832	0.84
30559	Other dried fish whether or not salted not smoked	3180907	2.6
30613	Shrimps and prawns frozen	118072722	738.03
30799	Other molluscs excluding live fresh/chilled	374320	0.76
40210	In powder, granules or other solid forms, of a fat	793214	1.2

	content, by weight, not exceeding 1.5%.		
4022100	Milk & Cream in Pwdr,Grnls/other Solid Forms not containing Added Sugar/other Swetng Matter containing Fat Exceedng 1.5% by Wt	487	0
40299	Other	2019	0
40390	Other	15100	0.02
4049000	Products other than Whey Consisting of Natural Milk Constitnts	40390	0.05
4062000	Grated or Powdered Cheese of All Kinds	680	0
4063000	Processed Cheese not Grated/Powdered	1200	0
4069000	Other Cheese	33822	0.11
40700	Birds' eggs, in shell, fresh. preserved or cooked.	10884909	11.86
41000	Edible products of animal origin, not elsewhere specified or included.	230	0
50400	Guts, bladders and stomachs of animals (other than fish), whole and pieces thereof.	382056	3.23
50590	Other	65852	0.49
50690	Other	1599906	0.55
50800	Coral and similar materials, unworked or simply prepared but not otherwise worked; shell of molluscs, crustaceans or echinoderms and cuttle-bone, unworked or simply prepared but not cut to shape, powdUNIT	51676	0.09
51000	Ambergris, castoreum, civet and musk; cantharides; bile, whether or not dried; glands and other animal products used in the preparation of pharmaceutical products, fresh, chilled, frozen or otherwise UNIT	7433	1.02
5111000	Bovine Semen	70	0.01
51191	Products of fish or crustaceans, molluscs or other aquatic invertebrates; dead animals of Chapter 3.	744876	6.99
51199	Other.	2521	0.08
6011000	Bulbs,Tubers,Tuberous Roots, Corms,Crown & Rhizomes,Dormant	1589679	0.16
60120	Bulbs, tubers, tuberous roots, corms, crowns and rhizomes, in growth or in flower; chicory plants and roots.	299962	0.1
6021000	Unrooted Cuttings & Slips of Live Plants	361070	0.12
60220	Trees, shrubs and bushes, grafted or not of kinds which bear edible fruit or nuts.	2440	0.01
6031000	Cut Flwrs & Flower Buds Suitable for Boqets or Ornamental Purposes,Fresh	2722348	5.97
6039000	Other Cut Flwrs & Flower Buds Suitable for Boqets/For Ornmntl Purpses	8295433	12.13
6049900	Foliage Branchs etc,Not Fresh without Flwr/ Flwr Buds & Gresses Suitable for Bouquets/Ornamental Purposes excl.g Fresh	3072788	4.32
7011000	Potato Seeds Fresh or Chilled	389096	0.1
7019000	Potatoes Fresh or Chilled other than Seeds	7873325	1.23
7020000	Tomatoes, fresh or chilled.	642712	0.11
70310	Onions and shallots.	215765607	41.85
7032000	Garlic Fresh or Chilled	3592247	0.97
70990	Other.	38819734	15.11

7109000	Mixture of Vegetables Frozen	3288584	1.85
71290	Other vegetables; mixtures of vegetables.	683622	0.89
7131000	Peas (Pisum Sativum) Dried & Shld	303652	0.13
7133100	Beans of the Spp Vigna Mungo,Hepper or Vigna Radiata,Wilczek Dried & Shld	9880	0.01
71339	Other	18010	0.01
8021100	Almonds Fresh or Driedin Shell	268	0
8021200	Shelled Almonds Fresh or Dried	20412	0.08
8051000	Oranges Fresh or Dried	10407098	2.43
8061000	Grapes Fresh	11382177	8.81
80620	Dried.	143334	0.19
8081000	Apples Fresh	7442120	2.38
8082000	Pears & Quinces Fresh	181894	0.02
81090	Other	12229068	4.99
90111	Coffee neither roasted nor decaffeinated	178945149	329.7
10011000	Durum Wheat	4100	0
100190	Other	1756900	0.32
10051000	Maize Seed	417160	0.13
10059000	Other Maize (Corn)	1646193	0.32
100630	Semi-milled or wholly milled rice, whether or not polished or glazed.	4888064962	1477.14
10070000	Grain sorghum	22000	0
11010000	Wheat or meslin flour.	3955265	0.86
120220	Shelled, whether or not broken	51877132	29.92
12060000	Sunflower seeds, whether or not broken.	1739754	1.65
120799	Other	21089622	11.75
12092900	Other Seeds of Forage Plants	1189190	0.5
120991	Vegetable seeds	3773368	8.73
120999	Other	1063222	6.03
121190	Other	37976307	56.51
130190	Other	6599663	78.02
140490	Other	5080607	4.82
150410	Fish-liver oils and their fractions.	23684	0.19
16023900	Other Prpd/preserved Poultry of Hdng No 0105	201620	0.52
16024900	Other Prpd/preserved parts of Swine incl. Mxtrs	71	0
16025000	Prpd/preserved Meat,Meat Offal of Bovine Animals	40000	0.02
160300	Extracts and juices of meat, fish or crustaceans, moliuscs or other aquatic invertebrates.	154060	0.56
16041900	Other Fish,Whl/Pcs,not Minced,Prpd/preserved	3663	0
16042000	Other Prepared or Preserved Fish	163564	0.8
190110	Preparations for infant use, put up for retail sale.	3878800	6.76
190190	Other	8275108	12.6
19021100	Uncokd Psta Ntstfd/otherwse Prpd containing Eggs	17610	0.03
19021900	Other Uncookd Notstfd/otherwse Prpd Psta	80880	0.1
19022000	Stuffed Pasta whether or not cooked/otherwse Prpd	62427	0.08
19023000	Other Pasta	36752	0.06
190410	Prepared foods obtained by the swelling or roasting of	2277631	1.65

	cereals or cereal products.		
19049000	Crls in Grain Form excl. Maize Pre-Ckd etc	686309	0.73
190530	Sweet biscuits; waffles and wafers	3007072	3.23
19054000	Rusks Toasted Bread & Similar Toasted Prdcts	90629	0.16
19059000	Others	487812	0.84
21041000	Soups & Broths & Preparations Therefor	40550	0.02
21042000	Homogenised Composite Food Preparations	8942	0.03
230120	Flours, meals and pellets, of fish or of crustaceans, molluscs or other aquatic invertebrates.	112275	0.06
230990	Other	83130500	15.34
300110	Glands and other organs, dried, whether or not powdered.	61766	1.39
300120	Extracts of glands or other organs or of their secretions	39797	0.66
30019000	Heparin Slts other Human/Animals Substns Fbr Thruptc/Prophylactic Use Nes	29604	0.46
300210	Antisera and other blood fractions	10336	0.45
300220	Vaccines for human medicine.	655058	25.04
300290	Other	0	2.75
300310	Mdcmnts containing Pnclns/Thr Drvtvs With A/Pnclnc Acd Strctre,Strptmcns/Thr Drvts	119557	0.76
300320	Medicaments Cont. Other Anti-Biotics	33508	0.34
300339	Other Medicaments	523952	5.68
300390	Other .	14004768	126.41
300410	Containing penicillins or derivatives thereof, with a penicillanic acid structure, or streptomycins or their derivatives	4012017	72.06
300420	Containing other antibiotics.	2695801	81.26
300431	Containing insulin	16811	2.81
41039000	Raw Hids and Skins of Other Animal	2000	0.03
	TOTAL	**5970847060**	**3576.79**

Source: India trades. 2001

Annexure 3 : Disputes referencing SPS and TBT Agreements in WTO DSU: to December 1999

	Petitioner	Respondent	Product	Issue	Outcome
DS2	Venezuela	United States	Petrochemicals	Environment	Appellate Rept
DS3	United States	Korea	Agriculture	Food Safety	Consultations
DS4	Brazil	United States	Petrochemicals	Environmental	Appellate Rept
DS5	United States	Korea	Agriculture	Food Safety	Settlement
DS12	Peru	EC	Agriculture	Marketing	Settlement
DS14	Chile	EC	Agriculture	Marketing	Settlement
DS18	Canada	Australia	Agriculture	Quantitative	Appellate Rept
DS20	Canada	Korea	Agriculture	Food Safety	Settlement
DS21	United States	Australia	Agriculture	Quantitative	Active
DS26	United States	EC	Agriculture	Food Safety	Arbitration
DS41	United States	Korea	Agriculture	Food Safety	Consultations
DS48	Canada	EC	Agriculture	Food Safety	Arbitration
DS56	United States	Argentina	Textiles	Customs	Appellate Rept.
DS61	Philippines	United States	Agriculture	Environmental	Consultations
DS72	New Zealand	EC	Agriculture	Customs	Settlement
DS76	United States	Japan	Agriculture	Food Safety	Appellate Rept
DS85	EC	United States	Textiles	Transit	Settlement
DS96	EC	India	Mixed	Customs	Settlement
DS100	EC	United States	Agriculture	Food Safety	Consultations
DS133	Switzerland	Slovak Republic	Agriculture	Transit	Consultations
DS134	India	EC	Agriculture	Customs	Consultations
DS135	EC	United States	Textiles	Customs	Active
DS137	Canada	EC	Agriculture	Quantitative	Consultations
DS144	Canada	United States	Agriculture	Transit	Consultations
DS151	EC	United States	Textiles	Customs	Consultations

5 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of Pakistan

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5.1 Introduction

The relationship between trade and environment has always generated heated debate. Proponents of free trade/globalization assert the compatibility of trade and environmental objectives. They contend that the most pressing environmental problems will be addressed only when economies are developed sufficiently -- trade being one among the many instruments for such development (for instance, through clean technology transfers).[1] The opposing view holds trade/globalization responsible for degrading the environment and rules out the possibility of synchronizing trade and environment objectives. This debate also coincides with a north-south split, one complicated further by the endorsement of southern concerns by progressive northern NGOs. Perhaps environmental regulations define this split best. Its advocates in the north advance the view that such regulations will promote sustainable development and growth eventually. Inverting this argument, southern countries claim environmental regulations are trade-restricting devices, engineered by coalitions to protect domestic industries and block exports from the south.

This paper tries to avoid the histrionics such debates can give rise to and focuses on the functional implications. It begins with the premise that the reality is somewhere in between, that trade can have both environmentally malign and beneficial impacts. By the same token, environmental regulations can cut both ways: they can be trade restricting but they also offer new market niches and can lead to cleaner production practices in the exporting countries. The institutional challenge is to address the concerns and maximize the benefits. Also, in the final analysis, developing countries are left with little choice other than to comply with the increasingly stringent environmental regulations in order to maintain their export shares. Given the multi-stakeholder interests, this means satisfying the demands of a range of stakeholders – governments, environmental organizations and the corporate sector.

The north, too, can facilitate this process by displaying sensitivity for institutional and social realities in the south. With regard to process standards (effluents, emissions) tolerances vary, given the initial pollution and emission baselines. This is as true intra-north, as across the north-south divide. Also, compliance/enforcement should be a function of both awareness and institutional capability and the National Environmental Quality Standards (NEQS) should reflect these differences. Such capability embraces in-house environmental management, as well as external (government, delegated) facilities to measure, monitor, audit and enforce. In particular, spillover and downstream impacts, which make attribution difficult inherently underscore the need for precise measurement. Effective mechanisms are as critical when assessing environmental/health effects embodied in products. Failure to adhere to prescribed

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[1] For a good treatment of the various effects, see Munasinghe (Munasinghe: 1996)

standards -- by passing off products through spurious certification -- can erode credibility and affect adversely export prospects.

Northern Initiatives

Northern industrialized countries are concerned about relaxed production and environmental standards in developing countries, which produce occupational and embodied health hazards and downstream and localized environmental pollution. The aim is to eliminate this "social and environmental subsidy" and to push for upward harmonization of environmental standards through various trade restrictive measures, such as emission, technology, performance and product standards etc. The overall effect of all these standards is to force producers, traders and consumers to consider the environmental impact of the economic decisions they take; in other words, they must begin to internalize the external environmental costs in their calculations.

Some of the environmental standards represent public interests, as manifested in specific national environmental laws and they draw their strength from legal status. Some other standards, though voluntary in nature such as eco-labeling schemes and environmental management systems, have come into force as a result of either consumer choice expressed through buying patterns or socio-cultural pressure, expressed through media campaigns, protests and boycotts. For instance, in Sweden, consumer choice has wiped out nearly all non-labeled detergents and washing powders in the local markets. With over 200,000 members, the Swedish Society for Nature Conservation, the largest environmental organization in Sweden, operates Society's "Shop-and-Act-Green" project, to promote awareness of what "normal citizens" can do for the environment on a day-to-day basis.

Another subset of environmental standards and which have trade implications are embodied in Multilateral Environmental Agreements (MEAs). They can represent both public and private interests. In the former case, they take the form of legal commitments to honor international bindings, in the latter; although rooted in national law; they are driven primarily by the expressed interest of citizens and environmental NGOs operating across the border. A recent UNEP report has suggested that MEAs should model themselves explicitly on trade agreement practices. (Richardson, 2000) Calculating the effective rate of protection for value added could be a useful tool in estimating the economic costs of different trade measures applied within MEAs. Also, a need exists to develop aggregate indicators to measure the effectiveness of MEAs in ensuring compliance with environmental mandates.

From the North's point of view, environmental standards are not, necessarily, trade restricting. They offer opportunities for exploiting emerging market niches for "green" products. Also, environmental endorsements, like good quality, can ensure sustained market demand.

Southern Reactions

Developing country producers and exporters view environmental regulations as trading obstacles -- variants of trade policy measures, such as tariffs, quotas, farming subsidies, etc., which protect domestic industries and restrict market access for southern products. The frequent use of anti dumping laws and other trade restrictive measures, such as subsidies, constitute reasonable grounds for such apprehensions. Between 1992 and 1996, the EU

launched more anti-dumping investigation in the "textile and allied" sector than any other country (32 out of 151 cases). At the end of 1996, the EU had 143 anti-dumping measures in place, the USA 198, Canada 93 and Australia 47. Recourse to anti dumping will continue to be a problem, even though Uruguay Round changes have moderated the EU requirements. Subsidies, an alternative form of protection, also present major obstacles to exports from developing countries. Although the Uruguay Round set limits to agriculture subsidies, total annual support for agriculture in OECD countries averaged $350 billion in 1996-98. This was more than twice the total of total agriculture exports from developing countries ($170 billion) during that period. Direct export subsidies account for around one sixth of the total EU agricultural subsidies. (UNCTAD: 1999)

The tendency to lump environmental regulations with direct and indirect export restrictions may or may not have merit. However, the south's sensitivity has an intrinsic rationale. Reflecting differences in pollution and emission baselines, environmental standards should accommodate differences in assimilative capacity of the physical environment to sustain industrial activities.[2] Also, the institutional and awareness constraints limit the ability to comply with/enforce environmental regulations. Thus, rather than type-casting the south as an irresponsible bad guy, a more constructive approach would be to accept its willingness to take appropriate measures, provided institutional constraints are recognized and adverse economic spin-offs are minimized.

Export Gains Through Compliance

In several cases, gains have accrued to southern countries as a result of conforming to environmental standards. One of several examples of securing market niches is Century Textiles of Bombay, the largest textile company in India. When its products gained Öko-Tex certification, it was able to raise prices by 8-10 per cent and increase market access by 10 per cent. (SIDA: 1998)

A Hungarian Automobile Battery Manufacturer, Perion, which produces and exports chemical batteries to EU has reduced environment load by 50 per cent as a result of introducing environmental management measures[3]. The most important financial result for Perion is the reduction of its environmental fines by 98 per cent. The wastewater pollution penalty has dropped from US$ 70,000 to US$ 1,380. Fresh water consumption has also been reduced. Fees for use of the public sewage system have decreased. Recycling of lead-containing car batteries also brings Perion an additional income of HUF 30 million per annum.

Another success story is the Colombian Leather Tannery, Curtigran Ltd[4]. Faced with increasing environmental legislation, decreasing productivity and product quality, the company saw eco-efficiency as a strategy which could ensure its survival. Working in co-operation with the local San Benito Leather Tanners' Association (ASOCUR), the company reduced their overall operating costs by 11 per cent, and pollution by 50 per cent. Then, clean and efficient technologies were developed in-company with the help of external consultants,

[2] Implicitly invoking the aphorism that, "what is sauce for the goose should be sauce for the gander," the south alludes to unsuccessful attempts at harmonizing standards, intra-north, for instance, among the EU countries

[3] Source: [illegible] studies/perion.html)

[4] Source: [illegible] studies/curtigran.html

expert tanners and a training program. It has reduced its environmental impact and improved its efficiency, productivity and product quality.

A recent UNEP study (UNEP 1999) examines six country experiences with the aim of identifying synergies between trade, environment and development. The reviewed sectors are fisheries, water, forestry and mining and the industries, shrimp and automative. Using cost-benefit analysis, it assesses the potential negative impacts of compliance and suggests practical ways and means of converting the losses into a win-win strategy for sustainable development.

The Environmental Rationale

The emerging trade-environment paradigm, which took shape during the last few decades, consists of many intertwined and cross-cutting elements. At the risk of some generalization, these can be summarized as follows:

Product Hazards

Various health and environmental hazards are associated with product use and its disposal, sometimes termed as 'product ecology.' Product oriented environmental standards have emerged out of scientific research. Such research has revealed the presence of chemical substances in various industrial products injurious to human health. This has led to the promulgation of environmental laws and regulations in developed countries. These laws regulate not only the composition and characteristics of products but also mandate safe disposal after use. They are primarily northern-driven with direct implications for the south, as they prohibit the entry of any product, which does not comply with these laws.

In environmentally sensitized countries like Sweden, Denmark and Holland, concern is growing about the harmful effects of textile fabrics. It has evoked reactions on issues like azo-dyes and formaldehydes. In Sweden, the campaign for clean cloth is aimed at educating buyers and consumers about the harmful effects embodied in the fabric used. The Danish EPA has published lists of colorants (dyestuffs), which are frequent skin sensitizers and should be regarded as carcinogens. Germany has banned the use of azo-dyes altogether and prohibits any product containing the trace of azo-dye from entering the German market.[3]

Production & Process Effects

These refer to the negative effects of production and process methods on the local environment and on the health of people. Over the past few years, concerted efforts have been made to harmonize process and production methods worldwide. The standards, as embodied in various eco-labeling schemes and environmental management systems (ISO-14000), aim to reduce the effluent and emission levels generated by production processes. In

[3] Any product with azo dyes that may split off any one of the 20 carcinogenic amines is not prohibited in these countries. The splitting of azo dye can occur on the skin, in the intestine and in the body. On the skin and in the intestine, this is brought about by bacteria. In the body, for instance in the liver, azo compounds can be broken down by certain enzyme systems. Non-fixed, water soluble azo dyes can also come in contact with skin via perspiration fluid. Some of these azo dyes form amines, which are carcinogenic. Benzidine in particular, is an identified carcinogen.

developing countries, people most affected are industrial labor and poor communities residing adjacent to industrial sites. The premise is that environmental awareness among such people is low. They are often ignorant of the health risks of using chemicals for instance, and have little opportunity to influence their working environment and immediate surroundings.

For instance, a study conducted in 1992 indicates that in the five ginneries in rural Sindh, 9% of total workers had severe byssionosis, 64% were asymptotic and the rest had other respiratory symptoms. (Khan, S. et. al, 1998). A survey conducted in tannery cluster of Sialkot assessed the environmental and health impacts. A very high proportion of communities, over 85%, held the tanneries responsible for the majority of public health and environmental problems. While the majority favored shifting the tanneries out of their localities, a substantial minority voted to retain them, provided they instituted appropriate waste management and environmental protection measures. (Ahmed, M, 2000)

The North favors harmonized production and process methods by arguing that the transition to environment friendly production processes in developing nations would be an extremely important factor in improving both the working and living environments, and with it the general health of the local population. Professing equal concern, southern governments resist harmonization for the reasons cited above. However, converging objectives improve prospects for negotiated agreements.

Spillover Effects

Spillover effects can be both regional and global, in as much as production activities do not recognize local or national boundaries. Acid rain deposition and the discharge of effluents into river bodies, with adverse downstream impacts on agriculture and biodiversity are examples of regional effects. Global warming and ozone layer depletion exemplify global impacts. The effects can be of the quick-response variety (industrial effluents, acid rain) or may entail long lead times (global warming, ozone depletion). Transnational agreements are required to deal with the cross-border dimension of environmental problems (Kyoto and Montreal Protocols, Agreements on POPs).

Biodiversity Conservation

Biodiversity concerns have also played an important role in standards formulation. Production for export can have toxic side effects, which threaten natural habitats. In particular, many components and additives banned in industrial nations are used still in developing countries. Crop production for exports, based on chemical-intensive monoculture, can result in soil and water quality deterioration and crop biodiversity loss. In a reversal of southern culpability, patent regimes enforced by the north amount to biopiracy (basmati rice, neem), demonstrating that the North needs to set impartial standards for itself too.

National environmental quality standards (NEQS) embrace biodiversity concerns also. Trade related standards are enshrined in various multilateral environmental agreements (MEAs). The important ones are[5]:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975

[5] Source: IISD' handbook on Trade and Environment

- Basel Convention on the Control of Trans-Boundary Movement of Hazardous Wastes and their Disposal, 1992
- Convention on Biological Diversity, 1993
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC), 1998
- Cartagena Protocol on Biosafety, 2000

Trade provisions in MEAs, as exemplified by the ban on the ivory trade in Zimbabwe under the CITES and the unilateral use of trade measures to enforce environmental compliance between trading partners, as in the tuna-dolphin and shrimp-turtle cases, illustrate the frequent use of the trade measures to promote biodiversity conservation. In extremis, this is viewed by the south as "eco-imperialism".

Trade Impacting Environmental Standards and Measures

The emerging environmental paradigms discussed in the previous section have led to various trade related improvisations in Western countries, in order to ensure environmental compliance at the national and international levels. Some measures are stated explicitly in specific laws about the use of certain substances and some legal provisions regulate, in general, toxicity or other environmental concerns. Similarly these measure reflect either public or private interests or, as in the case of eco-labeling schemes, both simultaneously. Finally, these standards either can acquire a trade restrictive dimension, or enhance the scope of trade, depending largely upon the compliance capacity of the developing countries.

Environmental Laws

Various environmental laws in the Western countries are in force, which regulate the nature and composition of products. They deal usually with the physical and chemical characteristics of the product. The product is, directly or indirectly, considered responsible for any adverse environmental or health effects. In addition to legislation on specific substances, several European countries including Germany and the Netherlands have general laws on products hazardous to health and to the environment. By means of this type of legislation, it is prohibited to bring onto the market products, which have been treated with dangerous substances. In Netherlands, this is regulated under the Goods Act, article 18c. In Germany, similar legislation exists under the Chemical Act, article 17 (CREM, 1996).

Environmental Management Systems

Environmental management systems (EMS) are a consequence of discrepancies in the specification and implementation of national environmental standards in developing countries. International buyers demand the institution of such systems, where client companies are required to be certified by internationally accredited certifying organizations. Examples of such systems are ISO 14000 and Environmental Management & Audit Schemes (EMAS). Such systems have begun to be introduced in Pakistan and encompass production processes, which cause pollution, use harmful additives and exploit their labor force. For instance, Otto Versand[6] demands an environmental management system, requiring the specification of an environmental strategy; detailed programs and monitoring reports. IKEA,

[6] A German buyer of textile products from Pakistan

another large buyer of textile products, has clearly stipulated EMS as a preferred option of doing business with its suppliers. (APTPMA, 1998)

Eco-Labeling

Eco-labeling has become an increasingly important tool for discerning consumers in industrial countries to influence production processes. The transmission works both ways: eco-labelling schemes provide information to consumers and encourage producers to shift to more environment-friendly production processes. Environmental labels contain information about the environmental impacts and qualities of the products, enabling organizations and individuals to make informed choices. Eco-labeling also constitutes a market-based incentive, both in terms of the choices it provides to consumers and the niche opportunities it offers to producers.

These schemes, originally designed for trade among developed countries, are being extended increasingly to products from developing countries. One such example is Century Textiles of Bombay, the largest textile company in India. When its products gained Öko-Tex certification, it was able to raise prices by 8-10 per cent; simultaneously, the market grew by 10 per cent. (SIDA, 1998). In addition, a scope for potential "new" markets is also being established. Synthetic materials can be replaced by natural ones, for instance, jute and *sisal* are offered as substitutes for artificial fibers, and color grown cotton can replace chemical intensive artificially dyed cotton.

An Italian organisation, namely Legambiente, is promoting an international event called Ecomoda for the fifth year: its aim is to spread information about ecological solutions for the production of textiles[7]. All the major producers will present their products and proposals. The European Commission is supporting the initiative, as a lot of attention will focus on the European eco-label

Codes of Conduct

Codes of conduct represent another effort by companies in the industrialized west to develop environmentally friendly profiles and have been a factor in influencing exporters and manufacturers in developing countries. Some company codes of conduct are tabulated illustratively.

In the Netherlands, codes of conduct for clothing vendors require a safe working environment for labor, including attention to safety and health, throughout the production chain, and participation in monitoring these conditions. Moreover, the seller helps finance the compliance system. Until 1996, no vendor signed the code of conduct. (CREM, 1996) Swedish companies such as Hennes & Mauritz, KappAhl, IKEA and OBS place both environmental and social demands on their suppliers as a condition of doing business. These demands are not as rigorous as for eco-labeling, but they are mandatory in nature and monitored closely by the buyers.

IKEA, which is currently buying textile products from a number of textile companies in Pakistan, does not permit the use of chemicals such as azo dyes and cadmium in textile products. The use of formaldehyde in textile products is governed by Finnish regulations.

[7] Source: [illegible] ...ment_ecolabel_env_it.htm

IKEA also applies the strictest possible (German) regulations on PCP (pentachlorophenol), used as a mould agent. These specify a maximum limit of 5-mg PCP/kg, which amounts to a ban on its use effectively.

IKEA also provides a niche for 'organically grown' cotton, meaning that no artificial fertilizers, or chemical biocides have been used in its cultivation.

Table 1: Environmental Codes of Conduct

Company	Standards for Suppliers
Wal-Mart	Environment: In accordance with the principle of the three 'Rs' -- reduce, reuse and recycle
Sears and Roebuck	Strict adherence to local laws governing working conditions and production methods
Levi Strauss	Sharing commitment to the environment and conducting business in a way that is consistent with Levi Strauss & Co.'s Environmental Philosophy and Guiding Principles.
IKEA	Due compliance to environmental conditions such as use of azo-free dyes, formaldehyde, PCP (pentachloropehenol,)
C & A	C & A will assist its suppliers in their efforts to meet their obligation to preserve the environment
Hennes & Mauritz	Suppliers must comply with all environmental laws and regulations in the country of operation

Extended Producer Responsibility (EPR)

Extended producer responsibility (EPR) imparts a life-cycle aspect to the product. It is based on the premise that the producer has some control over the composition of the product, its longevity and, ultimately, the ease of its recycling and disposal. In this context, EPR requires that environmental considerations be integrated into product design and manufacturing, embracing both the upstream aspects (such as the selection of materials), and downstream effects (such as ease of recycling and disposal). EPR can, potentially, give rise to concerns among exporters from developing countries. These relate to obtaining information about EPR, the price-depressing effects of repackaging/recycling and the disposal of wastes.

Green Public Purchasing

In many OECD member countries, green public purchasing (GPP) programs promote government purchases of environment-friendly products. Such practices are gaining currency in many European countries. In Sweden, tenders to supply public authorities are subject to rigorous environmental standards. Through the European Union's Generalized System of Preferences, the European Commission has proposed the establishment of an 'Encouragement Regime'. Import tariffs may be reduced by 20-30 % for products produced in 'an environmental and human way'. (CREM, 1996). Not surprisingly, exporters from developing countries may view these as schemes that appear to favor domestic producers However, such concerns may also reflect an inability to compete.

Over the past few years, the textile sector has undergone changes in term of composition and the increased export of untraditional but value added items. (see Table 2). Due to these changes, the textile sector is now able to produce wrinkle-free, anti-bacterial, anti-dust and anti-cling fabric that a few years ago was unknown. Similarly, it now possesses the ability to process 320-cm wide cloth with 24 colors. Besides traditional items such as yarn and cotton fabrics, the textile sector now offers a wide range of quality products that include bed covers, bed sheets, bed skirts, bed ruffle, bed spread, waterbed sets, quilts covers, rod valance, table covers, comforters, curtains, pillow covers, pillow sham and pillow ticking. Other new products being introduced high quality satins for beds and furniture and twills for apparel and clothing.

This sector illustrates the diversity of linkages between trade and environment. It embraces the gamut of product, technology, scale and structural effects. The environmental impacts have a two-fold dimension. Negative, product effects are evident in the use of substandard and unbranded chemicals and dyestuffs, particularly azo dyes. Obsolete technology in bleaching and singeing operations wastes energy and water. Scale effects manifest themselves in the increasing discharge of wastewater, contaminating water and soil and threatening aquatic life. The adverse structural effects relate to the growth of textile processing over the past two decades with its attendant demand for fresh water, the best transferring agent in processing. In the Kharianwala area of Faisalabad (the hub of textile industries), the underground water level has decreased from 10-15 feet to 200-250 feet as a result of excessive pumping of ground water by these newly established textile-processing units.

But there are positive environmental offsets as well. Benign product effects are embodied in the reduction of carbon content in fabrics. Alternative dyestuffs are replacing increasingly toxic dyes such as sulphur black or azo-dyes. The increasing scale of operations has made possible the introduction of a range of the latest environment friendly technology. In operations like printing and dyeing, energy efficient machinery and equipment imported from Germany and Italy is in use. The introduction of thermosole[8] dyeing machines has generated economic efficiency as well as ecological gains. The increasing use of pad batch dyeing for cotton, rayon and blends conserves energy, water, dyes and chemicals, labor and floor space. Water consumption for pad batch dyeing with steam wash-off is typically under two gallons per pound of dyed fabric, compared to, typically, 20 or more on atmospheric beck for the same fibre reactive dyed shade. This reduces associated BOD and COD loading for waste streams by up to 80% (Bailly, H. 1998).

The Financial, Social and Institutional Implications of Compliance

Though no empirical study has been done which quantifies the financial costs and benefits of environmental compliance, some inferences are possible. The export figures (Table 3) show a steady rise in Pakistan's exports but its share in world trade is declining particularly of textiles, which are the mainstay of its exports. This trend is reflected in dollar terms (Table 4). This is discouraging, considering the subsidies to exporters through rebates and the frequent rupee devaluations.

[8] Thermosole dyeing machines is considered better than traditionally used Jiggers and Jets

While declining shares can not be attributed solely to the lack of environmental compliance, the domestic policy climate is one which does not allow much scope for exploiting emerging market niches. The export companies in Pakistan have opted for an out-moded premise of international trade, i.e. selling low-cost, low quality items, cushioned by domestic protectionist policies. But such policies are becoming increasingly costly. The ban by the US on the import of surgical goods from Pakistan in 1994 due to lack of quality certification and an attempt to ban the export of footballs in 1997 signal the importance of familiarizing industrialists with standard requirements. (Ahmed. M, 1997)

Protectionist policies, being inward-looking, encourage poor corporate behavior. Fortunately, some firms have shown foresight, reaping gains by upgrading their production technologies. However, while this does have beneficial environmental spinoffs, these, are not enough. For instance, the thermosole dyeing machine provides an example of environmental benefits accruing through increased efficiency. But it needs to be combined with end-of-pipe solutions to reduce the increased outflow of untreated wastewater. Further benefits can accrue from improved environmental management. But, this is easier said than done. It is an area where compliance strategies and policies have to be given careful consideration.

Social conditions, environmental tolerances and institutional capabilities set a cap on how far developing countries are prepared to go in accommodating Northern standards. This is as true in the north as in the south. Countries with a high environmental profile, like the Netherlands, Denmark and Sweden developed their own systems of environmental management, reflecting their own internal realities and requirements. As a consequence standards are not harmonized intra-north, which establishes a precedent for the south to chart its own route to compliance.

Table 2: Pakistan's Share in World Export[9]

(US$ Millions)

	1993	1994	1995
Total Trade	3,257,589	3,617,591	4,490,031
World Total	6,842	7,328	8,125
Pakistan (% Share)	0.21	0.20	0.18
Textile & Clothing	271,926	238,433	277,669
World Total	5,091	5,593	5,921
Pakistan (%Share)	2.23	2.35	2.13
Carpets & Rugs	1,440	1,213	1,090
World Total	158	187	149
Pakistan (% Share)	10.97	15.42	13.67
Leather Goods	12,697	14,645	18,041
World Total	240	269	280
Pakistan (% Share)	1.89	1.84	1.55
Fish Products	33,384	36,531	41,693
World Total	202	143	150
Pakistan % Share	0.61	0.39	0.36

[9] Source: Mahmood Ahmed , 1998

5.2 Western Environmental Standards

Environmental standards and related developments in the north, which affect, primarily, the textile and leather products of Pakistan have been divided into three major categories. Category 1 deals with environmental laws, which regulate the nature and composition of importing products. Category 2 focuses on eco-labeling requirements of various European countries. Category 3 looks at process-oriented instruments, which are usually a part of environmental management systems.

Environmental laws relate to product-based environmental standards. Among complying Pakistani export firms, the capability of dealing with these bans is variable. While, exporters have, by and large, been able to restrict the use of azo-dyes, the presence of metals like cadmium asbestos and nickel is more difficult to detect. Companies either do not have access to the required detection facilities, or they are not available. Details of various environmental laws and regulations, which can affect the export potential of major trade products, have been provided in Tables 2-A and 2-B in Annex 2.

The experience with various European-based eco-labeling schemes has also been mixed. The elements of each scheme are relatively uniform across European countries, which is an advantage, and are based on the criteria of production ecology[10]. However, some schemes are more stringent than others in their requirements.

For instance, as per one scheme (the Nordic Eco-Labeling Scheme) it is possible to meet the condition of not using carcinogenic, mutagenic, toxic or potentially sensitizing dyes. This applies, too, to limitations on extractable materials. Less amenable is the requirement of 90% biodegradability of detergents and other chemicals used in different processes; limits on discharge of wastewater; and limits on AOX emissions. Such changes require expensive technology upgrades or emission control devices. Similarly the ban on tetrachlorophenol (TCP) & pentachlorophenol (PCP) and formaldehydes practically prohibit the use of local chemicals and compel the producers to use environment friendly chemicals[11] from more reliable sources i.e. multinational companies. This is expensive and hikes up the product price quite considerably.

However, other eco-labeling schemes based upon product standards only, are easier to comply with. The Oeko-Tex standard 100 points is one such scheme.[12].

The standard 100[13] sets yardsticks for noxious substances. It puts limits on the concentration of substances which, according to present knowledge, could have dangerous effects on humans during normal use. Oeko-Tex belongs to a product based standard series and is independent of manufacturing processes, the only requirement being that certain harmful substances not be used. Using this label fulfills the normal eco-label requirements. Pakistani textile export firms have reacted positively to it and concerted efforts are underway to qualify

[10] This refers to the process of production and manufacture of fibers, textiles and garments which should be environment friendly, and should satisfy requirements for air emissions, effluents, waste treatment and protection against noise

[11] Some Western companies have developed alternatives like Busan-30, which are 30 times costlier than PCP or equivalent chemicals (Atul Kaushik, 1999)

[12] Few companies like Chenab Fabrics have already qualified for it

[13] The Oeko-Tex Standard 100 is based upon criteria for human ecology, which in the view of consumers is more significant. This is based on the effect of garments on the users and on their near surroundings.

for this label. For more details on European Eco-labeling schemes and Nordic Eco-labeling schemes, see Table 2-C, 2-D and 2-E in Annex 2.

The third category relates to the development and implementation of environmental management systems. Given the prevailing discrepancies in implementing national environmental standards, the international buyers consider compliance with international standards such as ISO 14001 as the best way to guarantee the fulfillment of the supplier's environmental obligations, particularly in relation to local environmental laws.[14] A brief comparison of three popularly known environmental management system (ISO 14000 series, Environmental Management & Audit Schemes and BS 7750) is given in Table 2-F in Annex 2.

Environmental management systems (ISO 14001 and EMAS) requires a commitment to comply with the environmental performance requirement that already exist in laws, regulations and voluntary guidelines and ensures that that implementing companies pursue a policy of 'continual improvements'. Under EMS framework performance of the organization is measured with respect to management of aspects and impacts on the basis of measurable results of the environmental management system, related to an organization's control of its environmental aspects, based on its environmental policy, objectives and targets.

Local firms face barrier from the certification and verification systems and complain about the high costs associated with being certified to ISO 14001.[15] Many SMEs experience insufficient drivers for adoption and are uncertain about the market benefits of such systems. The lack of sector specific guidance and material tailored to different sizes of firms is an added barrier.

The lack of human resources rather than financial ones is the major internal barrier to EMS implementation and becomes increasingly important as the size of the company decreases. Practical problems with EMS implementation about how to determine environmental aspects and assign significance and how to achieve internal auditor independence in firms also exist. SMEs are largely ill-informed about environmental management systems, how they work and what benefits can be gained from their implementation.

5.3 Environmental Impacts

Pakistan has two main hubs of industrial development.: Karachi with its proximate industrial estates and industrial corridors in the Punjab. Both are characterized by their lack of waste management facilities, giving rise to acute environmental and health problems. With the majority of industries, untreated water is discharged directly into the main drain; flowing eventually into river bodies and seeping into underground aquifers and contaminating them. The pollution in Ravi River is the highest among all rivers in the Punjab. At present, the wastewater flow from the city of Lahore is 19 m 3 /sec with a BOD load of about 346 tonnes/day. Industries around Lahore discharge heavy metals (Cu, Ng, Ni, Cd, Cr) into the river water, with an estimated total load of 2.6 tonnes/day. The quantities of heavy metals (Cr, Cu, Pb) discharged are estimated at 15 tonnes/day. (Khan, A, Sep.2000).

[14] The ISO 14000 series is modeled after the BS 7750 (Environmental Management Systems) originally published in 1992 and updated in 1994.

[15] BS 7750 has been withdrawn in favor of ISO 14000 while EMAS are essentially for companies operating in European markets

Heavy metals, like chromium, are carcinogenic. High BOD and COD loads deplete oxygen level in fresh water bodies, causing mortality of aquatic life. The presence of heavy suspended solids also causes this. In addition, it blocks penetration of sunrays into lower strata of water bodies restricting their ability to perform photosynthesis, a process necessary for their survival.

Groundwater in the cities of Faisalabad (due to textile dying mills), Karachi (due to diversified industrial operations), has also become contaminated. Industries which can not access drainage channels, nullahs or rivers, resort to land disposal of their effluents. The wastewater accumulates in depressions. Some industries use soakage pits to dispose off their effluents. This leads to groundwater contamination.

Textile Industry

By any measure, textiles are the most important sector of Pakistan's economy whether it be production, employment generation, consumption and exports (see Table 1 in Annex 1). In recent years, environment-based restrictions have been added to the more conventional trade restrictions. The most important of these pertain to the ban on the use of azo dyes, which possess carcinogenic properties. (Banuri, T.1998)

Environmental impacts in the cotton chain manifest themselves early, beginning with the use of pesticides and fertilizers. In Pakistan, evidence exists that pests such as the American bollworm and the whitefly have developed resistance against common pesticides leading to progressively larger doses, a condition referred to as the pesticides treadmill.

Various textile processes using chemicals and dyestuffs, cause environmental and health problems of different kinds. These problems may occur during the production process (emissions, effluents, waste disposal, occupational or downstream health impacts), or the effects may be caused by exposure to the product itself, for instance, skin allergies. Table 3 provides details of the links between the various stages of production and their environmental and health impacts.

Leather Industry

On a unit basis, leather tanning is ranked among the highest for its pollution impacts. Chemical inputs are used intensively at every stage, from the cleaning of hides in the slaughterhouse, to their processing upto the final stage.

The solid wastes contain chromium residues, which are known to cause perforation and bronchiogenic carcinoma in humans who are continuously exposed. Chicken feed prepared from proteins containing tannery wastes introduces chromium directly into the food chain. Tests conducted by the Pakistan Tannery Association showed chrome residues in poultry feed. Leather shavings used as cheap fuel in kilns also release chromium into the environment. Solid wastes are dumped around the factory area on unutilized lands. These contain metals such as chromium, aluminum and zirconium, with detrimental effects on plant growth. (Khan, S. R..et al. 1999)

As in the case of textile effluents, large pH fluctuations and high BOD concentrations kill all natural life in affected water-bodies. Informal surveys have revealed that tannery wastes have

polluted the Korangi (Karachi) and Charsadda (near Peshawer) areas of Pakistan. The contribution of tanneries to the contamination of the Karachi coastal waters is estimated at about 10-15 percent of the total. Hydrogen sulphide formed due to the presence of sulphide in the effluent and chromium proved so toxic that, workers in Karachi died while clearing monsoon ditches filled with tannery sludge. In the Punjab, tanneries are contaminating directly prime agriculture land. The informal surveys also show that that the crop-yield has been affected adversely and the food contaminated. (Ahmad: 2000). Most of the tanneries in the Punjab and NWFP are located in or close to residential neighborhoods and pose a serious threat to the urban population.

Table 3: Environmental Hazards Associated with Textile Sector

Process	Source	Major Impacts
Fiber Cultivation	Pesticides use	Occupational health problems, reduction in natural fertility for the soil, harm to soil structure, soil aeration and soil erosion, reduced genetic biodiversity
Spinning	Spinning operation	Occupational health problems causing acute respiratory disease, low biodiversity, smog
Washing	Detergents, soaps, alkalis, wetting agents, foamers, defoamers and lubricants with high BOD, COD, TDS	Carcinogenic, depletion of ozone layer, potentially bioaccumulative, obnoxious odor, water turbidity, reduce light penetration, threaten aquatic life, low biodegradability
Sizing/desizing	Sizing material	Low biodegradability,
Bleaching	Bleaching material	Low biodegradability, emission of air pollutants such as formaldehydes etc
Mercerizing		High pH value
Dyeing	Dyestuff & chemicals	Carcinogenic, high allergy risk, high BOD & COD, obnoxious odor, threatens fish spawning grounds, water system corrosion
Finishing	Finishing materials	Extremely persistent effluents, very low biodegradability, high toxicity, occupational health hazards

Source: Based on information from various sources cited above.

The Case of Kasur City[1]

Kasur has a population of about 0.27 million and is located about 55 km southeast of Lahore. With its 240 tanneries, Kasur has the largest concentration of tanneries in the country. Currently only 9% treat their effluent.. In 80 percent of the cases, the effluent is discharged untreated into recipient water bodies or onto open land. In only 11 percent of the cases; is the wastewater drained into municipal sewers. Along with untreated municipal sewage, it is discharged into the Rohi Nullah flowing eventually into the Sutlej River.

The tannery clusters produce around 13,000 m3/d of effluents containing high BOD, TDS and toxic chemicals such as chromium, sulfides, salt and dyes. Farmers along the Rohi Nallah use the mixed sewage for irrigation. As reported by them, the crop yields have decreased by 50 %, perhaps due to high concentration of sodium. Water supplies from hand pumps are contaminated with dissolved solids, especially sodium chloride and sulfides. Sulfur present in the polluted water from hand-pumps is affecting metallic utensils. Improper use and handling of chemicals has subjected workers and residents to hazardous exposure Respiratory disorders, skin infection related diseases, diarrhea/dysentery are the most serious illnesses among the community. (Azher, Sep.2000)

Table 4: Environmental Hazards Associated with Leather Sector

Waste	Source	Major Impacts
Liquid	Organic & inorgani solid, hydrogensulphide, ammonia, volatil organic compound electrolytes	Occupational health problems, corrosion of the water-carrying system, contamination of coastal area, reduction in natural fertility for the soil, harm to soil structure, threat to aquatic life, low crop yield, contamination of food, reduce genetic biodiversity
Solid waste	organic material, mea remains, the tanne skin remains chromium remain during trimming	Contamination of soil and underground water, contamination of foof, occupational health hazard such as perforation and bronchiogenic carcinoma, contamination of poultry feed, reduce genetic biodiversity
Air emissions	Hydrogen sulphide sulphur-containing compound, ammoni & nitrogen containin compounds, organi solvents	Lower than NEQS

Source: Based on information from different sources.

5.4 Environmental Sensitivity of Industries/Products

Approach

The environmental sensitivity of the industrial products/sectors included in this study (which could also be used as a selection criteria to identify products/sectors for future research) rests on four aspects. The first aspect relates to the extent of degradation of natural resources and biodiversity loss. The second criteria reflects pollution control expenditures -- or potential pollution charges in case of non-compliance. The third aspect accounts for current and potential export trends. The fourth aspect takes into account employment sensitivity and employment generation potential.

Environmental Impacts

The Environmental Standard Committee (ESC) of Pakistan has classified industries into three main categories to in order to establish monitoring and reporting guidelines for industrial effluents and gaseous emissions. The legal basis for such classification is the Environmental Protection Bill, 1997, Section 6 (1) (i), which authorizes the Federal Agency to "establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors". These monitoring and reporting guidelines are based on environmental sensitivity of the industries. The following three factors have been taken into account while developing the classification system

- Pollution levels
- Toxicity of Pollutants
- Cost of monitoring

This classification system is designed basically to assesses environmental impacts qualitatively, as no comprehensive data is available on industry sector based pollution loads or air emissions[16].

Category A refers to the most hazardous industries which include textile processing industry, tanning & leather industry, petroleum refining, fertilizers, chemicals. Category B refers to moderately hazardous industries, such as dairy industry, fruit and vegetable processing, sugar, detergent, etc. In Category C are the least hazardous industries, such as pharmaceuticals, marble, cement industry industries[17].

Pollution Charges

The pollution charges have been calculated on the basis of liquid discharge from an average industrial unit. Only two pollutants, COD, and TSS have been taken into consideration to calculate annual charges to be paid by these industrial units[18]. The base pollution charge will be Rs 50/-during the years 1999 and 2000. The charge will increase incrementally The charges will be incremental in nature as given below:

01 Jan 1999 to 31 Dec. 1999: 10% increase on base rate
01 Jan 2000 to 31 Dec. 2000: 20% increase on base rate0
01 Jan 2001 to 31 Dec 2001: 40% increase on base rate
01 Jan 2002 to 31 Dec. 2002: 60% increase on base rate
01 Jan 2003 to 31 Dec. 2003: 80% increase on base rate

Table 5: Financial Implications of Pollution Charges

Pollution Charges (Million Rs/year)					
Industry	Year 1	Year 2	Year 3	Year 4	Year 5
Sugar	0.457	0.915	2.747	4.121	5.495
Paper	1.745	3.491	10.475	15.713	20.950
Textile	0.142	0.285	0.856	1.285	1.713
Leather[19]	1.709	3.419	10.258	15.388	20.517
Pollution Charges (% of Sale)					
Industry	Year 1	Year 2	Year 3	Year 4	Year 5
Sugar	0.05	0.09	0.27	0.41	0.55
Paper	0.34	0.69	2.05	3.08	4.11
Textile	0.01	0.02	0.06	0.09	0.12

[16] Industries are listed in two different lists for liquid and gaseous emissions. One industrial unit can be in Category A for liquid emission parameters and in Category B for gaseous emission

[17] Source: "Guidelines for Self-monitoring and Reporting by the Industry", SDPI1998

[18] For details, see Annex 3

[19] The data for leather industry is from "Leather Sector: Environmental Report", ETPI,http: www etpi.org.pk/pdf/LeatherSectorReport.pdf 1998

Export Potential

A brief review of current export trends is provided in Table 1 of Annex 1)

Employment

The data for daily average employment in each sector covers those establishments, which are engaged in manufacturing activities under the Factories Act, 1934. The total reported employment during 1990-91 was 622,234. The largest number of persons were engaged by textile industry which employed 268,494. Industry-wise details are given below:

Table 6: Daily Average Employment by Industry

Industries	**Average daily person engaged**	**Average daily employment inc. contract labor**
Textile	268494	268121
Leather	9390	9359
Footwear	5254	5241
Sports goods	7720	7705
Surgical instruments	3999	3970
Fish	NA	NA

Source:Census of Manufacturing Industries 1990-91, Federal Bureau of Statistics, Government of Pakistan

Environmental Sensitivity of the Products/Industries

Based on the selection criteria above, the textile and leather industries are clearly the most sensitive environmentally. Table 7 provides a qualitative interpretation of the mix of quantitative and qualitative data. The three industries/sectors scoring highest by the composite criteria are cotton textiles, leather and woolen carpets.

Table 7: Ranking Environmental Sensitivity of Industries/Products

Components	**Sector**					
	Textile	**Leather**	**Carpets**	**Sports goods**	**Surgical Instruments**	**Fish**
Environmental Impacts	5	5	4	1	1	2
Pollution Charges	4	5	4	0	1	0
Export potential	5	2	3	3	4	2
Employment	5	3	2	2	2	NA
Total	19	15	13	6	9	4
Ranking by importance	1	2	3	5	4	6
Score	(5=very high, 4=high, 3=middle, 2=low, 1=very low, 0=none)					

5.5 Mitigation Initiatives

Legal Initiatives

Legislation aimed at environment protection was introduced for the first time in 1977. Since then many institutional, policy and regulatory developments have taken place at the federal and the provincial levels. These include, among others, the creation of a Ministry of Environment, federal and provincial level environmental protection agencies, promulgation of the Pakistan Environmental Protection Ordinance in 1983, development of the Pakistan National Conservation Strategy (NCS) in 1992 and promulgation of the Pakistan Environmental Protection Act in 1997. Also, during this period, several protection, conservation and abatement projects have been implemented .

Public-Private Partnerships: National Environmental Quality Standards (NEQS)

A substantive breakthrough in environmental protection followed the first meeting of the Pakistan Environmental Protection Council (PEPC) in 1993, which led to the approval of the National Environmental Quality Standards (NEQS) for industrial emissions and effluents. The NEQS can be regarded as the first step towards internalizing external effects. They consist of 32 liquid and 16 gaseous parameters[20], in addition to setting limits on noise pollution. Industry specific NEQS and standards for water and land receiving bodies have been developed recently but are yet to be notified by the Ministry of Environment. Different standards have been set for effluents going into inland water bodies, sewage treatment plants, and into the sea. For instance, effluents discharged into the municipal sewerage system can have higher pollutant loads, provided they are processed eventually in a treatment plant. Changes have also been made in the standards of gaseous emissions.

Pollution Charge Regime

A pollution charge regime (see details above) is being introduced to achieve industrial compliance with the National Environmental Quality Standards (NEQS)[21]. These standards, if successfully implemented and documented, would go a long way in meeting the standard requirements likely to be imposed by importing countries. (Ayub, H. 2000). The aim of the charge is to discourage environmentally damaging activities and strengthen the incentives to reduce waste and pollution while generating revenues, which will be earmarked for environmental protection.[22] The principle is that that charge should induce clean up operations in industries. In other words, the net cost of the clean up should be less than the pollution charge

This development is unprecedented in Pakistan as the industrial sector has agreed voluntarily to a charge to be applied for generating pollution in excess of permissible national limits.

[20] See ETPL "Environmental Report on Leather Sector", Environmental News, January 2001

[21] A pollution charge is a fee or tax on amount of pollution in excess of levels allowed by the NEQS

[22] The secular aspect of these pollution charges is that money collected will be used primarily for activities that will help in abatement of environmental pollution through soft loan and other incentives. The private sector has demanded the creation of Provincial Environmental Trust Funds (PETFs) for that purpose.

Self-Monitoring Program

The objectives of the NEQS are unlikely to be achieved without a proper and systematic environmental monitoring program. The Pakistan Environmental Protection Council (PEPC) approved the 'Guidelines for Self-Monitoring and Reporting by the Industry' on August 26, 1999. The supporting guidelines for self-monitoring and reporting by industry include details on the sampling procedures, handling, transport, storage and preservation of samples, procedures for analyses of various pollutants and their flow rate measurements. Under these guidelines, all industries in Pakistan are required legally to submit self-monitoring reports from January 01, 2000.

Normally the monitoring is carried out by government agencies. However, the innovative aspect of this program is that industries decided to take the responsibility of monitoring and reporting of industrial effluents and emission upon themselves. The Federal EPA, in close association with the provincial EPAs, has initiated the first phase of a voluntary pilot program and nearly 50 industrial units have participated in the program. The national EPA has agreed also to issue a green certificate to the first 100 industries

Other Environmental Policies

Other areas are being identified to develop consensus-based policies between environmental monitoring institutions and the industrial associations, based on shared scientific and financial data. One joint initiative currently underway is that between the Pakistan Sugar Manufacturers Association (PSMA), the Pakistan Society of Sugar Technologists (PSST), and the Pakistan Paper & Pulp Board Manufacturers Association (PPPBMA). The associations have prepared already the first draft of the 'Environmental Policy' of their respective sectors. The draft of the Sugar Sector Environmental Policy was prepared in active consultation with PSMA and PSST. In the paper sector, the major players i.e Century Paper & Board Mills Ltd. and Packages Ltd. agreed to share their substantial experience in the implementation of environmental solutions with The Environmental Technology Program for Industries (ETPI), for the preparation of the policy paper for their sector. Eventually, these documents will be presented to the Federal and Provincial EPAs.

Private Initiatives

Industrial Associations

Reflecting a combination of international pressure and national environmental legislation, various industrial associations in the country have begun to take intermediate and long term actions towards making the industrial sector environmentally benign.

A number of interesting projects are underway. Among these are the; "Environmental Management Program of Pakistan Tanners Association", "The Introduction of Cleaner Technologies in Punjab Tanneries", and "The Uplift Program for Korangi Industrial Area".

The Korangi Association of Trade and Industry is the largest industrial estate of the country. About 2400 industrial units are located in the estate. The association has developed a 15 year phased clean-up program for itself. In the first phase, cleaner production options will be promoted and implemented. In the second phase, small sector level combined treatment

plants will be installed. Finally in the third phase, a combined effluent plant will be installed for National Environmental Quality Standards compliance.

The Pakistan Tanners Association (PTA) has been implementing a comprehensive environmental program since 1992. This includes a combined effluent treatment plant, a solid waste management program, an occupational health and safety program, and a drainage system for about 160 tanneries located in Korangi, Sector 7-A. The total cost of the project is more than Rs. 1 billion. The Sindh Government's, Export Development Fund, and individual tanners are providing more than 95% of the finances.

In the Punjab, the PTA is implementing Cleaner Technology Program with the assistance of The Netherlands Government. The project has completed an initial environmental examination" of more than 260 tanneries. Prototype environmental packages are under implementation in the selected tanneries. The emphasis of the project is on in-house improvement, primary treatment systems, and chemical recovery plants. The project will be completed by the year 2000.

Technology Transfer for Sustainable Industrial Developments (TTSID)

The Technology Transfer for Sustainable Industrial Developments (TTSID) is one of the important initiatives in the family of private sector environmental projects. Funded by the Swiss Federal Office for Foreign Economic Affairs and housed at SDPI, the project provided support for the promotion of sustainable industrial production through business-government roundtables, technical research reports, and information packages on environmental issue. The training component of the TTSID developed training materials by conducting environmental studies, followed by hands-on training and workshops. The project also conducted a study to establish green credit facilities for industrial environmental management projects.

Environmental Technology Program for Industries (ETPI)

The Environmental Technology Program for Industries is an independent initiative currently under way to extend technical services to industry and the government. Its primary objective is to promote the use of environmentally safe technologies in the industrial sector. This five-year project began in 1996 and works with Pakistani industries and their associations in identifying the most economical pollution prevention and abatement technologies and in implementing these solutions. The five components of the program include: the development of a user-friendly database of relevant information; institutional networking within and between key industrial institutions of the country: dissemination and communication to promote cleaner industrial production; institutional support and training to create in-house environmental capacity within chambers and industrial associations and; demonstration projects in 20 selected industrial sub sectors to demonstrate the economic feasibility and environmental efficacy of environmental technologies. Three representative industrial units have been selected in each sub-sector for preliminary environmental audits to assess the extent and nature of the environmental problems.

The ETPI is a joint project of the Federation of Pakistan Chambers of Commerce and Industry (FPCCI) and the Government of the Netherlands. Considered a private sector

project, its equity base is 67:33, with the 33% grant provided by the Government of Netherlands.

Cleaner Production

Another private sector initiative is cleaner production through optimization of resources and utilization of waste on commercial basis. (See Box 1 and 2). It aims to promote the use of waste from different sectors as useful by-products for other industries. For example, in tanneries fleshing and trimmings of wet-blue leather ordinarily can not be used due to chrome content. These are now being treated for use as chicken feed, leather board and glue manufacturing. In paper mills the recovered fiber is used for manufacturing of paperboard. Textile solid wastes are converted to waste cloth for use in other industries.

Research is underway on the use of the recovered lignin from the black liquor as a binding material in different industrial products. Manufacturing of compost by mixing the mud cakes with the distillery wastewater is one of the best examples of making economically productive by-products from the waste.

Box 1: Chrome Recovery Plants – The Environmental Income[23]

From 25-30% of the chrome that goes into the wastewater can be reused. The chrome tanning effluent from the tanning drum is the influent to the chrome recovery system. Addition of sufficient alkali to spent chrome recover will cause precipitation of the chromium in the form of basic complexes. These are separated from the liquor by settling and/or filtering under pressure. The liquor is almost free of chromium and contains most of the dissolved solids and other impurities. The chrome sludge cake can be dissolved in sulfuric acid to form tanning liquor which can then be reused. Preliminary estimates of the economic viability of chrome recovery and reuse in tanneries suggest that the cost recovery can be achieved in 6 to 7 months for most tanneries. This assumes 95% chrome recovery, which is very much within the feasible range. The capital cost of such a plant, for a tannery processing, around 12,000 kg of hides per day, is around U.S.$20,000.

Box 2: Shakarganj Sugar Mills Limited - A Zero Effluent Industry[24]

Shakarganj Sugar Mills Limited is located in district Jhang, Central Punjab, with an installed sugar production capacity of 10,000 tons per day. The main reasons for sugar losses were, overloading of the evaporators, vacuum pans, excessive boiling and incorrect liquid levels. The stream represents about 92% of the wastewater from Shakarganj Mills. The presence of BOD and COD in the spray pond overflow was due mainly to the presence of sugar content in the wastewater. The pollution load was very high, with most of it being organic in nature.

The mill had constructed already lagoons for wastewater treatment. These were not operating at the desired efficiency levels, due to flotation of fly ash and oil on the surface of water, which hindered the biological decomposition processes. ETPI conducted the environmental audit and recommended that ashes and oil be trapped at source. Sand filter

[23] Source: Environmental News, September, 1999
[24] Source: Environmental News, September, 1999

and oil skimmers were installed, with an immediate and substantial increase in efficiency. ETPI proposed a three weeks composting method based on the mixing of mud cake with the distillery wastewater. The idea has been successfully tested on 25% of the wastewater from the distillery. The compost is being used successfully in the sugarcane farms. At present, a full-scale plant is under construction. ETPI also recommended a system of environmental monitoring and evaporators maintenance. After the implementation of the proposed system the pollution levels are within the limits of National Environmental Quality Standards

The Shakarganj Mills invested in the range of US. $50,000 to US $75,000. In comparison, end-of-pipe solutions would have cost U.S.$1.25 million.

Publicity and Communications

Environmental News

The FPCCI started its own monthly environmental magazine "Environmental News" from February 1998, to keep the industries abreast of the new environmental regulations and initiatives. With a circulation of around 5000-8000 copies, it is sent to most of the important industrial units, industry associations, local chambers, local and international research & development institutions, education institutions, and the trade consulate in the country. UNEP, APCT, and UNIDO are the major international audiences.

International Network on Environmental Management (INEM)

FPCCI is planning to start an International Network on Environmental Management (INEM) with the support of INEM international. The major functions of the INEM will be to:

- Promote environmentally friendly actions by industry through training workshops, seminars and roundtables.
- Promote Pakistan's industry environmental actions in the international market
- Information dissemination and communication, locally and internationally
- Private sector environmental monitoring and evaluation of industrial units.
- Support to local chambers and industry associations on environmental issues.
- Assist members in obtaining technical and financial assistance from local and international sources.
- Co-ordinate with local and international regulatory bodies in developing sustainable regulatory frameworks.
- Promote link-ups with other INEM chapters world wide

INEM is considered an extension of ETPI soft components. Other than this, it is also envisaged that INEM will execute many environmental projects in the private sector with the assistance of local and international consultants.

Green Pages

The first directory of environmental technology vendors and R&D institutions, entitled "Green Pages" has been published in collaboration with the Environmental News. It comprises profiles of technology vendors and research and development institutions. The

publication cost was raised through advertisements, mainly from different private sector organizations. It is envisaged that the directory will be used by industrialists, technology vendors, consultants and R&D institutions.

Green Courts

On Friday June 5, 1999, the Federal Government announced setting up of two Environmental Tribunals, in accordance with the legal requirement under the Pakistan Environmental Protection Act, 1997. This also came close upon the heels of a Supreme Court order for the setting up of tribunals exclusively for deciding pollution cases. The order followed a Human Rights petition filed by the residents of Islamabad against the Capital Development Authority for allowing the setting up of a Steel Mill which was causing pollution. The first real case is ready to be filed against smoke emitting industrial units located in Islamabad. The environmentalists are of the view that fresh findings of SDPI's study regarding current environmental state of different industrial zones will play an important role in determining the fate of this case.

5.6 Policy Options for a 'Trade' and 'Environment' Agenda in Pakistan

Globalization and trade liberalization have both been instrumental in raising environmental concerns worldwide. In fact, the north has become increasingly sensitive to health, environmental, fair trade and labor aspects, embodied in traded products. The challenge is to integrate trade and environmental policies harmoniously in such a way that maximum synergies are achieved. In other words, the ideal paradigm is one where trade policies become environmentally sensitive and environmental policies are not trade-restrictive. A key requirement is that the south be encouraged and assisted in every possible way to take advantage of emerging green markets. While the south has its own environmental agenda, which coincides with many northern environmental concerns, the task is to ensure their convergence at the institutional level.

Initiatives in the South

Innovative approaches have been applied both by the governments in third world countries and by the private sector to provide green shades to industrial activities and products. Governments now realize that they can increase the influence of communities and stock markets by compiling reliable pollution statistics and reporting them to the public in easily understood forms.

Grading Polluters by Color

In Indonesia, the idea of grading polluters by color has proved very effective. The government has cut industrial water pollution sharply by monitoring industrial discharges and publicizing their finding in the news media. The government officials rank water polluters using color codes: black for factories, which make no attempt to control pollution and causing serious damage; red for those which have some pollution control but fall short of compliance; blue for those which meet national standards; and green for those which are much cleaner than required.

Environmental News in the Stock Market

In the Philippines, share prices for beer-maker San Miguel shot up nearly 60% when environmental regulators highlighted the firm's "green" record and the installation of new pollution control equipment. In Mexico, the share prices for paper manufacturer Kimberly Clark fell nearly 50 % after the government levied substantial fines for violating water pollution regulations.

The National Agenda: A Checklist of Possible Initiatives

Many environmental initiatives have been undertaken in Pakistan, as discussed in previous chapters. At present, there tends to be a coincidental rather than trade-specific aspect to these regulations. A concerted effort needs to be made to integrate industrial and trade policies with environmental objectives. However, environmental measures should be designed, keeping in mind the capacity of industries to conform with international environmental standards and the viability of the legal and institutional mechanisms to ensure compliance with such standards. An indicative check-list of themes for further trade-environment policy development is presented below. Essentially, these are areas of national concern, where some have a greater trade orientation than others.

Sector Specific Policies

A possible way to strengthen trade-environment linkages could be through a sector orientation. The case of sugar and pulp & paper industries was mentioned in the previous chapter. Extensive consultations between stake-holders in the these sector/industry policy formulations have established an encouraging precedent for incorporating environmental concerns in the export-oriented sectors, such as leather, textiles, fisheries etc.

Designation of Specific Inputs

Chemicals are used extensively in many industrial processes; in particular, the use of azo-dyes in textile and leather goods processing is common. About 200-300 of the 2000 or so azo-dyes available have carcinogenic amines and are banned in western countries[25]. Compliance with product-embodied standards with respect to azo-dyes could, notionally, entail the following:

- A ban on azo-dyes as listed in Annex I
- Standardization of dye manufacturing and other industrial chemicals
- Provision of the color index (CI) number and generic name
- A written proof that azo dyes will not split off any of the harmful carcinogenic amines
- A material data safety sheet providing information about the carcinogenic nature and occupational health hazards

Backward Linkages

Textile exporters can not prevent the use of harmful pesticides in upstream cultivation. This is where national level policies are required. Adverse trade effects need to be factored in the

[25] Any product with azo dyes that may split off any one of the 20 carcinogenic amines (See Annex I) is not prohibited in these countries

process where bans on the use of harmful pesticides are being contemplated for health reasons. Although only one pesticide i.e. PCP is prohibited in product legislation of the EU countries, the number of pesticides subject to prohibition in one or more eco-labeling schemes are increasing. A list of harmful pesticides provided by CREM can be taken as a benchmark. A ban on the use of these pesticides will enhance the capacity of manufacturers to comply with specified standards.

Waste Management

The NEQS and the associated pollution charge regime is expected to generate a thrust towards end-of-pipe treatment options both for air emissions and effluents. Studies conducted through TTSID and ETPI programs have shown that treatment options are cost effective and that, in additional, a potential exists to convert these options into business opportunities. (see Boxes 1 and 2 above).

Also measures such as reduction in custom duty on purchase of pollution abatement equipment, income tax relief for using these equipment and most favored tax treatment to indigenous pollution control technology etc. are needed to offset the lethargic inertia of the inaction. The inclusion of a comprehensive package for air emission and wastewater treatment plants in environment policy will provide the much-needed boost to industries.

Product Packaging

Legislation on packaging and packaging waste is already in force or in the process of being developed in all EU countries. Basically, this applies to the re-use and recycling of packaging material, as well as to limits on toxic concentrations in the material itself. It is an area domestic producers need to start paying more attention to.

The European Union Directive on Packaging and Reuse has introduced strict limits on concentrations of lead, cadmium, mercury, and hexavalent chromium in packaging, which is:

600 ppm after 30 June 1998
250 ppm after 30 June 1999
100 ppm after 30 June 2001

The packaging waste recovery limits vary from 50% to 70%. Compliance saves the importer the costs of composting or incineration.

Industries can ease into compliance gradually. A maximum concentration of 1500 ppm for all heavy metals is suggested, followed by a 10% to 15% reduction annually, until it goes down to some reasonable level. Paper and cardboard packaging, as compared to plastic, glass, wood or metal entails less hazards, therefore should be given preferential treatment. Also, a certain weight percentage of packaging material should be capable of being recycled, composted or incinerated. The use of polyvinyl chloride (PVC) should be avoided in plastic packaging. Finally, standardized multiple-use packaging is a preferred option as opposed to single-use packaging.

Annex-I

Table 1-A: Pakistan's Principal Textile Export[20] (%Share)

Product	1995-96	1994-95	1993-94	1992-93	1991-92
Cotton Yarn	17.6	18.78	18.51	16.47	16.99
Cotton Fabrics	14.6	13.28	12.07	12.67	11.86
Made-ups	8.90	7.96	8	9.04	7.73
Hosiery	8.07	8.47	7.48	6.81	6.16
Garments	7.45	7.89	9	9.07	8.88
Raw Cotton	5.82	0.76	1.16	3.98	7.50
Synthetic Textile	5.25	7.07	9.53	7.38	6.05

Table 1-B: Share of Major Export Products (Rs. Million)

Textile(excl. carpets)	**95-96**	**96-97**	**97-98**	**Average**
Yarn	54061.911	58491.014	55107.982	55886.969
Cotton fabric woven	43278.977	49354.342	53991.139	48874.819
Manmade fabric woven	15435.611	20048.744	26729.304	20737.886
Knitted fabric	2981.578	3339.930	3873.593	3398.367
Other fabric	2173.907	2084.591	2222.350	2160.283
bags/sacks	851.599	1105.812	1079.600	1012.337
Tarpulin	1322.637	1419.073	2529.459	1757.056
Blankets	230.493	171.588	255.229	219.103
Bedlinen	20487.269	25975.284	31335.435	25932.663
Curtains	838.956	1461.450	1798.835	1366.414
Madeup n.e.s.	3911.629	5115.759	6976.424	5334.604
Apparel & clothing accessories	56625.665	69442.872	76722.408	67596.982
Total textile export	202200.232	238010.459	262621.758	234277.483
% Share of total export	*68.60*	*73.2*	*70.4*	*70.7*
Leather	95-96	96-97	97-98	Average
Artificial Leather	0.403	1.215	2.129	1.249
Bovin Skin Leather	1570.074	1966.343	1986.488	1840.968
Other Bovine leather	2472.756	2025.872	1934.646	2144.424
Sheep/lamb leather	977.422	933.301	628.566	846.429
Goat leather	3632.699	4363.977	4404.913	4133.863
Other animals	72.509	31,025	13.720	39.084
Furskin	1.463	0	0	0.487
Other products	245.379	266.250	405.973	305.867
Total leather export	8972.705	9587.983	9376.435	9312.374
% Share of total export	*3.0*	*2.95*	*2.51*	*2.83*
Carpets	95-96	96-97	97-98	Average
Hand Knotted Wool Carpets	6964.382	7577.231	8475.895	7672.502
Hand Woven Rugs	30.490	119.684	116.880	89.018
Other Capets	136.298	120.462	108.674	121.811
miscellenous	0.042	3.469	7.779	3.763
Total carpet export	7131.212	7820.846	8709.228	7887.095

[20] Source. EPB. 1997

% Share of total export	*2.4*	*2.4*	*2.3*	*2.39*
Surgical Instruments	95-96	96-97	97-98	Average
Dental Instrument	59.211	101.018	144.196	101.475
Medical Instruments	4230.290	4838.546	5259.648	4776.161
Gas Masks	1.880		4.528	2.136
Medical Furniture	1.773	1.342	2.767	1.960
Miscellaneous	55.208	54.648	328.719	146.191
Total surgical instrument export	4348.362	4995.554	5739.858	5027.924
% Share of total export	*1.5*	*1.5*	*1.5*	*1.5*
Sports Goods	95-96	96-97	97-98	Average
Footballs	3358.174	3882.167	5057.422	4099.254
Fishing Goods	10.066	1.289	5.472	5.609
Ice Roller & Skates	0.527		1.487	0.671
Snow skis	2.261		0.750	1.004
Tennis Goods	13.569	3.751	4.078	7.133
Gloves	1938.110	2883.980	3349.392	2723.827
Miscellaneous	3051.837	5359.862	8174.653	5528.784
Total sports goods export	8374.544	12131.049	16593.254	12366.282
% Share of total export	*2.8*	*3.7*	*4.4*	*3.7*
Fish	95-96	96-97	97-98	Average
Fresh Fish	1004.222	1516.953	1548.193	1356.456
Fish Dried	468.315	574.806	526.886	523.336
Custaceans & molluscs	3006.330	3566.427	5102.535	3891.764
Others	223.201	140.296	196.364	186.620
Total fish export	4702.069	5798.482	7373.978	5958.176
% Share of total export	*1.6*	*1.8*	*1.98*	*1.78*
Rice	95-96	96-97	97-98	Average
Basmati	9937.633	7982.238	10967.079	9628.983
Rice other varieties	7203.388	10470.725	13595.415	10423.176
Total rice export	17141.020	18452.963	24562.494	20052.159
% Share of total export	*5.8*	*5.7*	*6.6*	*6.06*
Total % Share	79.98	85.56	83.19	82.91

Annex-2

Table 2-A: Western Environmental Laws on Textile Products

Country	Products	Law	Status	Standard	Parameter
Germany	Clothing, clothing material, bedding, towels, underwear, outer clothing, sportswear	Fourth Act amending the German Commodity Goods Act, July 1995	Legislation	Prohibition	Azo-dyes (Appendix I)
The Netherlands	All garments, footwear, bed linen	Dutch Commodity Goods Act (warenwet)	Legislation	Prohibition	Azo-dyes (Appendix I)
Sweden	Clothing, clothing material, bedding, towels, underwear, outer clothing, sportswear	Not Available	Future legislation	Prohibition	Azo-dyes (Appendix I)
Germany	Textile articles intended for skin contact	Dangerous Substance Act, 1993	Legislation	Compulsory labelling when exceeding 1500 ppm	Formaldehydes
France	Textile articles intended for skin contact	Not Available	Future legislation	Not to exceed 200 ppm	Formaldehydes
The Netherlands	Textile articles intended for skin contact	Not Available	Unofficial standards	Not to exceed 100 ppm	Formaldehydes
Germany	Textile products	Chemical Act, 1993	Legislation	Not to exceed 5 mg/kg	Tetrachlorophenol
The Netherlands	Textile products	Staatscourant nr.35, Act, 1994	Legislation	Not to exceed 5 mg/kg	Tetrachlorophenol
Sweden	Textile products	Not Available	Future legislation	Not to exceed 5 mg/kg	Tetrachlorophenol

Germany	Textile products intended for skin contact	German Commodity Goods Act, 1992	Legislation	Compulsory labeling when exceeding 0.5 ug/cm2/week	Nickel & nickel compounds
The Netherlands	Textile products intended for skin contact	Not Available	Future legislation	Probably compulsory labeling when exceeding 0.5 ug/cm2/week	Nickel
Sweden	Textile products intended for skin contact	KIFS 1996. Amendment to the Chemical Products Act, 1985 and KIFS 1992	Legislation	Compulsory Labeling when exceeding 0.5 ug/cm2/week	Nickel
European Union	Textile articles intended for skin contact	Directive 76/769/EEC, 1976	Legislation	Prohibition	Flame retardants
Germany	Textile articles intended for skin contact	German Commodity Goods Act, 1992	Legislation	Prohibition	Flame retardants
The Netherlands	Textile articles intended for skin contact	Textile Articles Decree, 1974	Legislation	Prohibition	Flame retardants
Sweden	Textile articles intended for skin contact	Chemical Product Act, 1985	Legislation	Prohibition	Flame retardants
European Union	Textile accessories	Directive 76/769/EEC, 1976	Legislation	Maximum 100 ppm	Cadmium
Germany	Textile accessories	Chemical Act, 1993	Legislation	Maximum 100 ppm	Cadmium
The Netherlands	Textile accessories	Staatscourant 1990	Legislation	Maximum 50 ppm	Cadmium
Sweden	Textile accessories	Chemical Product Act, 1985	Legislation	Prohibition	Cadmium
European Union	Protective clothing & furnishing textiles	Directive 76/769/EEC, 1976	Legislation	Prohibition	Asbestos
Germany	Protective clothing & furnishing textiles	Chemical Act, 1993	Legislation	Prohibition	Asbestos
The Netherlands	Protective clothing & furnishing textiles	staatscourant 1983	Legislation	Prohibition	Asbestos
Sweden	Protective clothing & furnishing textiles	Chemical Product Act, 1985	Legislation	Prohibition	Asbestos

Table 2-B: Western Environmental Standards on Leather Products

Country	Products	Law	Status	Standard	Parameter
Germany	Leather products intended for skin contacts that includes outerwear, shoes etc but excludes purse & other like products	Fourth Act amending the German Commodity Goods Act, July 1995	Legislation	Prohibition	Azo-dyes (Appendix I)
The Netherlands	Similar to German legislation	Dutch Commodity Goods Act (warenwet)	Future legislation	Prohibition	Azo-dyes (Appendix I)
Germany	Any leather product	Chemical Act, 1993	Legislation	Maximum 5 mg/kg (5 ppm)	Pentachlorophenol
European Union	Any leather product	Directive 76/769/EEC, 1976	Legislation	1000 ppm	Pentachlorophenol
The Netherlands	Any product	Not Available	Unofficial standards	Maximum 5 ppm	Pentachlorophenol
Germany	Leather products dyed by surface treatment	Chemical Act, 1993	Legislation	Maximum 100 ppm	Cadmium
The Netherlands	Products using cadmium as a stabilizer, pigment or coating	Staatscourant 1990	Legislation	Maximum 50 ppm	Cadmium
European Union	Leather products dyed by any treatment process	Directive 76/769/EEC, 1976	Legislation	Maximum 100 ppm	Cadmium
Germany	Any product	Chemical Act, 1993	Legislation	Prohibition	Polychlorinated Biphenyles & Eerphenyles
The Netherlands	Any product	Dangerous Substances Act, 1993	Legislation	Prohibition	Polychlorinated Biphenyles & Eerphenyles
European Union	Any product	Directive 76/769/EEC, 1976	Legislation	Prohibition	Polychlorinated Biphenyles & Eerphenyles

Country	Products	Law	Status	Standard	Parameter
European Union	Articles intended for skin contact	Directive 94/27/EC, 1994	Legislation	Max. release of 0.5 ug/cm2 per week of nicket to skin	Nickel
Germany	Articles intended for skin contact	German Commodity Goods Act, 1992	Legislation	Max. release of 0.5 ug/cm2 per week of nicket to skin	Nickel
The Netherlands	Articles intended for skin contact	Not Available	Future legislation	Max. release of 0.5 ug/cm2 per week of nicket to skin	Nickel

Table 2-C: European Eco-Labeling Scheme for Textile Products

Ecological Criteria	Requirement	Compliance verification
1. Acrylic	Residual acrylonitrile content < 1.5 mg/kg of yarn Emission to air of acrylonitrile < 1.5 mg/kg of fiber produced	Test required on application
2. Cotton Less than 50% cotton	Aldrin, captafol, chlordane, DDT, dieldrin, endrin, heptachlor, hexachloroben-zene, hexachlorocyclohexane (total isomers), 2,4,5-T, chlordimeform, chlorobenzilate, dinoseb and its salts, and monocrotophos < 0.05 ppm	Test method: US EPA recommended Test report required on application
3. Polyster Fiber	Antimony < 300 ppm VOCs emissions < 1.2 g/kg of produced polyster resin	Test method: direct determination by atomic absorption spectrometry
4. Carding & Spinning oil, waxes, lubricants, sizes	90% by weight biodegradable	Test method: ISO & OECD recommended Test report required on application
5. Tetrachlorophenol TCP & pentachlorophenol PCP	Prohibited	
6. Formaldehydes	Prohibited for stripping	
7. Detergents	(a)Alkylphenolethoxylates(APEOs), bis (hydrogenatedtallowalkyl) dimethylammoniumchloride (DTDMAC), distearyldimethylammoniumchloride (DSDMAC), di (hardenedtallow) dimethyl ammoniumchloride (DHTDMAC) and andethylenediaminetetraacetate (EDTA) are prohibited	Test method: ISO & OECD recommended Test report required on application

(b) At each wet-processing site	90% by weight biodegradable	
8. Bleaching agents	AOX emission < 40 mg Cl/kg	Test method: ISO & OECD recommended Test report required on application only if chlorinated bleaching agents are used.
9. Impurities in dyes	As < 50 ppm; Cd < 20 ppm; Cr < 100 ppm; Cu < 250ppm; Hg < 4 ppm; Ni < 200 ppm; Pb < 100 ppm; Sb < 50 ppm; Sn < 250 ppm; Zn < 1500ppm	
10. Impurities in pigments	As < 50 ppm; Cd < 50 ppm; Cr < 100 ppm; Hg < 25 ppm; Pb < 100 ppm; Sb < 250 ppm; Zn < 1000 ppm.	
11. Chrome mordant dyeing	Potassium dichromate < 1.8 % Sodium dichromate < 1.5 %	Test method: atomic absorption spectrometry
12. Metal complex dyes	< 7 % of the dyestuff applied (input to the process) shall be discharged to waste water treatment (whether on-site or off-site);	Test report required on application only if chrome mordant dyeing or metal complex dyes are used
13. Azo Dyes	Prohibited (Appendix 1)	Test method: German or French method recommended Test report required on application
14. Carcinogenic, mutagenic or toxic dyes	C.I. Solvent Yellow 1; C.I. Solvent Yellow 2; C.I. Solvent Yellow 3; C.I. Basic Red 9; C.I. Disperse Blue 1 and C.I. Acid Red 26 are prohibited Any dye or dye preparation that may cause cancer, may cause heritable genetic damage, may impair fertility or may cause harm to the unborn child as defined in Council Directive 67/548/EEC, as last	

	amended by Commission Directive 98/73/EEC is prohibited	
15. Potentially sensitising dyes	C.I. Disperse Blue 3;C.I. Disperse Blue 35; C.I. Disperse Blue 106; C.I. Disperse Blue 124; C.I. Disperse Yellow 3;C.I. Disperse Orange 3; C.I. Disperse Orange 37/76 and C.I. Disperse Red 1 are prohibited if fastness level is less than 4	Test method: ISO recommended Test report required on application only if one or more of these dyes are used.
16. Halogenated carriers	Not allowed	
17.Printing	Printing pastes used shall not contain more than 5 % volatile organic compounds (VOC) Plastisol-based printing is not allowed.	
18. Formaldehyde	< 30 ppm for products intended for infants of less than 2 years of age < 75 ppm for products that come into direct contact with the skin < 300 ppm for all other products.	Test method: Japan Law 112 or Finnish standard Test report required on application (except for yarns)
19. Waste water discharges from wet-processing	< 25 g/kg of COD content pH between 6 and 9 Temperature < 40 C	Test report and appropriate data required on application
20. Flame retardant	Prohibited	

Table 2-D: Nordic Eco-Labeling Scheme for Textile Products

Ecological Criteria	Requirement	Compliance verification
1. Raw Cotton Fibers	Pesticides are prohibited	Certification from an expert organization Test Method: US EPA
2. Polyster Fiber	Antimony < 300 ppm VOCs emissions < 1.2 g/kg of produced polyster resin	Certification from an expert organization
3. Chemicals	A complete list of all chemical products used, including formulas for each Chlorophenyls: PCB (polychlorinated biphenyls); Halogen-based anti matting agents; Halogen-based moth proofing agents; Chlorine-based bleach; Bromo- and chloro-organic flame-retardants; Organic tin compounds and PVC are prohibited APEO (alkylphenol ethoxylates); LAS (linear alkylbenzene sulphonates); DADMAC (dialkyl dimethyl ammonium Chloride); Phthalates; EDTA & Halogenated solvents < 1% by weight of chemical product purchased	Certificates from chemical suppliers (Appendix 3)
4. Spinning oils and knitting oils	Polycyclic aromatic hydrocarbon < 1.0 % by weight	Product information sheet
5. Azo dyes	Prohibited (Anex)	Certificate from the dye manufacturer
6. Adhesive dressing	At least, inherently biodegradable	Certificate from the supplier or information sheet
7. Pickling	Prohibited with metals	Certificate from dye works
8. Emission of oxygen demanding substance	For inorganic fiber < 25 g/kg For organic fiber < 60 g/kg	Laboratory Report
9. Energy & water consumption	A plan for minimizing electricity and heat showing how many litres of water and kWh are consumed	Documentation from the original textile manufacturer
10. Metals	As < 0.20 mg/kg; Cd < 0.10 mg/kg; Cr < 2.0 mg/kg; Cu < 50.0 mg/kg; Hg < 0.02 mg/kg; Ni < 4.0 mg/kg; Pb < 0.80 mg/kg; Sb <	Laboratory Report

	????; Sn < 250 ppm; Zn < 60.9 mg/kg	
11. Formaldehydes emission from textile products	Children clothes < 30 ppm Clothes < 30 ppm Outdoor clothes < 100 ppm Curtains < 300 ppm Furniture fabrics < 300 ppm Carpets < 300 ppm Bed textiles < 30 ppm Other textiles < 30 ppm	Laboratory Report
Marketing	Train marketing personnel regarding eco-labelling requirements	Certificate from marketing personnel as shown in Appendix
Inspection	Conducted by eco-labeling body	
Certification body	Accredited by the International Federation of Organic Agriculture Movements	Approval by eco-labeling organization

Table 2-E: European Eco-Labeling Scheme for Leather Products

Ecological Criteria	Requirement	Compliance verification
1.Residues in the final product	Chromium (VI) < 10 ppm Arsenic < 10 ppm Cadmium < 10 ppm Lead < 10 ppm Free and partially hydrolysable formaldehyde (a) Textile components of footwear < 75 ppm (b) Leather components of footwear < 150 ppm	Test method: direct determination by atomic absorption spectrometry Textiles: Japan Law Leather: IUC Test report required on application
2. Emissions from the production of material	75 % reduction of the COD contents in waste water	Test method: ISO & OECD recommended Test report required on application
3. Tetrachlorophenol TCP & Pentachlorophenol PCP	Prohibited	
4. Formaldehydes	Prohibited for stripping	
5. Use of harmful substances (up until purchase)	(a) Pentachlorphenol (PCP) and its salts and esters shall not be used.	Test method: Textiles: gas chromatography (GC) with electron capture detection (ECD), limit value 0,05 ppm leather: (a) mass spectrometry (MS) or (b) electron capture detection (ECD); limit value 5 ppm.
	(b) No azo dyes shall be used that may cleave to any of the aromatic amines (Annexure 1)	Textile: German or French method Leather: standard DIN, limit 30 ppm.
6. Use of volatile organic compounds (VOCs) during final assembly of shoes	(a) General sports, children, occupational, men's town, specialist cold: 30 gr VOC/pair, (b) Casual, women's town < 25 gr VOC/pair, (c) Fashion, infants, indoor < 20 gr VOC/pair.	Test method: ISO & OECD recommended Test report required on if chlorinated bleaching agents are used.
7. Electric components	The footwear shall not contain any electric or electronic components.	
8. Packaging of the final product	(a) Cardboard boxes shall be made from a minimum of 80 % recycled material. (b) Where plastic bags shall be made from	

	recycled material.	
9. Consumer Information	Potassium dichromate < 1.8 % Sodium dichromate < 1.5 % < 7 % of the dyestuff applied (input to the process) shall be discharged to waste water treatment (whether on-site or off-site):	Test method: atomic absorption spectrometry Test report required on application only if chrome mordant dyeing or metal complex dyes are used
10. User instructions	The following information shall be supplied with the product: (a) these shoes have been treated to improve their water resistance. They do not require further treatment. (This criterion is applicable only to footwear that has been water-resistant treated), (b) where possible repair your footwear rather than throw them away. This is less damaging to the environment.	
12. Fitness for use criteria	(a) Uppers flex resistance (b) Uppers tear strength (c) Uppers bondability (d) Outer soles flex resistance (e) Outer soles abrasion resistance (f) Outer soles bondability (g) Insoles water absorption and desorption (h) Uppers water resistance (i) Outer soles water resistance	Test report required on application
13.Printing	Printing pastes used shall not contain more than 5 % volatile organic compounds (VOC) Plastisol-based printing is not allowed.	
14. Formaldehyde	< 30 ppm for products intended for infants of less than 2 years of age < 75 ppm for products that come into direct contact with the skin < 300 ppm for all other products.	Test method: Japan Law 112 or Finnish standard Test report required on application (except for yarns)
15. Waste water discharges from wet-processing	(a) < 25 g/kg of COD content (b) pH between 6 and 9 (c) Temperature < 40 C	Test report and appropriate data required on application
16. Flame retardant	Prohibited	

Table 2-F: A Brief Comparison of BS 7750, EMAS and ISO 14000

	BS 7750	EMAS	14001
Nature	National	Regional	International
Scope	Whole site	Whole site	Part of the site
Environmental Aspect	Examination & assessment of environ. effects	Full inventory of environ. aspects	Identification of significant environmental aspects
Continuous improvement	Required	Required	Emphasized
Objectives	Time-scaled	Time-scaled	Time frame of EMP
Contractors	Require compliance		Communication only
Documentation	Register of effects		Not specific
Audits	Not specific	3 times a year	Not specific
IER		Required	Suggested
Communication	Only Policy statement	Public statement	Only policy

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6 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of Bangladesh

Zaid Bakht*

6.1. Introduction

The world economic order has undergone significant changes over the past decade or two. Rapid development in information and communication technology greatly reduced the cost of transactions across national frontiers. The result has been sharp increase in international flow of goods and service. At the same time, the successful completion of the Uruguay Round of GATT negotiations and the emergence of WTO as the successor of GATT provided strong impetus to the move towards multilateral rule-based global free trade regime.

However, this move towards global integration has been marked by great unevenness. The advanced market economies and the Newly Industrialized Countries (NICs) of East Asia account for a disproportionate share of the enhanced trade flows relative to their share in global income. Between 1980 and 1990, the share of the Least Developed Countries (LDCs) in the global trade declined from 0.8 per cent to 0.4 per cent and remained stagnant at that level throughout the decade of the 1990s. The experience bears testimony to the fact that for a developing economy a positive outcome originating from the process is neither automatic nor guaranteed.

The standard prescription for an economy striving to integrate with the global economy is liberalization of the internal and the external market to facilitate supply-side flexibility and attain macro-economic stability. Apart from trade policy reform, this would involve openness to capital and technology flows, unhindered flow of domestic investment and labor across sectors, financial reform to permit market determination of investment and saving, and public sector disinvestment. These reforms seek to reallocate resources from the production of non-tradables to tradables. Improved resource efficiency is secured from the exposure of enterprises to internal and external competition and through a drastic reduction in the scale and discretionary component of government interventions in enterprises and markets. In short, the thrust of this prescription is on "getting the price right" through unfettered market.

However, globalization of the world economy is changing the dynamics of world trade and this in turn is changing the focus of competitiveness from price aspects to structural aspects. What counts more in the current competition between nations is the quality of the goods and services produced and the skill of the human resource involved in such production. The pattern of world trade is increasingly being dictated not by comparative advantage based on factor endowments and cheap labor but by competitive advantage determined by quality, speed of delivery and presentation. Essential ingredients of competitive advantage are technological innovation, training and systematic updating of human resources, management techniques compatible with the global economy, flexibility to adapt to the ever changing global marketplace, and creativity.

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The structural aspects of competitiveness, again depends on a whole set of systems involving suppliers of goods and services, the financial, educational, technological, energy, transport, and telecommunications systems, infrastructure and the quality of the public institutions. World competition today is not between individual firms but between these systems. Shortcomings in these areas all affect the competitiveness of the firm. It is not surprising, therefore, that developing countries beset with important structural problems such as low skill capacity, poor infrastructure, weak institutions, low levels of investment and a weak state of governance are finding it increasingly difficult to cope with the challenges of globalization.

The woes of the developing countries are further compounded by threats of market restrictions based on social concerns. One such non-trade issue looming high is environmental standards. The demands from many high-income economies to link such social issue to trade policy are based on the following arguments. First, they are concerned that lower environmental standards provide industries in developing countries with a competitive advantage over their own industries. Second, there is the concern of international spillover effects resulting from environmental degradation. Thus, trade policy is seen by some as means of addressing these competitive and social concerns.

The linking of trade policy with environmental policy is likely to create several difficulties for the developing economies. First, there remains the risk of such social clauses being used for protection against competitive imports from developing world. Second, the capacity of the developing countries to adopt better environmental standards are often restricted by structural and resource constraints. The imposition of more stringent environmental condition, therefore, is unlikely to result in improvement of such standards and instead would marginalize these countries in world trade by undermining their comparative advantage. To the extent that environmental practices are often function of the level of development, the better way to address environmental objectives would perhaps be to generate economic prosperity through greater market access and trade.

The present paper attempts to examine the possible impact of enhanced environmental standards on the external trade of Bangladesh. As the preceding paragraphs have suggested, these impacts are likely to depend on (a) the underlying strength of the export sector, (b) success in eliminating policy induced constraints, (c) the structural bottlenecks to export growth, and (e) environment sensitivity of the export industries and the ability to cope with these.

Accordingly the paper is organized as under. After the introductory remarks in Section I, Section II provides an overview of Bangladesh's external sector highlighting its strength and weaknesses. Section III gives a brief account of the policy reforms carried out by Bangladesh in liberalizing its markets. Section IV highlights the structural impediments to Bangladesh's export growth. The environmental impacts of exports are discussed in Section V while Section VI reviews the incidence of relocation of industries in Bangladesh due to less stringent environmental standards. Finally, concluding remarks are presented in Section VII.

6.2 The External Sector of Bangladesh

Growth Performance

Between 1980/81 and 1990/91, Bangladesh's total exports in current US $ value grew at an annual compound rate of 9.2 per cent (Table 1). The annual growth rate was 14.4 per cent during the period 1990/91 to 1999/00. In fact, Bangladesh experienced double digit export growth in most of the years during the 1990s. However, the growth rate took a nosedive to 2.9 per cent in 1998/99 due to adverse impact of prolonged flood. Export growth revived to 8.3 per cent during 1999/2000.

Imports, on the other hand, grew at an annual compound rate of 4.4 per cent and 10.9 per cent during 1980/81-1990/91 and 1990/91-1998/99 respectively. The gap between export and import widened from $1572 million in 1980/81 to $1792 million in 1990/91 and further to $2814 million in 1999/00, although the share of export earnings in import payments steadily rose from 31 per cent in 1980/81 to 67 per cent in 1999/00.

The openness of the economy as measured by total external trade as a proportion of GDP went up from around 21 percent in 1980/81 to nearly 30 per cent in 1998/99 with the share of export in GDP rising from 5 per cent to 12 percent during the same period.

Table 1: Exports and Imports of Bangladesh during 1980s and 1990s

Description	1980/81	1990/91	1999/00	Annual compound growth rate (%)	
				1980s	1990s
Export (million $)	710	1718	5752	9.2	14.4
Import (million $)	2282	3510	8566	4.4	10.4
Trade deficit (million $)	1572	1792	2814	1.3	5.1
Export as % of import	31.1	48.9	67.1		
Export as % of GDP	5.0	7.3	12.1		
Import as % of GDP	16.0	15.0	17.9		
Openness of the economy (%)	21.0	22.3	30.0		

Source: Export Promotion Bureau and World Bank

Changing Structure of Export

The structure of export has changed significantly over the past two decades. Bangladesh seems to have made the transition from resource-based to process-based exports. In 1980/81, primary commodity constituted nearly 29 per cent of total exports. In 1990/91, this share came down 17.8 per cent and further down to 7.9 per cent in 1998/99 (Table 2).

However, when one takes a closer look at the disaggregate picture, the feature that strikes the eye is the shift from jute-centric to garments-centric export. In 1980-81, raw jute and jute goods together constituted 68 per cent of total exports. Between 1980/81 and 1998/99, export of both

raw jute and jute products declined in absolute terms and their total share came down to only 7 per cent in 1998/99. In contrast, woven and knit garments together accounted for less than 1 per cent of exports in 1980/81. Their combined share in exports rose to nearly 76 per cent in 1998/99.

Table 2: Changing Structure of Export: 1980/81-1999/00

(million $)

Item	1980/81	1990/91	1999/00	Growth(%) 1990-1999
Primary commodities	*209*	*306*	*469*	*4.9*
	(29.4)	*(17.8)*	*(8.2)*	
Raw jute	119	104	72	Negative
	(16.8)	(6.1)	(1.3)	
Tea	41	43	18	Negative
	(5.8)	(2.5)	(0.3)	
Frozen food	40	142	344	10.3
	(5.6)	(8.3)	(6.0)	
Other primary	9	17	35	8.4
	(1.3)	(1.0)	(0.6)	
Manufactured goods	*501*	*1411*	*5283*	*15.8*
	(70.6)	*(82.2)*	*(91.8)*	
Jute goods	367	290	266	Negative
	(51.7)	(16.9)	(4.6)	
Leather & leather goods	57	136	195	4.1
	(8.0)	(7.9)	(3.4)	
Woven garments	3	736	3083	17.3
	(0.4)	(42.9)	(53.6)	
Knitwear	0	131	1270	28.7
	(0.0)	(7.6)	(22.1)	
Chemical products	11	40	94	9.9
	(1.5)	(2.3)	(1.6)	
Other Manufactured goods	63	78	375	19.1
	(8.9)	(4.5)	(6.5)	
Total Export	*710*	*1717*	*5752*	*14.4*
	(100)	*(100)*	*(100)*	

Figures within parentheses show % share in exports
Source: Export Promotion Bureau

The evidence presented brings out the basic weakness of Bangladesh's export sector. In spite of the rapid growth in export, particularly of manufactured exports, the export base has remained extremely narrow. In fact, it has become narrower during the 1990s. The observed growth in export has been propelled mainly by growth in the export of garments - both woven and knit. Two other items that registered significant growth during the 1990s are frozen food and chemical products.

Market Concentration of Exports

The commodity concentration also led to concentration in the destination of exports. Historically, the major destinations of Bangladesh's export have been USA, EU, Canada, Japan and China. In 1980/81, these regions received about 30.5 per cent of Bangladesh's export. But market

concentration accentuated over time and in 1998/99, the same region was the destination for 88.0 per cent of Bangladesh's export (Table 3).

Table 3: Percentage Distribution of Exports by Destination

Destination	1980/81	1990/91	1999/00
USA	12.3	29.5	39.5
EU	10.6	39.1	42.7
Canada	0.9	1.8	1.9
North America & EU	*23.8*	*70.4*	*84.1*
Japan	2.7	2.4	1.7
China	4.0	1.9	0.2
Sub-total	30.5	74.7	86.0
ASEAN & NIEs	5.5	4.3	3.8

If one looks behind the export performance of Bangladesh, one finds that the spectacular growth of garments industry was triggered by the relocation of their trade in Bangladesh by East Asian exporters in an attempt to circumvent binding quota restrictions in their own country imposed under the Multi-Fiber Arrangement (MFA) particularly for the North American market. This resulted in the direction of Bangladesh's garments export to remain focused towards USA and Canada.

The other factor that contributed towards the rapid growth of apparels sector particularly of knitwear in Bangladesh was the zero-tariff access to the EU markets under the Generalized System of Preference (GSP). Because of these twin benefits of MFA and GSP, 97 per cent of all apparels exports from Bangladesh were directed towards North America and EU markets even in 1998/99.

Two issues are of concern in connection with direction of export, - (a) the spread of the export market, and (b) the share of growing economies in the export market. If the export of a region is narrowly directed to a handful of economies, it remains vulnerable to fluctuations in the economic performance of these economies. Again, a larger share of the developed and growing economies in the export market indicates a higher incidence of income-elastic products in the export basket and hence higher potentials for growth of export along with the growth of these economies.

Judged on those criteria, Bangladesh seems to have failed to broaden her export market. She was particularly unsuccessful in penetrating the market in the growing economies of ASEAN and the NIEs. The share of her export going to this region declined from 5.5 per cent in 1980/81 to 3.5 per cent in 1998/99.

Trend in Export and Import Price

As would be expected, Bangladesh's exports have failed to climb up the value ladder significantly during the past two decades. The readymade garments industry, which has been the prime mover of exports during this period, remained concentrated at the relatively lower end of

the market segment producing mainly T-shirts, pajamas, ordinary shirts, shorts, caps, women's and children's wear etc. Diversification into higher valued jackets, shirts of complicated designs, and *brand* items etc has been slow. Similar has been the experience with the export of leather goods. Jute goods, another important item of manufactured exports lost in unit value due to displacement by synthetics and slowing down of world demand. In the case of primary commodities such as raw jute, tea, and frozen food, export price index virtually stagnated. The overall export price index thus, registered only modest rise during the past two decades (Table 4). With the import price index rising by a higher margin, the terms of trade deteriorated during the 1990s. The situation became particularly bad in 1998-99 when all major export items of Bangladesh except woven RMG, experienced decline in unit value by a margin of 5-40 per cent. As a result the overall export price index rose marginally by 0.6 per cent. This was largely the aftermath of East Asian financial crisis that led to worldwide fall in commodity prices, and it contributed significantly to the sharp fall in Bangladesh's export earnings in that year.

Table 4: Price Index of Export and Import

Description	1980/81	1990/91	1999/00	Yearly growth (%) 1979-1999
Export Price Index	100	118.55	140.6	1.7
Import Price Index	100	111.25	158.0	2.3
Terms of Trade	100	106.56	89.0	Negative

6.3. Reforms in Trade and Exchange Rate Policy

Bangladesh carried out wide-ranging trade policy reforms during the past two decades. The reforms covered both tariff and non-tariff barriers. With regard to non-tariff barriers, the focus has been on deregulation of import procedure and elimination of quantitative restrictions. In the case of tariff barriers, the attempt has been to rationalize the tariff structure, reduce the number of duty slabs, and bring down tariff rates and their dispersion amongst similar commodities.

Non-tariff Barriers

Bangladesh has come a long way in terms of dismantling its non-tariff barriers. The system of import license has been virtually eliminated and the Control List of Banned and Restricted items has been brought down to a minimum. As part of the conditionality of concessionary loan under the World bank Industrial sector Adjustment credit (ISAC-I), it was stipulated that beginning in 1987-88, there would be a yearly reduction of 20 per cent in the Negative list. Table 5 shows the change in the level of quantitative restrictions between 1986-87 and 1997-2002 measured at the four-digit level. The main manufacturing sector receiving protection from QR on trade-related ground is the textile sector, with a quarter of tariff lines in this sector still remaining under QRs.

Table 5: Number of 4-digit H.S.-Lines under Quantitative Restrictions

Item	1986-87	1990-91	1997-2002
Total	550	239	124
Trade Reasons	489	179	28
a. Banned	252	93	5
b. Restricted	151	47	6
c. Mixed	86	39	17
Non-trade Reasons	61	60	96

Intervention by state trading enterprises has been reduced over time. The role of the state trading body - the Trading Corporation of Bangladesh (TCB) in import and export has been curtailed, and there is now wider participation by the private sector in import and export trade that were earlier reserved for the TCB.

Tariff Structure

As a least developed country, Bangladesh has been exempted in the Uruguay Round of agreements from making commitments regarding tariff reduction. However, rationalization of the tariff structure has been one of the key elements of trade policy reforms in Bangladesh. Prior to 1986, the tariff code had 24 tariff slabs, which were not based on easily discernible principles for assigning different rates to different products. The duty rate varied widely, not only among different industries, but also between products in the same industry depending upon the type of importer, end use of the product, geographical location of the firm, or the size category of the industry.

In a bid to rationalize the tariff structure, the government attempted to reduce the wide variations in tariff rates and ensure that statutory and actual rates do not vary much. The number of ad valorem custom duty rates has been reduced gradually which stood at 12 in 1993-94 and 6 in 1996-97. Preferential rates of duties applicable to public sector enterprise were eliminated in 1989. Tariff reform was accelerated significantly in the fiscal year 1992-93 by the compression of custom duty rates into a range of 7.5-100% for most products accompanied by the removal of many end user defined distinctions. As a part of the rationalization measures, maximum tariff rate was reduced from a level of 350% in 1991-92 to 50% in 1995-96 and then further down to 42.5% in 1997-98. As a result of these sustained efforts, average nominal protection, including all import duties and protective taxes, fell from 89 per cent in 1990-91 to 25 per cent in 1995-96, a drop of 64 percentage points (Table 6). The import-weighted average protection rate fell by 21 percentage points. Agriculture enjoyed lowest protection both in pre and post reform period.

Table 6: Trends in Nominal Protection, 1990/91 - 1995/96

Description	Agriculture	Mining	Manufacturing	All Tradables
Pre-reform, 1990/91				
Unweighted	90.5	54.1	89.0	88.6
Import-weighted	20.9	24.0	51.8	42.1
Post-reform, 1995/96				
Unweighted	26.0	13.6	24.6	24.6
Import-weighted	10.1	38.8	21.9	21.0
Current Status 1999/00				
Unweighted	-	-	24.2	24.7
Import-weighted			-	17.3

6.4 Structural Constraints to Export Growth

Power

Bangladesh faces serious problems of power shortages. Power generation capacity in 1999 was 3681 MW. But average daily generation in 1998-99 was 66 per cent i.e. 2400 MW. Average daily demand for electricity during this period was 2650 MW, which amounted to a daily load shedding of 250 MW. Accordingly, consumption of electricity per capita in 1999 was only 110 KW, which is less than one third of per capita electricity consumption in South Asia. Demand for electricity grew at a rate of 8.5 per cent during the past decade but supply has grown at an average rate of 4.8 per cent only. The supply demand gap has thus been widening over time. The annual load shedding duration was 113 hours in 1991 and 763 hours in 1995 and 2870 hours (33 per cent of total operating hours) in 1997-98.

The main reason behind the power shortage is lack of new investment as well as inadequate maintenance of the existing capacity. Due to lack of maintenance investment there is a continuous deterioration in the operating efficiency and quality of service. Plant efficiency is estimated at about 30 per cent. Up to 20 per cent of electricity is lost due to aging transmission lines.

There are acute shortage of funds for the maintenance of the power infrastructure The financial crisis of the power sector are largely due to rampant corruption and serious management deficiencies within parastatal power organizations Power Development Board (PDB) and Dhaka Electric Supply Authority (DESA). There are problems of overstaffing and high system loss averaging more than 30 per cent, and large unpaid dues. The combined net system-loss of PDB and DESA in one year is estimated at US$100 million, which could in itself, provide the necessary investible fund for at least one 250 MW gas turbine. The outstanding due on DESA alone is Tk. 2.5 billion.

Apart from internal problems of its power system, Bangladesh has also been exposed to a complete disruption in the availability of ODA for the power sector from its multilateral and bilateral donors because of the slow pace of reform in the sector required under World Bank's

Energy Sector Policy Loan of 1989, and also due to changed policy of donors for using FDI for power sector.

Demand forecasts suggest that maximum demand would grow from 3150 MW in 2000 to 4600 MW in 2005 and to 6780 MW in 2010. Finally, by 2015 maximum demand would reach 9900 MW. To meet the forecast demand will require investment of US$4.4 billion in generation and US$2.2 billion in transmission during the current decade. The overwhelming need to generate and add around 1200-1500 MW of electricity to the present system up to 2002 is inescapable.

Given the supply shortage scenario, the government formulated a private power policy in October 1996 with a view to attracting FDI. Agreements were signed within 2 years (1997-99) for three 100 MW each floating barges. During the same period, 2 major land based contracts were also signed for supply of power of about 800 MW (combined cycle) capacity by 2002. The government has also taken several steps to augment PDB electricity generation capacity.

The opening of the power generation activities to the private sector has been a positive development. But pouring more power into the system is not the only way of coming to grips with problems in this sector. Much more needs to be done with regard to outdated transmission and distribution lines, load management and above all huge system, transmission and distribution losses.

Telecommunications

Telecommunications infrastructure constitutes the backbone of today's information technology. The high rates of return and the extensive social and economic benefit that Bangladesh can derive for wider segment of the society through the application of information technology critically hinges on her ability to rapidly upgrade the existing telecommunication infrastructure.

By world standard, the existing telecommunication facility in Bangladesh is a primitive one. In 1980 there were 120,000 telephone lines in the country, which increased to 241,190 by 1990. By 1999, number of telephone lines increased to 474,322. The current teledensity of 0.5 telephones for every 100 persons compares very unfavorably with 1.5 in India and 2.5 in Pakistan. Digital technology was first introduced in the domestic telephone network in the late 1980s. Currently, 61 per cent of the telephone lines are digital. By 1981, the country had two earth stations for satellite communications and one more was added in 1994. These earth stations are much too small for the requirements of data communications. Data communication is therefore done with VSAT connections to satellite, a method that does not give all the bandwidth necessary for large Internet provision. The appropriate provision for high-speed data communication is Optical Fibre Gateway. When the Asian IT Highway - the undersea optical fibre cable in the Bay of Bengal - was laid, the government of Bangladesh declined participation. The government is now looking for a cost-effective way of connecting to the IT Highway through private collaboration.

The sector was opened up for private investment in 1994. Since then several private investors have entered into the sector mainly in the area of mobile telephones. There are now some 128,664 telephones provided by the private sector.

The parastatal body in telecommunications is Bangladesh Telephone & Telegraph Board (BTTB). Given BTTB's past performance record, the future of Bangladesh's telecommunication sector will hinge critically on its ability to attract private investment. This in turn will depend largely on the extent to which the government is willing to circumscribe BTTB's monopoly and regulatory roles.

Human Resource Constraints

Bangladesh has achieved impressive success in the broad area of human development. This is reflected in both aggregate and individual measures. Thus, the value of human development index (HDI) has roughly doubled in three decades, from 0.166 in 1960 to 0.309 in 1992, yielding an annual average rate of increase in the order of 2.7 percent per year. The progress has been faster in the nineties: between 1992 and 1996/97, the HDI value has increased by 40 percent, rising from 0.309 to 0.438, with an implied average increase of 9.3 percent per year.

Similar trends follow through when the incidence of aggregate human deprivations such as the human poverty index (HPI) is considered. The human poverty index (HPI) focuses on three aspects of human deprivation: deprivation in longevity, deprivation in knowledge, and deprivation in economic provisioning. The results show that the incidence of human poverty has declined from 61.3 percent in 1981-83 to 47.2 percent in 1993-94, and dropped further to 40.1 percent in 1995-97. The progress was faster on human poverty front. The incidence of income-poverty at the national level--as measured by the head-count index of poverty—declined from 52.3 percent in 1983/84 to 46.6 percent in 1995/96. This statistic gives a poverty reduction rate of only 1 per cent a year compared with the matched figure of about 3 per cent recorded for human poverty during the same period.

Individual indicators such as literacy and mortality rates also show considerable improvement. Thus, infant mortality rate, which stood at 148 per thousand live births in 1970, declined to 81 in 1997 according to WDI data. The rate of improvement was faster in the recent period as the matched figure dropped to 65 in 1999 according to BBS/Planning Commission data. Similarly, the adult literacy rate has increased from 29 per cent in 1981 to 39 per cent in 1991 as per the Population Census data. The progress was much faster in the nineties, the 1999 estimate being in the order of 56 per cent.

As mentioned earlier, success in human development also comes through cross-country comparison. The pace of increase in HDI was fastest in Bangladesh among all South Asian countries during 1987-96.

Although Bangladesh has achieved considerable success in the broad area of human development, a number of key challenges still remain inadequately addressed. The mismatch between quantitative and qualitative dimensions within the broad area of human development is particularly worrying. This cuts across dimensions of education, health, nutrition, family planning, and women empowerment. Here are a few examples.

- Completion of a particular grade does not imply access to commensurate level of knowledge. Thus, some recent studies, which carried out aptitude tests, indicate that the level of knowledge,

as implied by the 5th grade, seems to be achieved only by the 8th graders. This may explain why mere graduation from the primary level often does not yield significantly different social and/or poverty outcomes.

- Variation between the quality of education is considerable among the various educational systems and sub-systems, defined by public/non-formal/private categories, and across madrassah, Bengali-medium, and English-medium schools. This is true for the primary, secondary, and higher levels of education. The quality differential in education is also significant between advanced and backward areas. The educational curricula remain insufficiently sensitive to technical and vocational training, gender concerns, agricultural development, health and environmental issues.

- The dismal state of public curative health care shows little signs of progress. Even as late as mid-nineties, only 15 per cent of rural population have access to public health care. The situation is also far from satisfactory in urban areas. Public service is increasingly failing to cater to the health care needs of both urban non-poor and urban poor. Since the poor are the principal users of outpatient facility, statistics on the number of outpatients may serve as an indicator of their access to urban public health care. According to the health statistics provided by DG Health, there has been a decline of 11 per cent in the total number of outpatients in the urban public sector hospitals and centers between 1996 and 1998. One explanation is that outpatient facility in these centers has declined over time. The urban non-poor is fast loosing their confidence in the public health system by taking recourse to medical treatment abroad. According to the Fifth Plan document, the aggregate private health expenses (inclusive of travel) incurred by the patients seeking treatment abroad may be as high as Taka 5000 million in a year.

- For many otherwise well-intended programs, sustainability remains an open question. Bangladesh Integrated Nutrition Programme (BINP) aspires to serve the unmet nutritional requirements of pregnant and lactating mothers as well as children under two years. However, the program design provides feeding only up to 3 months, though the requirement of the poorest is much greater. The program is also not targeted to the poor and the poorest. Similarly, the program of Food for Education (FFE) remains insufficiently alert to the need of the poorest areas. This is over and above the problem of ensuring quality education at the primary level. From the nutritional point of view, a mid-day meal program at the school may have been a better alternative to BNIP or FFE. The child immunization coverage has also dropped in recent years--from over 70 per cent in the early nineties to about 55 per cent--according to BRAC's health monitoring data. The implementation of new health policy via Health Population Sector Programme (HPSP) appears to be extremely slow. Some commentators are apprehensive of deterioration in population control following the withdrawal of the door-to-door visit program. The problem of child labor, dropout and non-enrollment still remains significant: income-poverty remains the binding constraint to achieving the target of universal primary education.

- The problem of misgovernance lies at the heart of the mismatch between income and non-income dimensions of poverty, and within each dimension, between quantitative and qualitative measures. This is a crosscutting issue focusing on the implementation capacity of various state and non-state agencies, the extent of beneficiary participation, the state of civic activism and the quality of the public culture.

6.5 Environmental Impact of Export Industries

Bangladesh is a low-industrialized country as reflected in the low share of the manufacturing sector (15 per cent) in the GDP and low growth of manufacturing value added (4 per cent) attained over the past three decades. But the environmental degradation caused by the sector is quite high. The pollution absorption capacity of the country is also quite low given that the country has a small land area but a large population. Industries that are major contributors to manufacturing GDP and exports are either natural resource based processes or pollute the environment through emission of waste and toxic products. Water pollution through untreated discharge of solid wastes and liquid effluents and air pollution through gaseous emissions are the most pervasive forms of industrial pollution in Bangladesh. According to the Department of Environment (DOE), the major polluting units belong to the following industrial sub-sectors:

i) Shrimp culture
ii) Sugar
iii) Distilleries
iv) Textiles including dyeing & finishing
v) Leather tanning
vi) Pulp and paper
vii) Fertilizer, and
viii) Re-rolling mills

Amongst these polluting industries, shrimp culture is a fully export oriented industry while leather tanning and fertilizer cater to both domestic and export markets. Textiles including dyeing and finishing are important backward linkage industries for Bangladesh's main export earner readymade garment industry. The following sub-sections provide a brief account of these export industries and the nature and magnitude of environmental degradation caused by them

Shrimp Culture

Profile of the Industry

In 1980-81, export of frozen food from Bangladesh was only US $ 40 million. In 1999-2000, it reached the level of US $ 344 million, the annual compound growth rate being nearly 12 per cent. Although the share of this item in total export is currently about 6 per cent, in value added terms it is the single largest export of Bangladesh based almost entirely on local raw materials. Nearly, 89 per cent of the export of frozen food from Bangladesh consist of shrimp.

Up to mid 1980s, the export was based mainly on open water catches of shrimp. Coastal aquaculture for export of shrimp is predominantly a development of the late 1980s and early 1990s. Rising world prices provided the incentive to venture into commercial shrimp farming. Price of shrimp went up from $2.4 per pounds in the mid 1980s to $4.5 ponds in the mid 1990s. Given that the product is largely natural resource and labor based, Bangladesh had a comparative advantage in the export of shrimp. A World Bank/UNDP investment program of $30 million also helped launch the export oriented commercial shrimp farming with infrastructure and technology during this period. The government also joined-in with a number of incentives covering

amendments to the land-lease laws, subsidized credit and tax holidays. A significant portion of the shrimp export now originates from the aqua-culture sector. Like other exports of Bangladesh, the export market for shrimp is also narrow with about 55 per cent going to USA followed by EU (19 per cent) and Japan (14 per cent).

Environmental Consequence of Shrimp Culture

Shrimp culture involves prolonged inundation of land by saline water. This causes salinity of the land to increase and soil fertility to decline not only in the land under shrimp culture but also in the neighboring lands. As a result, production of agricultural crops and fodder decline sharply. The salinity level in neighboring fresh water ponds also rises creating scarcity of fresh water for drinking and household purpose. It also contributes to public health hazards such as deposition of salt on human skin and higher incidence of water-borne diseases.

Shrimp fry used for shrimp culture are collected from natural sources, namely, coastal rivers, seacoast and estuarine area. During the harvesting of each shrimp fry, about 90-100 eggs or fries of other aquatic species get destroyed, which affects the ecological and biological system in the coastal area. Moreover, during transport of fries from harvesting area to shrimp culture ponds, a large percentage of the fries are lost unless handled properly.

Ecological systems are also affected by harvesting of shrimp by trawlers unless care is taken to extrude other species. There are also complaints of over-trawling and harvesting in breeding areas prohibited by law.

Product Quality and Health Standards

Internationally recognized product and health standards such as ISO certification, HACCP etc are being increasingly demanded of the exports of the developing countries. Current state of product quality monitoring and control in these countries falls far short of international standards. As a result, enhanced health and hygiene are having similar trade restrictive effects on the exports of these countries as enhanced environmental standards. In fact, the distinction between the two seems to increasingly getting obscure. The case of EU's ban on import of shrimp from Bangladesh for non-compliance of HACCP regulations highlights the urgent need for technical assistance to support the export industries in upgrading their product quality and hygiene standards and for improving the institutional capability to monitor and control such standards.

European Commission Ban

In July 1997, the European Commission imposed a ban on import of frozen shrimp from Bangladesh on the grounds of non compliance with the importer's hygienic regulation Hazard Analysis Critical Control Points (HACCP)[1]. Specifically, the objections related to the following:

[1] HACCP is a system of regulations that has been widely accepted as an international standard to control all factors related to contamination, survival and growth of microorganisms in food in all stages of the food chain. It is based on the recognition that microbiological hazards exist at various points of the food production and distribution chain but measures can be taken to control these hazards at specific points in the chain.

(a) use of unskilled workers with unhygienic habits
(b) unhygienic transportation and preservation
(c) untimely procurement of shrimp and
(d) corrupt practices for making excessive profit

The EC had initially given Bangladesh up to November 31, 1997 for taking adequate measures to ensure compliance with the regulations. On the basis of a visit by an EC technical team the time limit was extended by another three months. The ban continued for nearly eight months. In February 1998, the EU lifted the ban on imports from six shrimp processing firms, and from another 11 firms in July 1998. Thereafter, the EU ban was gradually lifted from a large number of other exporters as those plants were eventually up graded. A total of $17.6 million was spent in up grading the plants and the industry cost required to maintain HACCP is estimated to be $2.2 million per year.

Given that, EU is the single largest buyer of Bangladeshi shrimp, the ban spelled disaster for the industry. Nearly 80 per cent of the shrimp processing plants got shut down. The following figures show how the export of frozen shrimp declined steeply after the imposition of the ban.

Export of Frozen Shrimp from Bangladesh to the EU

Month	Export ($million)
August '97	46.4
September '97	38.8
October '97	30.9
November '97	25.4
December '97	19.6
January '98	11.9
February '98	8.1

Impropriety of the European Ban

While the importance of adequate health and hygienic standards in the export of food items can hardly be denied, the manner in which the EU ban was imposed on the import of frozen shrimp from Bangladesh reflects its arbitrary nature and also the vulnerability of the weak economies such as Bangladesh to non-tariff barriers against their exports.

It is generally known that there are about 25-30 firms in Bangladesh who are well equipped and who export quality shrimp under proper hygienic conditions. The EU has all along been importing from these firms as well as from other firms in Bangladesh. Thus, EU was aware of the variations in the quality of the shrimp processing units in Bangladesh. The government of Bangladesh was informed of the problem of poor hygienic quality of shrimp processing. An FAO project aimed at assisting the formulation and implementation of a HACCP based assurance program was already underway. The EU imposed the ban after it visited a few firms recommended by the government and found them to be of unsatisfactory hygienic standards. Ideally, the EU should have continued importing from the quality exporters instead of imposing

the ban across the board. They should have provided appropriate guidelines for the improvements of the other firms and given them lead-time to improve. EU could also provide technical assistance where necessary. Only in the event of failure of these firms to comply with the health and hygiene requirement could EU impose ban on import from these firms.

The above experience epitomizes the difficulties Bangladesh faces in coping with the provisions of the UR Agreement on the Applications of the Sanitary and Phytosanitary measures. The Agreement seeks to introduce harmonized standards in respect of health and safety regulations for the protection of human, animal and plant life or health. The basis for harmonization adopted in the Agreement are three international standards. For food safety, the standards, guidelines and recommendations established by the Codex Alimentaurias Commission, relating to food additives, veterinary drugs and pesticide residues, contaminants, methods of analysis and sampling, and codes and guidelines of hygienic practice are to be followed. While the animal health standards are to follow the guidelines and recommendations of the International Office of Epizootics, plant health standards are to set in line with the international standards, guidelines and recommendations developed by the Secretariat of the International Plant Protection Convention in cooperation with regional organizations operating within the framework of the International Plant Protection Convention.

Scope of Containing the Environmental Fall Out of Shrimp Culture

The extent to which agricultural production is displaced by shrimp culture will depend on the level of salinity and soil fertility that existed prior to the setting up of the shrimp farm. A zoning policy that demarcates the area in terms of high, medium and low saline zones can, therefore, be helpful in containing the displacement effect of shrimp culture.

The extent of salinity and the level of degradation of soil fertility have been found to vary significantly with the type of shrimp culture practiced. The environmental fall out of shrimp culture has been found to be much less when intensive or semi-intensive types are used and are integrated with mangrove/ paddy plantation etc as may be appropriate. What is also important is that the productivity of intensive shrimp farms is much higher than the productivity of the extensive type farms. Unfortunately, there has been indiscriminate horizontal expansion of extensive shrimp culture in Bangladesh, which has not only caused significant environmental damage but has also resulted in the productivity level to be less than one tenth of what could be achieved even with semi-intensive practice.

The damage to ecosystem due to procurement of fries from natural sources can be easily corrected through establishment of modern hatcheries. In the mean time, training of fry collectors through adequate extension service can help minimize the spoilage of both shrimp fries and fries/eggs of other species. Similarly, proper implementation of trawling rules can help contain damage to sea-resources.

A review of the present health inspection and quarantine rules of Bangladesh shows that they are totally out of date and needs to be drastically modified for compliance with the UR Agreement. In the specific context of shrimp export, the Department of Fisheries needs to take several steps

to meet the HAACP regulations. These include: (i) Building hygienic service centers near the shrimp farms, which are needed to prepare shrimp for transportation to the processing plants by washing and sorting it, and by packing it into baskets with ice. (ii) Modifying design and operation of the processing plants to meet the regulations. (iii) Importing additional refrigerated trucks, and (iv) continuing the training workshop and technical assistance programs already undertaken by FAO.

Recognizing the limitations of the developing countries in meeting the requirements of regulations, the Agreement on the Applications of the Sanitary and Phytosanitary measures stipulated that they should be granted, upon request, specified time-limited exceptions, in whole or in part, from obligations under the Agreement, keeping in view their financial and developmental needs. The unilateral action of the EU in banning shrimp import from Bangladesh goes against this spirit of accommodation of the developing countries concern.

Leather Tanning

Profile of the Industry

Bangladesh produces about 182 million square feet of hides and skin every year of which only about 15-20 per cent is used up domestically. Given the availability of the basic raw material for leather production and the labor-intensive nature of the activity, leather and leather goods manufacturing constitute important export-oriented industries for Bangladesh. In 1980-81, leather export from Bangladesh was to the tune of US $ 57 million only and consisted almost entirely of semi-processed leather called wet blue. To achieve greater value addition, the government set July 1990 as the limit beyond which export of wet blue leather would be banned and provided fiscal and financial incentive for up-gradation of the leather units for production and export of more processed crust and finished leather and leather products. In 1991-92, leather export amounted to US $ 144 million and all of it was in the form of crust or finished leather. At around that time, a few firms ventured to produce selected leather goods for overseas market and exported leather goods worth US $ 4 million in that year. During the mid 1990s, a few leather footwear manufacturing units with modern machinery were set up and started production of quality shoe for selected overseas markets. In 1997-98, export of leather goods including footwear stood at US $ 48 million registering an annual compound growth rate of nearly 51 per cent. In 1999-00, total export of leather sector amounted to $195 million (3.4 per cent of total export) of which 65 per cent were crust leather, 27 per cent finished leather and 8 per cent leather products. Leather export also has a concentrated market with 35 per cent going to Hong Kong, 24 per cent to Italy, 6 per cent to Japan and another 4.9 per cent to Spain.

Environment Sensitivity of Leather Sector

Leathery tanning industry in Bangladesh faces serious pollution problem on the domestic front. Of the 214 tanneries in the country, 196 units are located over 25 hectare of land in an area called Hazaribag in Dhaka City and they process nearly 95 per cent of all hides and skins. All these units drain toxic wastewater in the river Buriganga. In addition to the wastewater, the tanneries also discharge large volume of highly toxic effluence into the river. The most hazardous element

in the waste disposal of the tanneries is chromium, which in its hexavalent form is carcinogenic. Concentration of chromium in Buriganga River is observed to be 6mg/l where as the maximum allowable limit is 4 mg/l. The industry also causes air pollution while soaking, processing and finishing leather through the discharge of harmful chemicals and strong odor.

On the external front, restrictions on the use of certain chemical dyestuffs particularly *Pentachlorophenol* (PCP) causes difficulties for the industry. EC standard for PCP is 10 mg/kg, which is followed strictly by Germany but less so by Italy, Spain and France. The restrictions imposed by Hong Kong are also less stringent. Since Germany accounts for less than 2 per cent of our leather export, problems faced by Bangladeshi exporters has not been very acute so far.

Containing Environmental Hazards of Leather Industry

Leather industry in Bangladesh is dominated by small and medium enterprises. Given their weak financial standing, these units have special problems in complying with higher environmental standards. The small and medium enterprises have to depend on the support from the government and other agencies to address the environmental problems of leather industry. There are two important steps that are required for containing the environmental hazards of leather industry. First, the provision of effluent treatment plant to free the waste from toxic substances and second relocation of the industry at a suitable place away from the city. Currently, only a handful of tanneries are known to treat its wastewater effluent in an effective manner. The government had taken up a plan to setup a leather estate in the outskirts of the city. But because of the of the financial cost involved and possible dislocation in exports, the entrepreneurs have been less enthusiastic about the leather estate, and not much progress has been made so far in this regard. The government has recently undertaken a program to establish a common effluent treatment plant (CETP) in Hazaribagh with the assistance of UNIDO. Roads and drainage systems in the tannery area are now being improved for proper operation of the CETP.

Fertilizer Industry

Profile of the Industry

Yearly production of chemical fertilizer in Bangladesh is approximately 2 million mt. About 75 per cent of this fertilizer is used domestically and about half a million ton is exported annually Export earnings from fertilizer was US $ 10.3 million in 1981-82 and increased to US $ 104.1 million in 1996-97 but came down to US $ 59.9 million in 1999-2000. Yearly compound growth of fertilizer export in current dollar value between 1981-82 and 1999-00 works out at 10.3 per cent. However, in terms of proportion of total export earnings, the share of fertilizer remains miniscule at 0.1 per cent. Major export destinations of fertilizer are Australia (26.2 per cent), India (13.5 per cent) and Thailand (6.2 per cent).

Nature and Magnitude of Pollution Caused by Fertilizer Industry

Except one joint venture, all the fertilizer plants in Bangladesh are in the public sector set up with foreign aid. The foreign aid involved tied technical assistance and equipment acquisition from the donor country. The environmental performance of these units, therefore, reflects donor-country standards at the time of installation. As would be expected, the more recent plants are

cleaner than the earlier ones as they embody more recent technology consistent with stricter environmental standards.

The oldest urea fertilizer plant (NGFF), built with Japanese assistance in 1961, is located in the northeastern part of the country on the Kushiara River. The plant's discharges contain toxic ammonia, high BOD and Ph levels, and substantial residues of grease and oil. They have been clearly identified as the cause of major fish kills, paddy field damage and health threats. In addition, there have been regular atmospheric releases of ammonia and sulphur di- and trioxide. The intensity of pollution by this plant is ranked as high amongst all the urea fertilizer units in the country. A second (UFF) and third (PUFF) urea plant set up in 1968 and in 1985 with Japanese and Chinese assistance respectively have comparable technology. Both plants are clearly identifiable polluters the pollutant being same as the earlier plant, namely, BOD, Ph, ammonia, urea, alum sludge, oil and grease. However, in terms of intensity of pollution these two plants fall in the middle range. In spite of being of a later vintage, a Triple Super Phosphate Complex (TSPC) set up in 1970 in Chittagong is identified as the most pollution-intensive dangerous fertilizer plant in the country. The wastewater is loaded with flouride and sulphur. There are heavy emissions of sulphur di- and trioxide, flouride and nitrous oxide. The Chittagong Urea Factory set up in 1989 with Japanese assistance marked the beginning of high standard of process cleanliness. The plant internalizes environmental concerns to such an extent that effluent load of wastewater is very low and there is little need for "end-of-pipe" waste treatment.

Containing Pollution Impact of the Fertilizer Industry

It is recognized that the age and technology of NGFF preclude cleanup to a very high standard. The government has, therefore, settled for a modest first-level clean up effort. Earlier, effluents went directly into the Kushiara River. Now, there are two lagoons in which the effluent is diluted by adding the staff colony's wastewater and local spring water. In addition, acidic and alkaline injections are used to neutralize the Ph level. Some separation of oil and grease from the water has also been undertaken. Community pressure has also resulted in payment of some compensation and prior warnings before periodic cleaning operations discharge large quantities of ammonia and other pollutants in the river.

In the case of UFF and PUFF, there were strong community reaction to pollution and the qualitative response of the two plants were similar to NGFF.UFF has increased the number of employees working on pollution control. Both pay some local compensation for damage claims. Both plants share a first stage treatment lagoon to dilute the effluent with wastewater from their staff colonies. UFF employs urea hydrolysis, an ion exchange facility and an oil/grease separation plant. PUFF reduces the ammonia load in its effluent with a steam stripping method, and spreads a simple cloth barrier over the out-fall to capture some of the oil and grease. In the case of TSPC, however, little clean up efforts were undertaken in spite of strong community protests. The main reason being that the technical and human resource requirements for effective clean up in the facility was much more demanding. In part, it was also a management failure.

Textile Industry and Readymade Garments

Textiles is by far the most dominant manufacturing activity in Bangladesh. There is a pervasive presence of textiles across all size classes – large, medium, small and cottage industries. Textile industries have also been identified as the third major polluting industries in Bangladesh. Major pollutants in textile industries are wastewater containing alkali, chlorine dye, organic matters, detergents etc. Pollutants are particularly high in dyeing and printing activities. Pollution load of a typical composite textile mill in Bangladesh is BOD 500mg/l, COD 500 mg/l and total suspended solid 375 mg/l, while Bangladesh standards for such pollutants are 50 mg/l, 200 mg/l and 150 mg/l respectively.

Bulk of the textile industry of Bangladesh is, however, domestic market oriented and hence stringent textile related environmental conditions of developed countries are unlikely to have any significant impact on the polluting effects of Bangladeshi textile industries. Currently, less than 15 per cent of the fabric used in the export oriented readymade garments industry are met from domestic sources.

The readymade garments industry, however, faces strict regulation in the European market regarding dyes and chemicals used in the fabric. Germany particularly prohibits apparels containing AZO dyes. Given that, EU in general and Germany in particular is a major importer of Bangladesh's readymade garments, the RMG exporters are obliged to comply with these requirement. Since, Bangladesh imports bulk of dyes, chemicals and textiles that are used to feed its RMG industry, the stringent regulations of EU does not put her into particular cost disadvantage. Discussions with RMG exporters revealed that they see the myriad of environmental standards and regulations more as business irritant. Since testing facilities are not available domestically, the exporters have to procure from abroad certificates regarding absence of particular types of dyes and chemicals sometimes incurring certain amount of cost.

6.6. Migration of Dirty Industry to Bangladesh

One anticipated adverse effect of enhanced environmental standards is the possible relocation of polluting industries in countries where environmental measures are lower or weak. To what extent has this happened in Bangladesh?

It was noted in the earlier section that Bangladesh's export of shrimp grew at the fairly rapid rate 10 per cent per anum during the 1990s. The comparative advantage of Bangladesh in shrimp production is revealed by the fact that the share of Bangladesh in world export of shrimp increased from around 2 per cent in 1990 to nearly 4 per cent during late 1990s. This means that Bangladesh's export of shrimp grew at a higher rate than world export during this period. However, a major factor contributing to rapid growth of shrimp production in Bangladesh was the implementation of a World Bank/UNDP investment program of $30 million, which helped launch Bangladesh's shrimp export industry with infrastructure, technology and foreign advice. The government also came forward with a number of pro-active policies including amendments to the land-lease laws, subsidized credits and tax holiday. Thus, the rapid expansion of shrimp industry in Bangladesh during the 1990s was largely due to endogenous reasons and there is no

evidence to suggest that weaker environmental standards of Bangladesh contributed to this process in a major way.

The leather sector also does not seem to have been influenced by relocation of industries. Bangladesh's export of leather and leather goods increased at a modest annual rate of 4.1 per cent during 1990s. Compared to tannery, leather goods manufacturing is less dirty as the process and production method are less polluting. In 1990, leather goods constituted only 2 per cent of total export earnings from leather and leather goods. In 1999-00, this share rose to 8 per cent. Thus, expansion of the more dirty component of the leather sector has been rather low in Bangladesh during 1990s and hence deficient environmental standards does not seem to have resulted in relocation of leather industries in Bangladesh during this period.

Bangladesh's export of fertilizer increased at an annual compound rate of nearly 10 per cent during 1990s against the growth rate of 5 per cent in world export of fertilizer. However, since 1990-91, there has not been any new investment in the fertilizer industry in Bangladesh and the annual production of urea fertilizer oscillated between 1.5 and 2 million metric tons during this period. Thus, no relocation of fertilizer industry seems to have been prompted in Bangladesh during this period due to differences in environmental standards.

The spectacular growth of export oriented readymade garments and knitwear industries in Bangladesh during the '80s and the '90s was triggered by the relocation of the trade by international intermediaries faced with binding quota restrictions in their own country. At the same time, quick government support in the form of duty free imports, back-to-back LC facility, XPB benefit, duty relief on import of machinery etc helped significantly to create the needed incentive. The continuation of the protection provided by the country specific import quota, specially in the USA, under the Multifiber Agreement (MFA) and the facilities provided under the Generalized System of Preference (GSP) gave the main stimulus to the growth of this industry. Thus, the rapid growth of readymade garments and the various backward linkage industries including textiles in Bangladesh seems to have been the result of some special factors relating to world trade in these commodities rather than the impact of varying environmental standards.

6.7 Concluding Remarks

The evidence presented in this paper has shown that the environmental hazards of Bangladesh's exports are quite high. The review of four major export items, namely shrimp, leather, fertilizer and RMG, however, suggest that cost considerations are not the main reasons behind the current environment degrading features of these activities. Rather, lack of awareness and technical know-how, infrastructural deficiencies, management failures, inadequate enforcement of environment related laws, absence of supportive role of the state particularly in providing extension service, common effluent treatment plant etc are mainly responsible for the persistence of the environment related ills of these industries. Therefore, mere application of stringent international environmental standards is unlikely to be successful in bringing about an improvement in the basic malice. On the contrary, the evidence suggests that in spite of the impressive growth performance, the external sector of Bangladesh has remained extremely narrow and un-diversified both in terms of commodity composition and market orientation.

Bangladesh, therefore, remains highly vulnerable to unilateral imposition of trade restrictions on such non-trade grounds. Instead of punitive actions, there is need for technical and financial support from the developed importing countries for Bangladesh to overcome the structural constraints to export diversification in general and solving the environmental ills of her export industries in particular.

Appendix Table A1: Waste Water Discharge and BOD Loads

Industry	No. of units	No. of employees	Waste water discharge (m^3/day)	BOD load (kg/day)
Leather	196	16364	15800	17600
Textiles	502	67259	40000	26000
Pulp & Paper	5	8470	228000	40000
Fertilizer	7	6593	-	2087
Sugar	16	28000	30000	4000
Chemicals	100	9083	1350	1200
Pharmaceuticals	102	11560	3500	700
Metal works	84	5537	13800	-
Distilleries	4	288	1638	5720

Source: Government of Bangladesh /Asian Development Bank, "Industrial Pollution Control Management, Bangladesh Final Report, 1995

Appendix Table A2: Air/Pollution in Industrial/Commercial Areas in Bangladesh

(Micrograms per cubic meter of air)

Sites/Cities	SPM(PM10)	SO_2	NO_2
Dhaka (3 sample points)	570.00	312.00	54.70
Chittagong (4 sample points)	3194.00	12.98	16.18
Khulna (2 sample points)	371.63	12.65	283.01
Bogra (1 sample point)	547.00	-	-
Bangladesh Standard	400.00	100.00	100.00

Source: Department of Environment, Annual Report 1993-94

Appendix Table A3: Cost of End-of-Pipe Treatment Plants in selected Industries

Industry (Type of ETP)	Capital Cost	O&M Costs
Textiles (Waste water treatment)	2-3% of project cost	2-3% of profit
Fertilizer (Ammonia stripping)	3% of project cost	0.5-1% of running cost
Tannery (Chromium recovery)	Minimal	-
Bulk drug (Waste water treatment)	8% of project cost	3% of annual turnover

Source: Bhattacharya, D et al., "Industrial Growth and Pollution in Bangladesh: A Sectoral Analysis", (mimeo) 1995

7 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of Nepal

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7.1 Introduction

Nepal is predominantly a rural society with about 88 per cent of 23.35 million people living in the rural areas. The population growth rate is estimated at 2.37 per cent per annum with about 7.45, 44.66 and 47.88 per cent of the population living in the Mountains, Hills and the Terai respectively (MOPE, 1998). Based on the estimated population of 2001, the population density exceeds 330 persons/km^2 in the Terai while it is 170 persons/km^2 and only 34 persons/km^2 in the Hills and the Mountains respectively. Being basically an agriculture-based economy, annual per capita GDP is about USD 240 in the year 2000.

Although the global and regional economies have been improved, the pace of growth of the Nepalese economy has remained almost stand-still with signal positive development on some economic indicators. In 2000, the overall economic growth rate was estimated at 6 per cent accounting to about 5 per cent in the agriculture sector and 6.7 per cent in the non-agricultural sector as compared to the previous year (MOF, 2000). Expected domestic revenue collection was behind the target while the expenditure growth increased significantly. However, the total foreign trade has increased by about 33 per cent over the past year. Similarly, total export and import increased by about 42 and 29 per cent respectively and major share of import is from India. Despite the export growth surpassed import growth, the total trade deficit has increased by about 20 per cent in 2000 over 1999 due to bigger import base. Export of items including leather and hides decreased and combined percentage share of woollen carpets and ready-made garments is over 80 per cent of the export. Hence, there is a need for expanding export of high value-and low volume products to improve of balance of payments, and minimise trade deficit (MOF, 2000).

Nepal is facing two broad categories of environmental problems. The rural areas face the problems of soil erosion, landslide, flood, scarcity and unsafe drinking water, and low calorie intake, which are broadly associated with forest depletion and decline in agricultural production. The urban areas experience environmental pollution of varying magnitudes. At a broader perspective, Nepal's environmental issues can be categorised into three levels based on their urgency (MOPE, 2001). Among the first level (most urgent) issues are: forest depletion, land degradation, solid waste management, water, and air pollution. Among these issues, the first two issues reflect the rural problems, while the later three are more concerned with the urban environment. Similarly, in the second level are an additional eight issues (dwindling biodiversity, desertification, haphazard urbanisation, forest fire, groundwater depletion, glacial lake outburst flood event, food security, and alternative energy), which can be classified as moderately urgent from management point of view. In the third level are issues such as waning fisheries, decreasing biomass energy, transboundary movements of wastes, and noise pollution. These are also considered significant but less urgent in terms of implementing environmental prescriptions (UNEP, 2001).

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Poverty is one of the major factors for these problems. The incidence of poverty varies substantially, reflecting the wide variation in living costs. In the lowlands and hills around 42 per cent of the population live below the poverty line, while in the mountains, 57 per cent of the total population live below the poverty line.

Nepal is at infancy stage of industrial development. In urban and industrial areas, problem of solid waste management, and pollution of water and air are emerging. Management of municipal solid wastes is becoming a major challenge in the country. Many industries are discharging effluents without any treatment and most of them are located in the Terai, Nepal's low-lying southern belt. Out of the 4,271 industries established in 1991, about 40 per cent cause water pollution (Devkota and Neupane, 1994). About half of the total industrial units are located in the Kathmandu valley, the capital city. Studies indicated that about 72 per cent of the total water polluting industries are located in the Kathmandu valley. However, it comes to only 7 per cent of the total industrial effluent loads (Devkota and Neupane, 1994).

Some of the export materials having implication on environment include medicinal herbs, woollen goods, paper and paper products, hides and skins, carpets and textiles. Adoption of liberalised and open market policy, and also the processing for accessing to World Trade Organisation (WTO) has increased foreign trade in Nepal. The foreign trade deficit rose continuously till 1997 and is on the decrease due to expansion in exports and contraction in imports (MOF, 2000). The practice of linking trade and environment in Nepal is a recent understanding, and many industries lack information and skill to link their products with the environment.

In the recent years, Nepal has realised the importance of producing environment-friendly products in order to increase export, and has encouraged the production of the export items that meet the environmental standards of the importing countries. With this in background, the following chapters describe the current initiatives on imposing environmental standards through policy and legal measures to produce environment-friendly products which complies with the standards of the importing countries.

7.2 Export oriented environmentally sensitive products

Nepal's economy is mainly dependent on subsistence agriculture. Industrial development is at infantile stage. However, strict environmental standards set by the developed countries on certain products have resulted in disastrous impact on Nepal's main and limited export-oriented industries.

Nepal mainly exports two products-hand knitted woolen carpet and readymade garment to western countries where strict environmental standards are enforced. Carpet industry is the single largest source of much needed hard currency. Share of this product in the country's total exports was 61.5 percent in 1992/93.

Ready-made garment is the second important export-oriented commodity of Nepal. It, in some years, holds about 40 per cent share of the country's total exports. It's share in total exports has increased to 40 per cent in the year 1999/2000 from mere 18 per cent ten years back.

Both of these products are environmentally sensitive. Since the share of these two products in total export of Nepal is more than 80 percent Nepal's export-oriented industry is likely to be affected badly even if the exporting countries adopt strict environmental standards on two products only. Table 1 shows the contribution of these two products in Nepal's total export.

Table 1: Major environmentally sensitive products and their share in total exports

(in NRs. 000)

Year	Share of carpet	Share of garment
1990/91	50.11	18.2
1991/92	52.03	22.7
1992/93	61.5	24
1993/94	57.7	34.9
1994/95	53.9	30.04
1995/96	51.7	37.5
1996/97	53.8	33
1997/98	47.3	37.5
1998/99	44.8	36.8
1999/2000	37.4	39.8

Carpet

Nepal's carpet industry was once the fastest growing industry of Nepal. In the year 1991/92, earnings from carpet almost doubled compared to the previous year contributing to 52 per cent of total exports' earnings of Nepal. The progress continued in 1992/93 also. Carpet industry provided direct or indirect employment to about 300,000 people. But the same progress couldn't be achieved in the 1993/94 when the earnings from carpet begun declining. In the year 94/95 earnings from carpet went down by 19 per cent compared to 1993/94.

Nepal carpet faced both problems caused by environmental and human rights concerned groups. In 1992, Concern for Child Workers in Nepal (CWIN) published a report on child labour in Nepali carpet industry. The report said that about half of the laborers employed in the carpet industry were children. Nepali government and carpet industry said that the figure was exaggerated and the number of child labour in carpet manufacturing was insignificant. However, issue of child labour continued to appear in both Nepali and international media. In 1994, a television programme on child labour in Nepali carpet industry was broadcast by Germany, major carpet buyer of Nepal. As a result buyers begun boycotting Nepali carpet on human rights ground.

Another problem faced by carpet industry was water pollution. Carpet factories were (still are) mainly located in Kathmandu valley, most of them on the bank of the river Bagmati. The industry uses huge quantity of clean water for washing. It uses various chemicals for dying. Both of these practices pollute rivers. It was also alleged that the factory used water from the drinking water supply system which is much scarce in Kathmandu.

Impact of such human rights and environmental concerns in the buying countries had led the decline in the import of Nepali carpet.

Table 2: Export of Nepali carpet

Year	Quantity (Sq. mt.)	Value (in NRs) (000)	Percent change in value compared to previous year *
1990/91	1628318	3701992	61.33
1991/9	237451	7130928	92.6
1992/93	3126290	9525649	33.58
1992/94	3325123	9578055	-0.08
1994/95	1896090	7703760	-19
1995/96	2617645	8032233	4.3
1996/97	289225	9144635	13.85
1997/98	2447050	8516344	-6.9
1998/99	2582178	9927360	16.6
1999/2000	2623784	10404709	4.8

* The increment in the value is partially due to the devaluation of Nepali currency with other currencies.

Germany is the largest buyer of Nepali carpet. More than 80 per cent of the total exports was directed to Germany. The other important markets are the United States, Austria and Belgium. Strict environmental (restrictions on the use of ozodyes which had been widely used in Nepali carpets and environmentally unsound production process) and social standards (boycotting the product that uses child labour) set by Germany has far reaching consequence on Nepali carpet industry. Nepali carpet faced the problem of loss of orders and reduction in price in Germany. Nepal, for example, earns NRs. 4912 and NRs. 3677 per square metre from carpet exported to the United States and Germany respectively. Regarding Nepali carpet exported to the United States the industry has not faced the kind of problems they faced in European market especially Germany.

The major problems faced by the Nepali carpet industry are:

Nepali carpet industry used ozo dyes widely as it was cheap and easily available. There is no alternative dye locally available. At the beginning, they also faced the problems caused by lack of information on affect of dyes on health and their alternatives. Now they have begun to import less harmful dyes from Europe which are costly compared to ozo.

Lack of technical facilities: Nepal still doesn't have laboratory that can test dyes.

Producing child labour free carpet was another social problem. As child labour is cheap and easily available carpet factory is still using them. Even after the huge loss incurred because of the use of child labour only 8 per cent of the carpet export are certified child labour free by RUGMARK.

Readymade Garments

Readymade garments played an important role in Nepal's economy. Its importance is ever increasing. Its share in Nepal's total export has gone up about 40 per cent in the year

1999/2000 from 18 per cent ten years back. Table 3 shows it's increasing importance in Nepal export earnings.

Table 3: Readymade garment export of Nepal

Year	Quantity (piece)	Value (000 NRs.)	Share in total export (percent)
1990/91	12,487,592	13,543,572	18.2
1991/92	25,346,508	3112002	22.7
1992/93	22,785,186	3723448	24.0
1993/94	27,969,944	5414746	34.9
1994/95	33,505,181	5357029	30.04
1995/96	27,969,944		37.5
1996/97	29,953,917	6783025	33
1997/98	34,950,594	8154920	37.7
1998/99	37,748,724	11082558	36.8
1999/2000	46,836,446		39.8

With environmental awareness and consumer's rights movement demand for the safe readymade garments have been ever increasing in international market. Introduction of two eco-labels and ECO-Tex Standard - 100 are example of such awareness. However, Nepal's readymade garment export has not surprisingly been affected by this.

One of the reasons that Nepal's readymade garment industry has not been affected by the consumer awareness and strict environmental regulations is that biggest market of Nepal's readymade garment is the United States followed by France, United Kingdom. Germany, biggest market of Nepali carpet is in the fourth position in terms of the Nepali readymade garment export.

The condition set by the eco standards in international market such as pesticides free cotton, ban on the use of AZO dyes and other chemicals, environmentally sound production process are sure to affect Nepali industry. However, Nepal's readymade garment industry is not worried about this yet. Its major worry today is new import policy of the United States which provides Sub-Saharan Africa and Carribbean region quota-free access at a subsidised duty to the US market. This, Nepali industry fears, will increase their competitive strength.

Sooner or later Nepal's readymade garment industry will be affected by the eco-standards set by developed countries. It will be hit hardest compared to other South Asican countries since Nepal is totally dependent upon India and Pakistan for the raw materials. Nepal can't do anything to produce pesticides free cotton as cotton is not produced in that quantity. Nepal can't do anything to introduce environmentally sound technology in textile sector as this sector is not functioning in Nepal.

7.3 Policy initiative

The practice of linking trade and environment in Nepal is a recent understanding, and many industries lack information and skill to link their products with the environment.

In the recent years, Nepal has realised the importance of producing environment-friendly products in order to increase export, and has encouraged the production of the export items that meet the environmental standards of the importing countries. With this in background, the following chapters describe the current initiatives on imposing environmental standards through policy and legal measures to produce environment-friendly products which complies with the standards of the importing countries.

Since early 90s Nepal has formulated a number of policies in order to promote environmental conservation, produce environment-friendly product, and promote liberalised trade. Although, there is a tendency to formulate policies through sectoral approach, the following review indicates Nepal's initiatives in policy formulation, enactment of legislation, standards and guidelines including institutional strengthening in the field of environmental management and industrial development.

Policies

A separate long-term national policy on environment has yet to be formulated in Nepal. Environmental commitments have been made in the policies of the periodical plans and sectoral policies in order to make the activities environment-friendly.

The current Ninth Plan (1997-2002), with a single objective of poverty alleviation, includes a separate environment policy for the plan period. The Plan, as a whole, has prioritised five areas. They are: agriculture and forestry; water resources; human resources and social development; industrialisation, tourism development and international trade; and infrastructure development. The long-term objective for the environment is to achieve sustainability in resource conservation and utilization. The Plan recognizes poverty and unmet needs of the people as a challenge for environmental management (NPC, 1997). The Plan focuses, *inter alia*, on:

Community participation on resource management;
Continuing public awareness, and promoting participatory environmental assessment and environmental management;
Developing partnership among stakeholders;
Effective utilization of environment fund;
Preparation and implementation of management plans for pollution control by setting up of standards on water and air quality;
Reviewing national resources conservation legislation, and legal and procedural arrangement for the implementation of conventions ratified or accessed; and
Voluntary and compulsory compliance of pollution standards (air, water and land).

Sectoral policies focus, *inter alia*, on the conservation and promotion of environment-friendly technologies, development of clean production technologies, formulation of necessary legislation for an inspection system to ensure safe and clean working environment, formulation of a land use plan, assistance to local bodies for the conservation and sustainable use of local resources, and involvement of the private sector to utilize wastes as a resource (NPC, 1997).

In 1983, HMG, in collaboration with The World Conservation Union - IUCN, prepared a prospectus on a conservation strategy. An elaborated National Conservation Strategy (NCS) was prepared and implemented since 1988. NCS Implementation Project, within a decade, generated information on natural resources, and environmental pollution and assisted in internalising the environmental assessment system in development planning. It also assisted in introducing environmental education in formal education at school level.

In 1998, MOPE published "Environmental Strategies and Policies for Industry, Forestry and Water Resources Sectors" which emphasises the implementation of projects leading to the preparation of environmental standards, development of an integrated mechanism for environmental management at local level, and development of EA professionals. It emphasises the need for implementing, *inter alia*, energy efficiency system in industries (fossil fuels), waste exchange and waste minimization programs for industries, carpet waste treatment project, eco-labelling of products (MOPE/IUCN, 1998).

Nepal introduced the Industrial Policy in 1992 with the commitments of not nationalising the private industries, and encouraging the private sector in industrial establishments, and reiterating the mitigation of adverse environmental impacts during the establishment, expansion and diversification of industries.

The policy aims to increase the contribution of industrial sector in national economy through the enhancement of industrial production and productivity. The policy emphasises, *inter alia*, the need for developing industries by utilising the comparative advantage of the country, protecting industries through custom duties, accelerating the economic development through export of industrial goods, attracting foreign investments, and emphasising the transfer of advanced technology and efficient management.

The policy opens avenues for the establishment of the Environment and Industrial Pollution Control Unit in the Ministry of Industry to formulate policies, guidelines and standards to check and minimise the adverse effects of pollution due to industrial growth. Industries that are likely to affect the environment have been categorized and a license is required to establish industries affecting public health and environment[1] (MOI, 1992).

Furthermore, about 31 types of industries, including industries related to cotton and woollen, leather processing and leather goods producing, insecticides and pesticides, chemical fertilisers, hospital and nursing homes, are included in the national priority industries (Annex 1).

The industrial policy approaches to minimise industrial pollution by implementing environmental standards with the participation of private sector. The cleaner production technology has been promoted and the Plan emphasises to introduce pollution fee technology and technology transfer.

Laws

Since the 1980s, Nepal has incorporated environmental aspects in legislation related to natural resource management and pollution control. Various sectoral *Acts* contain "loose" provisions for the consideration of environmental aspects and almost all the legislation enacted before 1990 neither included comprehensive provisions nor were they implemented

within the framework of the regulations. However, the legislation enacted or amended after 1992 include provisions to encourage the government to frame and implement rules and guidelines on environment. Such provisions are scattered and are made on sectoral interests. Though the preamble sounds good, a number of laws (*Acts* and Rules) are unclear on the intentions and levels of environmental improvement that are to be attained.

The Constitution of the Kingdom of Nepal 1990 mentions the need for conserving the environment. The Directive Principle states that "*The State shall give priority to the protection of the environment of the country and also prevent damage due to physical development activities by making people conscious of the environmental cleanliness, and by making special arrangement for the protection of rare species, forest and vegetation*" [Article 26(4)] (MLJ, 1990). Furthermore, the State shall adopt a policy for attracting foreign investment and technologies in order to promote national development [Article 26 (12)]. This provision provides sufficient backups for the inclusion of environment-friendly provisions in the legislation.

Environment protection laws, industrial enterprises, foreign investment and technology transfer and custom laws are related to the present study and this sub-section documents major legal provision, which promote or regulates export and import of products.

Environmental Laws

Nepal enacted umbrella legislation, the *Environment Protection Act* (EPA) in 1996 in order to maintain the clean and healthy environment by minimising adverse environmental impacts on human beings and other life forms, and physical objects taking into consideration the concept of sustainable development and economic development. The *Environment Protection Rules* (EPR), 1997, enforced thereafter, elaborate the legislative provision to meet the above objectives. The environmental legislation provides a basis to institutionalise environmental assessment system at the project level, prevent and control pollution particularly the industrial pollution by mobilising the environmental inspectors, protect natural heritage, maintain environment protection areas, establish and/or accredit laboratories, and provide a basis for compensation.

The legislation also provides a basis to establish and operate Environment Protection Fund, constitute Environment Protection Council for policy guidance, co-ordination, providing suggestion to the government on the environmental matters. The most important provision of the legislation to minimise pollution control is the provision for additional concession and facility.[4] Furthermore, the legislation empowers the government to frame guidelines and rules in, inter alia, areas of sources, standards, prevention and control of pollution (water, air, noise and soil pollution), management and transportation etc. of waste and other necessary matters (MOPE, 1997).

The environmental law provides the government an opportunity to formulate and implement necessary standards, guidelines and procedures for the control of pollution and promote the trade of environment-friendly products.

Nepal has enforced the Industrial Enterprises Act in 1992, within the framework of the industrial policy of 1992, with a view to fostering industrial enterprises in a competitive manner through productivity increment. The Act obliges the proponent to get permission for the establishment, expansion and operation of industries that affect the health and the environment. The Act has also listed a number of national priority industries (Annex 1). Of these industries, the sugar, leather, textile, paper, pesticide, chemical fertilize etc. industries contain pollutants in the effluents and may degrade the environment during production process.

The Export Import (Control) Act, 1957 was enacted with a view to regulate and control the export and import of any products. The Custom Act, 1963 (several amendments) regulates exports and imports of various products. The products, which can be imported or exported, are included in the Financial Act, enacted every year. The custom rate varies each year and the export and import of items are related through the financial legislation.

The Financial Act 2000 provides tax incentive equivalent to two years cost of the total cost to industries installing pollution control equipment (facilities) as per the recommendation of the official of the Department of Industry. The legislation exempts VAT for energy producing equipment through biogas, solar and wind energy through the recommendation of the Alternative Energy Promotion Centre. Import of gas operated three wheeler vehicles obtains about 50 per cent less in custom tax, and custom tax exemption has been introduced for the import of catalytic converter for vehicles in order to minimise vehicular pollution (MOF, 2000). Similarly, individuals, institutions or commercial firms willing to import old clothes, metals and plastic made old goods and equipment should get prior approval from the Ministry of Population and Environment. The Act also provides the government an opportunity to introduce pollution control tax (@ Rs. 0.5/liter of petrol and diesel) sold in the Kathmandu Valley by gazette notification. This amount will be deposited by establishing a separate fund and will be used for pollution control activities.

The basic consideration in Nepal's legal regime is to punish the individual if s/he violates the rules and regulations. When government activities damage the environment, it is very unclear how the legislation will be implemented, and how a government agency which has the legal power to enforce these regulations enforces the legal provisions to punish the violators, her development partner. This may be one of the reasons that the legislation has not been enforced to the desired extent. Another reason may be a lack of inadequate instruments such as guidelines, standards, norms, procedures, etc. to enforce the legislation (Uprety et. al, 1999). Furthermore, various instruments including fiscal and incentives measures could encourage the industries to produce environment-friendly items for export and domestic consumption. In other words, facilitating instruments are inadequate and the existing legal regime is rather based on command-and-control principle.

Environmental Standards

Setting up of environmental standards is a recent phenomenon in Nepal. Prior to the enforcement of the legal regime on environment, Nepal introduced the tolerance limit for industrial effluents, which are similar to the other countries of Asia (Annex 2). These are non-legally binding standards and industries were encouraged for voluntary compliance.

Industrial Effluents: Recently, the government has released a generic standard for industrial effluents and industry specific standards for paper and pulp, vegetable ghee and oil, fermentation, wool processing, and tanning industries (Annex 4). The generic standard is similar to Annex 2 non-legally binding standard and the industry specific standards are based on the generic standards. It is hoped that these standards will help in minimising industrial pollution during the production of the export items.

There are no regulatory mechanisms to regulate the import of products, which do not meet the environmental standards. Based on legal regime on products, the industrial products have to meet the quality standards to get the product symbol from the Department of Standards and Metrology. However, these trademarks are not related with the environmental quality maintained during the production of products both for export and domestic consumption.

In Nepal, ISO 9000 has been initiated in few industries. Some distilleries have operated effluent treatment facilities as per the standards of the collaborating foreign industries. In the past, Nepal also encouraged through administrative instructions to operate the effluent treatment facilities for selected industries without issuing the environmental standards. In this case, industries felt difficulty on what to meet (the standards), and they did not give much emphasis on this aspect.

Import Restriction on and Phase Out of ODS: Although the Industrial Enterprises Act, 1992 encourages to importing raw materials, Nepal has recently implemented *Ozone Depleting Substances (ODS) Consumption (Control) Rules, 2001* as per Section 24 of the *Environment Protection Act, 1996* in order to phase out the consumption of ODS as a Party to the Vienna Convention for the Protection of the Ozone Layer, 1985 and Montreal on Substances that Deplete the Ozone Layer, 1987. Under the Rules, the substances that could be consumed, sold or distributed within the country have been issued (Annex 5), and the government has prescribed the annual consumption, import quantity and phase out rate.

The import of ODS shall be based on the import license and re-export of such substances shall not be allowed.

Pesticides: In accordance with the provisions of the *Pesticide Act 1991*, HMG has registered 168 types of insecticides, 55 fungicides, 21 herbicides, and 8 acaricides (MOAC, 2001). These agro-chemicals contain concentration, formulation and are linked with WHO class. These standards are applicable to both exported and imported agro-chemicals. Furthermore, government has banned the import and use of 12 pesticides considering them as the persistent organic pollutants. They are: chlordane, DDT, dieldrin, endrin, aldrin, heptachlor, mirex, toxaphene, BHC, lindane, phosphamidon, and organic mercury chloride.

Environmental Guidelines

In order to assess the likely impacts of the pollution prone industries, and avoid or minimise industrial pollution, government has issued a list of proposals (projects), which require environmental assessment (EA), either Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA). Nepal has introduced EA as a planning and management tool. Environmental assessment is carried out to the prescribed proposals (Annex 6) in order to assess the potential environmental impacts, examine the significance of

the environmental implications, recommend environmental protection measures (preventive, compensatory or curative measures) for each adverse impact identified, predicted or evaluated and provide adequate information to the decision-makers (MOPE, 1997). Such assessment has encouraged the proponents to minimise industrial pollution load while producing the exportable items as well.

7.4 Institutional Frameworks

In order mainstreaming implementation of environment-friendly programmes, Nepal has established and/or strengthened environmental institutions. The sectoral institutions also include environmental responsibilities to minimise adverse impacts of their activities on the environment.

7.4.1 Environmental Authorities

Parliamentary Committee: A Parliamentary Committee on Natural Resources and Environment was set-up to discuss the bill, prepare annual report on the implementation status of government policies and programs. The Committee provides inputs in law-making (new legislation and amendment of existing legislation), budget speech, ratification of treaties and affiliation with international institutions. This Committee looks after the policies, laws, programs and activities of the *environment, forests, soil conservation, industry, housing and physical planning* sectors.

Advisory Bodies: Government has established the *Environment Protection Council* (EPC), an advisory bodies on environment, industry and trade related issues. The National Planning Commission is the principal policy advisory body with the mandate of preparing overall development plans and programs. The Commission also conducts monitoring and evaluation of environmental and trade related issues.

The EPC chaired by the Prime Minister comprises of ministers, representatives of the concerned agencies, recognised political parties, private sector, environmental experts. It provides policy guidance and suggestion to the government with regard to environment protection and ensures co-ordination amongst different agencies.

Similarly, the government has constituted a *Board of Trade* at the Ministerial level with representation from the private sector in order to streamline foreign trade, sort-out problems encountered, co-ordinate related agencies, and bring necessary reforms to enhance trade.

Policy Making Bodies: Two ministries, the Ministry of Population and Environment (MOPE), and the Ministry of Industry, Commerce and Supply (MOICS) are directly related to the promotion of environmental protection, and industrial development and trade respectively. MOPE, established in September 1995, is responsible for the formulation and implementation of policies, plans and programs; conduct study, research, survey, training; development of human resources; acting as a focal/contact point for national and international organisations; pollution control, environmental conservation and balance; and regular and periodical monitoring and evaluation of activities implemented by other organisations in the domain of the environment.

MOPE is also responsible for assisting partners in integrating environmental aspects in sectoral policies and programmes and implementing environmental standards. In the field of environment, MOPE's Environment Division is mandated to institutionalise environmental assessment system, minimise pollution through the implementation of environmental standards, develop procedures for providing additional incentives, and also develop procedures for compensation.

The Ministry of Industry, Commerce and Supply (the independent ministries of commerce, and supply were merged with industry recently) has four divisions relevant to this study. They are: Foreign Investment and Industrial Promotion Division, World Trade Organisation Division, Import Promotion and Trade Division, and Technology and Environment Division. The last division is responsible to assist in the formulation of policy, plan and programmes in order to develop and improve technologies, and promote their transfer, minimise adverse impacts on the environment through technology development and promotion, and promote the production of environment-friendly products. This division has two sections - Technology Development, Improvement and Transfer Section, and Environment Conservation and Environment-friendly Products Section.

Implementing Agencies: Environmental policies and programmes are translated into action through existing government and private organisations. At the government level, MOPE has no implementation arm at the departmental and field levels while the Ministry of Industry, Commerce and Supplies has a good network of institutional bases and implements its activities particularly through the Department of Industry (DOI), and the Department of Commerce. The former department has approached to institutionalise the environmental administration through institutional effort. Before awarding the license, DOI's Environment Section reviews projects on environmental ground and pollution control point of view, provides opinion on the adequacy of environmental studies and pollution control facilities, determine the amount to be deducted from the taxable amount (tax is exempted for about 50 per cent of the total investment for pollution control equipment), supervise site, and process for pollution control. The Foreign Investment Section processes all activities related to attracting such investment. On the other hand, the Department of Standards and Metrology is mandated for quality assurance, assessment and monitoring of industrial pollution.

Furthermore, the Trade Promotion Organisation, a joint venture of government and private sectors, has also been instrumental in providing necessary services, information and in conducting promotional activities for export promotion and import management.

7.4.2 Trade Facilitating Organisations

Issues on industrial pollution control and trade of quality products have been repeatedly raised in the recent past. As the developed countries started banning of the low quality carpet and garment products, the government and private sectors started to take into account the environmental aspects. The Federation of Nepalese Chambers of Commerce and Industry (FNCCI), commodity-based organisation (carpet, leather, and garment associations etc.) and country-based organisation have particularly made efforts to minimise industrial pollution and produce quality products so as to compete in the international market.

Established in 1965, FNCCI as an umbrella organization of the Nepalese private sector, provides, *inter alia*, information, advisory, consultative, promotional and representative

services to business community. FNCCI is represented in almost all national policy advisory bodies concerned with business and industry.

FNCCI acts as a catalyst for business and industrial development in the country, reinforce business community's commitment to the society, provide advisory services to government in the formulation and execution of business and industry related policies, acts and programmes proactively, and create awareness and support for environment, business and industry's effort on quality, environment and industrial relation. It has over 45 commodity/sectoral associations including committees on export promotion, foreign investment promotion, and environment.

FNCCI has recently established an *Environment Cell* in its Secretariat with the assistance of DANIDA. The Cell will provide necessary information to the industrialists and business community including people at large on environmental matters, identify problems and provide recommendations for the effective implementation of the existing legal regime on the environment.

In order to ensure export of quality products, the chambers of commerce and industries have also been constituted at bilateral level. These institutions bring the industrialists and the business community closer, discuss the level of quality of the exportable products, and promote exports. For example, Nepal-Germany Chamber of Commerce and Industry is actively involved in sharing environmental requirements of the products, market potentials and sorting out trade barriers.

At commodity level, a number of associations such as Carpet Association, Leather Tanning Association, Tea Producers' Association etc. are working to foster promotional and export activities in the respective fields. These associations are active to knock the government in order to minimise difficulties during import of raw materials, particularly for garment, and export of leather and tea products.

7.4.3 Civil Society

A number of non-governmental and professional organisations have been established to create public awareness on the importance of environmental conservation, and encourage the industrialists to manage their wastes in order to prevent or minimise likely impacts on the environment. Some NGOs are involved in recycling wastes, encouraging for reducing, reusing and recycling wastes in the industries and introducing occupational health and safety measures.

Recently, consumer associations are also involved in encouraging the industrialists to produce and sell quality products. However, consumers have low purchasing power and they are not rather ignorant on the quality of products.

7.5 Migrated industry

Here, efforts have been made to find out whether dirty industries have been migrated to Nepal to take advantage of low environmental standards. To determine this data on joint venture (foreign investment) industries are analysed.

a. Industries under operation

There are . joint venture industries with foreign investment operating in Nepal. However, the developed countries with strict environmental standards (USA, Germany, Australia, UK and Canada) have invested in only 250 industries. The largest sector that attracted foreign investment from developed countries is tourism where about 42 joint ventures under operation. This is followed by readymade garment and health and herbal products (Aurvedic products).

Tourism, the largest sector that attracted foreign investment doesn't have anything to do with strict environmental standards set by the developed countries. They have been lured by Nepal's prospect in tourism sector not the weak environmental standards.

Another important sector is readymade garment. There are nine ventures in operation under the joint venture with developed countries. This sector has of course directly related to environmental standards set in the developed countries. However, it can't be said that they have migrated to Nepal to avoid strict environmental standards in their home country because the market for their product is not Nepal. They aimed at importing their products to developed countries. They have been attracted by the fact that Nepali readymade garment had in the past enjoyed special quota in the US market.

The other sectors that attracted investment from developed countries with strict environmental standards are health service, soft drink, tobacco, education, natural/herbal products, carpets etc.

b. Industries under construction

There are about 46 industries with foreign investment under construction. Even in this category tourism ranked the first with 12 industries followed by food and beverages, carpet, health service.

c. Industries licensed

Of total 132 licensed industries heighest number is scored by tourism (20) followed by readymade garment (2), carpet (2) and food and beverage (3) and Aurvedic product (3).

d. Approved

Here again heighed number (20 out of total 138) of approved industries are related with tourism. This is followed by readymade garment (6) and carpet (1) education (1) etc.

The the new sectors that have attracted foreign investments are hudropower, computer software, gift item, natural products (herbal medicine, organic food), vehicle workshops, electric vehicles, tobacco etc.

The attractions for foreign investment in these sectors might be good prospects for such investment. For examples, Nepal's emerging mid-class consumer sensitive to their health and education, availability of raw materials for (natural/Aurvedic products), liberal trade and

transit treaty with India that allows easier access to Nepali products in huge Indian market and need of latest technology in Nepali industrial sector (in readymade garment and carpet).

7.6 External assistance to mitigate environmental problems faced by export oriented industries

In order to implement the above policies and strategies, projects related to the technology transfer and development, establishment of technological park, productivity promotion, and industrial pollution control are being implemented. Some environmental and industrial pollution control projects have been implemented and they have generated information on the status of pollution and approaches required to make the projects environment-friendly. In this context, The World Conservation Union - IUCN Nepal initiated the *Demonstration of Cleaner Technology in Nepal's Carpet Industry* was initiated in 1997. MOPE implemented an *Institutional Strengthening of MOPE* assisted by the Asian Development Bank and carried out by the Resources Futures International in association with IUCN Nepal. This Project produced an Integrated Environmental Management Initiatives in a Pollution Prone Zone (PPZ) in Nepal by integrating economic instruments (economic incentives) in the existing command-and-control approach. The study categorised the polluting industries such as vegetable and animals oils and fats, sugar, distilleries and breweries, carpet and rugs, leather and tanning, pulp and paper, paints, pharmaceuticals, etc. in terms of effluent loads and characteristic of pollutants. It has proposed to introduce environmental standards, pollution fees, issue environmental compliance licenses, enforce sanctions, operate waste exchange and deposit-refund programs, waste fees, and discharge standards (MOPE/ADB/HBS/ RFI/IUCN, 1999). The Project also produced modus operandi for setting pollution standards and monitoring, and quality assurance related reports.

For minimising industrial pollution, Nepal completed *Industrial Energy Efficiency Improvement Project* in April 1998, which introduced industrial audits, hotel lighting audits and improved electrical-based management. The Asia Foundation administered the *Business Environmental Partnership Program* and provided USD 141,000 to five NGOs for:

Source Reduction in the Sugar Industry - a partnership between the Forum for Protection of Public Interest and Sri Ram Sugar Mills Ltd.
Waste Minimisation in the Paper Industry - a partnership between Save the Environment Foundation and Get Paper Industry.
Reduction of Pollution and Waste in Cement Factories - a partnership between the Environment and Public Health Organisation and Himal Cement Company Ltd.
Pollution Prevention in the Carpet Industry - a partnership between the Institute for Legal Research and Resources and Formation Carpet Industry.
Waste Minimisation in Motor Workshops - a partnership between Clean Wheels Nepal and nine automobile workshops in Kathmandu.

These activities have made notable progress in documenting industrial processes, quantifying effluents and their environmental impact, raising public and private sectors awareness on industrial pollution and identifying low cost options to reduce waste and conserve production resources. This is the first partnership programme between NGOs and the private business sector in Nepal focussed on waste and pollution reduction.

Similarly, UNDP funded a project on "Pollution Control in Tanning Industry". Under the bilateral agreement between HMG and FINIDA, a project on "Local Administration and Municipalities in Environment Management" will be implemented to develop local capabilities on eco-labelling of export products. GTZ has continued its assistance to local municipalities through its "Urban Development through Local Effort" in order to improve water supply and sanitation and develop human resources. The Canadian International Development Agency (CIDA) is funding *Collaborative Environmental Management and Assessment Project* (CEMAP) with the objectives of starting a formal inter-agency process to strengthen MOPE, and local authorities such as District Development Committees and Village Development Committees: Similarly, ILO has supported the Ministry of Labour in 1996 to develop the Occupational Health and Safety (OHS) centre, and to promote safety and health working conditions for labourers. USAID funded a study to explore possibilities for relocation of the carpet industries outside the Kathmandu Valley.

Some projects implemented since the yearly 1990s in response to environmental/industrial pollution problems including on Nepalese carpet products are presented in Table 2. Prior to 1990, Nepal has not implemented projects that contribute to minimise industrial pollution and improve products quality.

Table 2 Relevant Projects for Industrial Pollution Control and Quality Control of Products

S.N.	Name of Project	Donor	Amount (USD mill)	Status *Commencement*	Status *Completion*	Remark
1	Strengthening of EIA Guidelines at Inter-ministerial level (TA)	ADB	0.5	1994	1995	Sectoral EIA guidelines developed and coordination improved
2	Nepal Environmental Policy and Action Plan (NEPAP)	World Bank	0.03	Jan. 1993	Aug. 1993	Proposal for policy formulation
3	Applicability of Indian Cleaner Process	World Bank	NA		1995	
4	Study on Pollution Problem in the Carpet Industry	DANIDA	0.03	1994	1995	Problems identified & recommendation proposed
5	Hazardous Waste Management: Policies, Legislation, Strategic Planning	FINNIDA	0.15	1992	1994	Need for hazardous waste management Realised
6	Relocation of Carpet Industries in Kathmandu Valley	IRIS	NA		1994	Relocation of carpet industries proposed
7	Study on Medium and Large Scale Industries in Kathmandu Valley	DOI	NA	1994	1994	Study level
8	Effluent Treatment Plan in Balaju Industrial District	IUCN	NA		1991	Study level

S.N.	Name of Project	Donor	Amount (USD mill)	Status *Commencement*	*Completion*	Remark
9	Industrial Pollution Control Management Project	UNDP	0.67	1996		Promoted to internalise environmental aspects in industries
10	Formulation of Industrial Pollution Regulation	ADB	0.14	1993	1996	Rules drafted and major provisions incorporated in EPR, 1997
11	Industrial Pollution Control Management Project	UNDP	0.980	1993	1998	
12	Establishment of Model and Demonstration Tannery Effluent Facilities	UNIDO	0.735	1994	1995	Studied and designed
13	Pollution Prevention	DANIDA	0.827	1995	1997	
14	Municipal Infrastructure Improvement Project in Kathmandu Metropolis	ADB		1999		Improving sanitation and environment, local planning etc.
15	Assistance in Pollution Control in the Tanning Industry in South East Asia	UNIDO	4.375	1994	1998	
16	Environment Sector Program Support	DANIDA		1999	2004	Pollution control

Source: Various project documents

The Industrial Pollution Control Management (IPCM) Project, implemented by the Ministry of Industry with the assistance of UNDP/UNIDO, was instrumental in developing human resources, and making realisation of the need for industrial pollution control both in public and private sector decision-making. The project contributed, *inter alia*, in:

institutionalising cleaner production;
establishing environmental sections in the Ministry of Industry and its departments;
establishing environmental management system in the selected industries;
enhancing capabilities of environmental service companies in the private sector and environmental authorities of the public sector;
providing reasonable and legitimate incentives to industries in bearing environmental protection costs;
raising environmental awareness, particularly in industrial pollution control;
managing information and data;
developing industry specific discharge and emission standards for voluntary compliance; and
launching waste exchange program.

In this context, The Industrial Pollution Control project approaches to set effluent standards, conduct initial environmental examination (IEE) or environmental impact assessment (EIA), issue pollution control certificate, and promote cleaner production technologies in the existing and new industries.

This project led to the development and implementation of the Environment Sector Support Program with the assistance of the Danish Government (DANIDA) and this project has been implemented since September 1999 until September 2004 with the objectives of strengthening the overall environmental management of the so-called "brown sector" (industrial and urban environment) through enhanced co-ordination between line ministries, government institutions and the private sector. Under this Programme, an Institute of Environmental Management (IEM) has been established to develop human resources, particularly in creating public awareness on private sector and technical capabilities of environmental authorities.

The Cleaner Production (CP) component is currently working with more than 50 industries with the objectives of introducing cleaner production techniques to enhance productivity and reducing pollution loads. The provision for Cleaner Production Fund (CPF) to provide soft loan to industries for the implementation of CP options is attracting the private sector to implement compliance plan for pollution control in the spirit of the *Environment Protection Rules, 1997*. The results from the CP activities in Hetauda Industrial District, where all 34 operative industries have participated, have shown that the overall production cost can be reduced with up to 33 % in some cases. The average potential savings of energy will be 30 % or a total of 8,000,000 kWh per year for the whole district. The average water savings will amount to 40 % per year and 70 %, if the Hetauda Textile Mill is included. Many industries have saved raw materials, some of

them up to 20 %. The results show that CP is a very strong and effective business tool (Malinovsky, 2001). Savings of raw materials, energy and chemicals through cleaner production activities in the pulp and paper sector will account for at least 80 million Rupees per year. In the carpet sector, which has recently decided to work with cleaner production, savings of at least 15 million Rupees per year are expected.

The ESPS component 3, the demonstration of common Wastewater Treatment in Hetauda Industrial District, will demonstrate that the industry can benefit economically and environmentally by operating a common wastewater treatment plants instead of establishing individual treatment at their own premises and help in complying with the recently gazetted mandatory standards for industrial wastewater. Under this scheme, the project will be responsible for construction and equipment cost while industries will bear the operational cost of the combined effluent treatment facilities. This will likely reduce the treatment cost for individual industries and will provide a model for developing treatment facilities at public-private sector.

The ESPS component 4, Institutional Strengthening of Environmental Authorities is assisting human resource development of the Ministry of Population and Environment (MOPE), Ministry of Industry, Commerce and Supplies (MOICS), and Ministry of Labour and Transport (MOLT). The component has also supported the strengthening of the private stakeholders e.g. by giving support to the establishment of environmental cells at FNCCI and some of its branch offices. Promotion of Environmental Management Systems has been initiated in the Nepalese industry with the expectation that some of the industries will be able to obtain an ISO 14001 certificate in 2001. These activities will through increased energy efficiency and other cleaner production measures contribute to a reduction of the air pollution originating from the brick kilns of the valley.

The fifth component, the Air quality Management of Kathmandu Valley, has recently been signed between HMG and DANIDA to reduce air pollution originating from the vehicles in Kathmandu Valley. This component will strengthen electrical vehicles (EVs) and other clean vehicles, improve vehicle fuel quality, prepare vehicle emission standards, establish efficient vehicle emission control and enforcement procedures, establish ambient air quality monitoring in Kathmandu, launch awareness campaign on air pollution, and establish a vehicle engine emission and maintenance program to reduce hazardous emissions from petrol and diesel vehicles. This project is expected to establish a national environmental data bank and information system in the environmental authorities, and provide incentives for industrialists and business community in a move to minimise pollution load and produce environment-friendly products.

Realising the stricter environmental standards for consumer products in the European and North American countries, and banning on the import of Nepal's textiles and leather goods using azo dyes and low quality woollen carpets, ready-made garments, and handicrafts in Germany and Nordic countries, HMG with the financial assistance of the Government of Finland has launched a three-year project named "Environmental Labelling for Export Industries in Nepal" (September 1999 to August 2003). The Project aims to assist the Nepalese industries to achieve and demonstrate the level of

environmental friendliness required by the International and Domestic Environmental Labelling schemes. The Project will develop capacity on the utilisation of international environmental labels, design and establish environmental labelling schemes for prioritised Nepalese export product groups, and strengthen the capacities of accredited private laboratories to conduct product quality testing and environmental analysis, and also strengthen the capacity of the Nepal Bureau of Standards and Metrology (NBSM) laboratory to act as an accreditation, training, control and verification laboratory for environmental labelling. The Project also aims to create institutional set up in the government and private sector for verification and certification of industrial products in the spirit of the legal regime on the environment, particularly on providing eco-labels to environment-friendly products. The Project will also assist the committed companies in environmental audits and raw material inventories, and prepare and implement support service for action plans free of charge, while certification and testing fees should be paid by the companies.

In spite of these initiatives in the recent past, the pollution load has not been decreased and the consumer products are not free from pollution. Production of pollution free export items is not only handicapped by the lack of appropriate environmental quality standards but also due to lack of awareness on the business community. Also promoters do not know the environmental requirements of the importing countries, and technologies available to minimise pollution. Furthermore, promoters also feel that pollution control and production of quality products increase production costs, and hence difficult to compete in the international market. In this context, these initiatives are patchy, undermines the quality of products and also the occupational health and safety measures. In order to ensure the production of quality products and earn foreign exchange from export, Nepal has yet to develop and enforce environmental standards and product standards considering that of the importing countries, explore and minimise trade barriers and protect local industries through additional incentives. These initiatives will likely encourage the industrialists and business communities to produce environment-friendly products and develop a feeling of social responsibility.

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Annex 1

National Priority Industries

SN	Category of Industries	SN	Category of Industries
1	Modern sugar and khandsari mills	2	Modern oil mills processing local oil-seeds
3	Integrated diary (including animal husbandary)	4	Fruit and vegetable seed production
5	Tea and coffee farming and processing	6	Fruit processing
7	Herbs farming and processing	8	Baby food and hygienic food processing
9	Cotton, wood, silk and textile based thereon	10	Leather processing and leather good producing
11	Commercial and professional tools and equipment	12	Slate, stone and concrete blocks
13	Paper (writing, printing and news print)	14	Education materials and stationeries
15	Pharmaceutical	16	Medical equipment and tools
17	Engineering including agricultural and industrial tools and equipment processing	18	Pesticide
19	Chemical fertilizer producing	20	Industry manufacturing fuel saving devices
21	Industry manufacturing pollution control devices	22	Solid waste or waste product processing
23	Hydropower generation and distribution	24	Hotel, resort
25	Road, bridge, tunnel, ropeway, flying bridge railway, trolley, bus and office, and residential complex etc.	26	Mineral-based
27	Caustic soda, chlorine, aluminium smelter etc. using electricity as its main component	28	Hospital, nursing home
29	Computer software	30	Export-oriented agro-based
31	Precision goods		

Source: The Industrial Enterprises Act, 1992.

Annex 2

Tolerance Limit for Industrial Effluents Discharged into Inland Surface Waters

SN	Characteristics	Unit	Tolerance Limit
1	Total Suspended Solids (TSP)	mg/l	30 - 200
2	Particle size of TSP		Shall pass 850 micron shieve
3	pH		5.5 - 9.0
4	Temperature		Shall not exceed 40^0C in any section of the stream within 15m downstream from the effluent outlet.
5	Biological Oxygen Demand for 5 days at 20^0C	mg/l	30 -200
6	Oils and grease (maximum)	mg/l	10
7	Phenolic compounds (maximum)	mg/l	1.0
8	Cyanides (as CN) (maximum)	mg/l	0.2
9	Sulphides (as S) (maximum)	mg/l	2.0
10	Radioactive materials		
	a) Alpha emitters (maximum)	c/ml	10^{-7}
	b) Beta emitters (maximum)	c/ml	10^{-8}
11	Insecticides		Absent
12	Total Residual Chlorine	mg/l	1.0
	Fluorides (as F) (maximum)	mg/l	2.0
	Arsenic (as As) (maximum)	mg/l	0.2
	Cadmium (as Cd) (maximum)	mg/l	2.0
	Hexavalent Chromium (as Cr) (maximum)	mg/l	0.1
	Copper (as Cu) (maximum)	mg/l	3.0
	Lead (as Pb) (maximum)	mg/l	0.1
	Mercury (as Hg) (maximum)	mg/l	0.01
	Nickel (as Ni) (maximum)	mg/l	3.0
	Selenium (as Se) (maximum)	mg/l	0.05
	Zinc (as Zn) (maximum)	mg/l	5.0
	Ammonical Nitrogen (maximum)	mg/l	50
	Chemical Oxygen Demand (maximum)	mg/l	250
	Silver (maximum)	mg/l	0.1

Source : MOI, 1991. *Nepal Standards, 229-2047*. Ministry of Industry, Nepal Bureau of Standards, Kathmandu.

Annex 3

Nepal Vehicle Mass Emission Standard, 2056 (1999)

A. Vehicles Fueled with Gasoline (Positive Ignition Engines)

1 For Passenger Cars with Up To Six Seats and Gross Vehicle Weight (GVW) less than 2.5 tons

1.1 Type 1 Test - verifying exhaust emissions after a cold start

	grams per kilometre	
	Carbon monoxide (CO)	Hydrocarbons plus oxides of Nitrogen (HC + NOx)
Type Approval*	2.72	0.97
Conformity of Production**	3.16	1.13

Note: The test shall be as per the Driving Cycle adopted by different countries, with cold start on Chassis Dynamometer.

1.2 Type II Test - carbon monoxide emission at idling speed

This test applies to vehicles fueled with leaded gasoline only.

The carbon monoxide content by volume of the exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

1.3 Type III Test - verifying emissions of crankcase gases

The crankcase ventilation system must not permit the emission of any of the crankcase gases into the atmosphere.

1.4 Type IV Test - determination of evaporative emission

This test applies to all vehicles fueled with leaded and unleaded gasoline.

Evaporative emissions shall be less than 2 g/test.

1.5 Type V Test - durability of pollution control devices

This test applies to vehicles fueled with unleaded gasoline only.

The test represents an endurance test of 80,000 kilometer driven on the road or on a chassis dynamometer.

Not withstanding the above requirements, a manufacturer may choose to use the deterioration factors from the following table.

Deterioration Factors	
CO	HC+NOx
1.2	1.2

2 For Light-Duty Commercial Vehicles with Gross Vehicle Weight (GVW) less than or equal to 3.5 tons

2.1 Type 1 Test - verifying exhaust emissions after a cold start

Reference Mass *grams per kilometre*

(kg)		Carbon monoxide (CO)	Hydrocarbons plus oxides of Nitrogen (HC + NOx)	
RM < 1250	Type Approval	2.72	0.97	
	Conformity of production		3.16	1.13
1250<RM<1700	Type Approval	5.17	1.4	
	Conformity of production		6.0	1.6
RM >1700	Type Approval	6.9	1.7	
	Conformity of Production		8.0	2.0

Note: The test shall be as per the Driving Cycle adopted by different countries, with cold start on Chassis Dynamometer.

Reference mass means the "unladen mass" (mass of the vehicle in running order without crew, passengers or load, but with the fuel tank full and the usual set of tools and spare wheel on board, when applicable) of the vehicle increased by a uniform figure of 100 kg.

Includes passenger vehicles with seating capacity more than six persons or reference mass more than 2,500 kg.

2.2 Type II Test - carbon monoxide emission at idling speed

This test applies to vehicles fuelled with leaded gasoline only.

The carbon monoxide content by volume of the exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

2.3 Type III Test - verifying emissions of crankcase gases

The crankcase ventilation system must not permit the emission of any of the crankcase gases into the atmosphere.

2.4 Type IV Test - determination of evaporative emission

This test applies to all vehicles fuelled with leaded and unleaded gasoline.

Evaporative emissions shall be less than 2 g/test.

2.5 Type V Test -durability of pollution control devices

This test applies to vehicles fuelled with both leaded and unleaded gasoline.

The test represents an endurance test of 80,000 kilometer driven on the road or on a chassis dynamometer.

Not withstanding the above requirements, a manufacturer may choose to use the deterioration factors from the following table.

Deterioration Factors	
CO	HC+NOx
1.2	1.2

3 For Two Wheelers and Three Wheelers

3.1 Type I Test - verifying exhaust emissions after a cold start

	CO (grams/kilometer)		HC + NOx (grams/kilometer	
	2- Wheeler	3- Wheeler	2-Wheeler	3-Wheeler
Type Approval	2.0	4.0	2.0	2.0

Conformity of Production	2.4	4.8	2.4	2.4

Note: *The test shall be as per the Driving Cycle adopted by different countries, with cold start on Chassis Dynamometer.*

3.2 Type II Test - carbon monoxide emission at idling speed
This test applies to vehicles fueled with leaded gasoline only.
The carbon monoxide content by volume of the exhaust gases emitted with engines idling must not exceed 3.5% at the settings used for the Type I test.

3.3 Type III Test - verifying emissions of crankcase gases
The crankcase ventilation system must not permit the emission of any of the crankcase gases into the atmosphere.
Not applicable for two wheelers

3.4 Type IV Test -determination of evaporative emission
This test applies to vehicles fueled with leaded and unleaded gasoline.
Evaporative emissions shall be less than 2 g/test.
Not applicable for two wheelers

3.5 Type V Test - durability of pollution control devices
This test applies to vehicles fueled with unleaded gasoline only.
The test represents an endurance test of 80,000 kilometer driven on the road or on a chassis dynamometer.
Not withstanding the above requirements, a manufacturer may choose to use the deterioration factors from the following table.

Deterioration Factors

CO	HC+NOx
1.2	1:2

Note: *In case of two wheelers this test is only applicable if fitted with anti-pollution devices.*

B. Vehicles Fueled with Diesel (Compression ignition engines)
1 For Passenger Cars With Up To Six Seats and Gross Vehicle Weight (GVW) less than 2.5 tons

1.1 Type I Test - verifying exhaust emissions after a cold start

	grams per kilometer		
	CO	HC + NOx	PM (Particulate Matter)
Type Approval	2.72	0.97	0.14
Conformity of Production	3.16	1.13	0.18

Note: The test shall be as per the Driving Cycle adopted by different countries, with cold start on Chassis Dynamometer.

1.2 Type II Test - carbon monoxide emission at idling speed
Not applicable

1.3 Type III Test - verifying emissions of crankcase gases

Not applicable

1.4 Type IV Test - determination of evaporative emission

Not applicable

1.5 Type V Test - durability of pollution control devices

The test represents an endurance test of 80,000 kilometer driven on the road or on a chassis dynamometer.

Not withstanding the above requirements, a manufacturer may choose to use the deterioration factors from the following table.

Deterioration Factors

CO	HC+NOx	PM
1.1	1.0	1.2

2 *For Light-Duty Commercial Vehicles with Gross Vehicle Weight (GVW) less than or equal to 3.5 tons*

2.1 Type I Test - verifying exhaust emissions after a cold start

Reference Mass (kg)		*grams per kilometer* CO	HC + NOx	PM
RM < 1250	Type Approval	2.72	0.97	0.14
	Conformity of production	3.16	1.13	0.18
1250<RM<1700	Type Approval	5.17	1.4	0.19
	Conformity of production	6.0	1.6	0.22
RM>1700	Type Approval	6.9	1.7	0.25
	Conformity of Production	8.0	2.0	0.29

Note: The test shall be as per the Driving Cycle adopted by different countries, with cold start on Chassis Dynamometer.

Reference mass means the "unladen mass" (mass of the vehicle in running order without crew, passengers or load, but with the fuel tank full and the usual set of tools and spare wheel on board, when applicable) of the vehicle increased by a uniform figure of 100 kg.

Includes passenger vehicles with seating capacity more than six persons or reference mass more than 2500 kg.

2.2 Type II Test - carbon monoxide emission at idling speed

Not applicable

2.3 Type III Test - verifying emissions of crankcase gases

Not applicable

2.4 Type IV Test - determination of evaporative emission

Not applicable

2.5 Type V Test - durability of pollution control devices

The test represents an endurance test of 80,000 kilometer driven on the road or on a chassis dynamometer.

Not withstanding the above requirements, a manufacturer may choose to use the deterioration factors from the following table.

Deterioration Factors

CO	HC+NOx	PM
1.1	1.0	1.2

3 For Heavy-Duty Vehicles and Vehicles with Gross Vehicle Weight (GVW) more than 3.5 tons

3.1 Type I Test - verifying exhaust emissions after a cold start

Pollutants	Type Approval	Conformity of Production
CO (grams per kilo-watt hour)	4.5	4.9
HC (grams per kilo-watt hour)	1.10	1.23
NOx (grams per kilo-watt hour)	8.0	9.0
PM (grams per kilo-watt hour) for engines with power less than 85 KW	0.61	0.68
PM (grams per kilo-watt hour) for engines with power more than 85 KW	0.36	0.40

Note: *The test shall be as per the Test Driving Cycle adopted by different countries with 13 Mode Emissions Engines Dynamometer Test.*

3.2 Type II Test - carbon monoxide emission at idling speed

Not applicable

3.3 Type III Test - verifying emissions of crankcase gases

Not applicable

3.4 Type IV Test - determination of evaporative emission

Not applicable

3.5 Type V Test - durability of pollution control devices

Not applicable

Note :

* Please see the explanatory note

** Please see the explanatory note

As amended by the decision of HMG/N of 2056.12.02

As added by the decision of the HMG/N of 2056.12.02

Explanatory Notes

* Type Approval: Most countries require some form of certification or type approval by vehicle manufacturer to demonstrate that each new vehicle sold is capable of meeting applicable emission standards. Usually, type approval requires emission testing of prototype vehicles representative of planned production vehicles. Under ECE and Japanese regulations, such

compliance is required only for new vehicles. U.S regulations require that vehicles comply with emission standards throughout their useful lives when maintained according to the manufacturing specifications.

The advantage of a certification or type approval program is that it can influence vehicle design prior to mass production. It is more cost effective because the manufacturers identify and correct the problems before production actually begins.

* Approval of a Vehicle: Vehicle manufacturers apply for approval of a vehicle type with regard to exhaust emissions, evaporative emissions and durability of pollution control devices to the authority responsible for conducting the tests. The application for approval also includes details like description of engine type comprising all the particulars, drawings of the combustion chamber and of the piston, description of evaporative control system, particulars concerning the vehicles, descriptions of pollution control devices etc. If the vehicle type submitted for approval meets the requirements of various types of tests mentioned, only then the approval of that vehicle is granted.

** Conformity of Production: The conformity of production is an assembly line testing system. The objectives of assembly line testing are to enable regulatory authorities to identify certified production vehicles that do not comply with applicable emission standards, to take remedial actions (such as revoking certification and recalling vehicles) to correct the problem, and to discourage the manufacture of non-complying vehicles. This test provides an additional check on mass-produced vehicles to assure that the designs found adequate in certification are satisfactorily translated into production, and that quality control on the assembly line is sufficient to provide reasonable assurance that vehicles in use meet standards. The basic difference between TA and COP is that TA is based on prototype vehicle or design of the vehicle while COP measures emissions from real production vehicles.

As per the requirements set forth by the European Union, a sufficient number of random checks are made of serially-manufactured vehicles bearing the type approval mark of vehicles bearing all the types of tests mentioned above. The tolerance limits are provided for conformity of production in Type I test.

Annex 4

Tolerance Limits for Industrial Effluents Discharged into Inland Surface Waters
(Generic Standard)

Characteristics	Tolerance Limit
Total Suspended solids, mg/L	30-200
Particle size of total suspended particles	Shall pass 850-micron Sieve.
pH	5.5 to 9.0
Temperature	Shall not exceed 40 degree C in any section of the stream within 15 meters down-stream from the effluent outlet.
Biochemical oxygen demand for 5 days at 20 degree C, mg/L	30-100
Oils and grease, mg/L, Max	10
Phenolic compounds, mg/L, Max	1.0
Cuanides (as CN), mg/L, Max	0.2
Sulphides (as S), mg/L, Max	2.0
Radioactive materials: Alpha emitters, c/ml, Max	10^{-7}
Beta emitters, c/ml, Max	10^{-8}
Insecticides	Absent
Total residual chlorine, mg/L	1
Fluorides (as F), mg/L, Max	2.0
Arsenic (as As), mg/L, Max	0.2
Cadmium (as, Cd), mg/L, Max	2.0
Hexavalent chromium (as Cr), mg/L, Max	0.1
Copper (as Cu), mg/L, Max	3.0
Lead (as Pb), mg/L, Max	0.1
Mercury (as Hg), mg/L, Max	0.01
Nickel (as Ni), mg/L, Max	3.0
Selenium (as Se), mg/L, Max	0.05
Zinc (as Zn), mg/L, Max	5
Ammonical nitrogen, mg/L, Max	50
Chemical Oxygen Demand, mg/L, Max	250
Silver, mg/L, Max	0.1

Tolerance Limits for Tanning Industry

Characteristics	Tolerance Limit
Colour and odour	Absent * *
Total dissolved solids, mg/L, Max	2100
Suspended solids, mg/L, Max	100
Biochemical oxygen demand (5 days at 20^0 C) mg/L, Max	100
Chlorides as (Cl) mg/L, Max	600
Hexavalent chromium (as Cr) mg/L, Max	0.1
Total chromium (as Cr) mg/L, Max	2.0
Sulphide (as S) mg/L, Max	2.0
Sodium %,.Max	60
Chemical oxygen demand mg/L, Max	250

pH Value	6.0-9.0

** For colour and odour, no requirements have been laid down standard but it is recommended that, as far as practicable, colour and unpleasant odour should be absent in the standards.

Tolerance Limits for Wool Processing Industries

Characteristics	Tolerance Limit
Suspended Solids, mg/L	100
Biochemical Oxygen Demand (5 days at 20^0 C), mg/L	100
Oil and grease, mg/L	10
Chemical Oxygen Demand, mg/L	250
Total Chromium (as Cr), mg/L	2
Sulphide (as S), mg/L	2
Phenolic compounds (as $C_6 h_5 OH$), mg/L	5
pH Value	5.5-9.0
Temperature ^{0} C	40

Tolerance Limits for Fermentation Industries

Characteristics	Tolerance Limit
pH	5.5 to 9.0
TSS, mg/1, max	100
BOD 5 days at 20^0 C mg/l, max	60

Tolerance Limits for Vegetable Ghee and Oil Industries

Characteristics	Tolerance Limit
BOD5 days at 20^0 C, mg/L Max	100
COD, mg/l, Max	250
pH	6-9
Oil and Grease, mg/l, Max	10
Nickel, mg/l, Max	3

Tolerance Limits for Paper and Pulp Industries

Characteristics	Tolerance Limits
pH	5.5-9
Suspended Solids, mg/l	100
BOD5 days at 20^0C, mg/l Max	100

Source: Ministry of Population and Environment, Nepal Gazette, May 2001, Kathmandu.

Annex 5

Specifications of the Ozone Depleting Substances and Import Quantity Permitted for 2000

SN	H.S. Code	Chemical Composition of ODS	Name of ODS	ODP
Group A				
1	2903.41	Trichlorofluromethane ($CFCl_3$)	CFC-11	1.0
2	2903.42	Dichlorodofluoromethane (CF_2Cl_2)	CFC-12	1.0
Group B				
3	2903.49	Chlorodifluoromethane (CHF_2Cl)	HCFC-22	0.055
Group C				
4	2903.46	Bromochlorodifluoromethane (CF_2BrCl)	Halon-1211	3.0
5	2903.46	Bromotrifluoromethane (CF_3Br)	Halon-1301	10.0
6	2903.46	Dibromotetrafluoromethane ($C_2F_4Br_2$)	Halon-2402	6.0
Group D				
7	2903.14	Tetrachloromethane (CCl_4)	Carbon Tetrachloride	1.1
Group E				
8	2903.13	1,1,1-Trichloromethane ($C_2H_3Cl_3$)	Methyl chloroform	0.1
Group F				
9	2903.49	Bromomethane (CH_3Br)	Methyl Bromide	0.6

Note: ODS = Ozone Depleting Substances; ODP = Ozone Depleting Potential of the substance
Group A is related with Group-1 of Annex A of the Protocol
Group B is related with Group-1 of Annex C of the Protocol
Group C is related with Group-2 of Annex A of the Protocol
Group D is related with Group-2 of Annex B of the Protocol
Group E is related with Group-3 of Annex B of the Protocol
Group F is related with Group-1 of Annex E of the Protocol

Source: MOPE, 2001. *Ozone Depleting Substances Consumption (Control) Rules, 2001.* Ministry of Population and Environment, Kathmandu.

Annex 6

List of Selected Proposals Requiring Environmental Assessment

Initial Environmental Examination	Environmental Impact Assessment
Alcohol production up to @ 0.5 million lpd with boiling and fermentation facilities	Alcohol production more than @ 0.5 million lpd with boiling and fermentation facilities
Breweries and wineries @ 0.5 million lpd with fermentation facilities	Breweries and wineries more than @ 0.5 million lpd with fermentation facilities
Acid, alkali and primary chemical industries with production capacity of 100 Mt/day	Acid, alkali and primary chemical industries with production capacity of more than 100 t/day
Hide processing less than 5,000 sq. ft/day	Hide processing more than 5,000 sq. ft/day
Paint, foam, battery industries	Petro-chemicals and processing industries
Sugar factories with production capacity of less than 3,000 Mt/day	Sugar factories with production capacity of more than 3,000 Mt/day
Pulp and paper industry with production capacity of less than 100 Mt/day	Pulp and paper industry with production capacity of more than 100 Mt/day
Plastic and photo processing, soap, threading, packaging materials, etc. having fixed capital exceeding Rs. one million	Production of extremely hazardous substances and chemical processing

Source: MOPE, 1997. *Environment Protection Act, 1996 and Environment Protection Rules, 1997*. Ministry of Population and Environment, Kathmandu.

8 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of Sri Lanka

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8.1 Introduction

When the international trading system was reconstructed after the Second World War, the environmental consequences of economic integration was not a primary concern. Only indirect references to the environment were included in the exception clause of GATT 1947,Article XX, which allows countries to sidestep the normal trading rules if necessary to protect human, animal or plant life or health, or to conserve exhaustible natural resources, provided that such measures do not discriminate between sources of imports or constitute a disguised restriction on international trade. After long silent, the issue was put on the agenda first in the early 1970s in the preparation for the UN Conference on Human Environment, held in Stockholm in 1972. However, no significant commitment was made to mitigate the issues on trade and environment until the beginning of the 1990s.

One reason for the low environmental profile of the GATT in the formative decades was that trade was not perceived to be an environmental issue as such, nether among policy makers nor the public at large. What perceived was at that time according to theoretical background, if governments used proper environmental policies to internalize the environmental cost of production and consumption, trade would eventually raise welfare (McGuire, 1982). But environmental policies lagged behind in many countries. Therefore, the basic presumption on which the free trade case rested was not satisfied. This background was not seen as a reason to halt or reverse the process of trade liberalization, but to rather to strengthen environmental policies and institutions, including on the international level.

As environmental issues had a low priority during the first four-decade of the GATT, they came back with a vengeance in the early 1990s. The starting point of the current debate was a series of continuos environmental related trade disputes, especially the "tuna dolphin" dispute between Mexico and the United States. With the formation of the WTO in 1995, environmental issues, as they related to trade, are now firmly anchored in the multilateral

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trading system. The objective of WTO, as spelled out in the preamble of the Marrakesh Agreement Establishing the World Trade Organization, now embrace the internationally recognized principle of sustainable development, defined by the World Commission on Environment and Development in 1987 (Nordastrom and Vaughan, 1999).

The environment community argues that free trade is responsible for some of the environmental problems as free trade means more production and consumption of environmentally unfriendly products, which result in more pollution and environmental degradation. Trade policy instrument such as tariff and export taxes have been suggested to minimize the damage caused by such trade. Supporters of free trade argue that free trade generates gains from specialization and exchange to the countries involved in such trade and that additional income received can be used for more environmental protection. Pro-trade groups argue that the environmentalists' demands undermine the prospects of mutually beneficial trade.

The concerns for environmental protection are widespread in the countries such as Sri Lanka where rapid trade liberalization programmes are in place. Since 1977, Sri Lanka has promoted export-lead growth as a means to achieving rapid economic development. Although Sri Lanka has made tremendous progress in trade liberalization, along with many other developed and developing countries, no attempt has been made so far in policy-making circles either to examine the implications of trade liberalization on environment or to reconcile trade and environment policies. The purpose of the paper is to examine some selected issues involved in trade and the environment giving more emphasis on 'how environment impacts on trade'. In attempting to investigate the link between trade and the environment, the paper is designed to examine firstly, the relationship between environmental management and trade drawing some evidence from literature. Secondly, It reviews effects of complying with domestic environmental standards and requirements on Sri Lanka's international and domestic competitiveness. Thirdly, it examines the effects of international environmental measures on Sri Lankan export competitiveness.

8.2 Environment Management and Trade

It is widely held that the links between the environment and trade are at best tenuous. While it is production and consumption with the associated transport that causes environmental

damage, the resulting management of the environment has implications for trade. Environmental degradation has been identified as arising from four major sources, namely material source pollution, process pollution, product pollution and residual or waste pollution (Walter, 1975). Environmental management involves a cost and these will be reflected in the prices of exportables and importables. How this affect to international flow of goods and services will depend on a host of factors. Environment management problems are highly industry and product- specific. Countries vary in assimilative capacity of their environments, as well as in the priorities to be accorded to environmental protection, the dependence on exportables and impotables, the type of products produced, and in their resource endowment, to name of the important factors.

While the environment is a global concern, the symptoms and causes of environmental degradation appear to be different as between the developed and developing countries. The problems of the developing countries have been identified as 'deforestation, desertification, demographic pressures, soil erosion and water pollution. In the developed world it is one of 'acid rain, atmospheric pollution, contaminated water, environmental mutagens and carcinogens, and toxic wastes'. Problem of global warming and depletion of ozone layer would appear to be more widespread or global in their impact and both the developed and developing countries as contributes. The proximate causes would appear to be the poverty of the developing countries and the wealth of the developed countries. Given however the accelerated levels of economic activity, especially in the third world, which in turn is expected to be associated with increased environmental despoliation and an increasing demand for environmental management, countries could be expected to pay more attention to problems of environmental management and divert more resources to environmental management. This will effect international trade and this cannot be expected to be symmetrical.

Economists view environmental degradation as arising from the failure of the market to internalize the environment externalities. To the extent that the externalities are not reflected in relative costs, a difference in private and social cost and benefits arise. Paradoxically, public policy is required to redress the imperfections caused by market failure. Otherwise, the allocation of resources is such that the social optimum is not realized (Jogaratnam, 2000).

The potential impact of enforcing rigorous environmental standards on given country's exports and imports depends on however on several factors. Firms may reallocate resources in country or relocate in resources in another country where environmental standards are less rigorous and where the assimilative capacity is greater. Imports may be restricted because of the inability of the exporting country to meet the required standards, or conforming to the standards raises cost in the exporting country. Much will depend on the extent to which the international community can harmonize standards. The fear is that the develop world would enforce much more rigorous standards resulting in looking the competitive edge. This may result in affected firm of 'Green Protectionism' on the other hand, it is feared that lower standards and lax enforcement in the poorer countries could lead to 'ecological dumping'.

The available empirical evidence however suggests that the costs of environmental management do not significantly affect trade. A study by Krissoff et al.,(1996) for the USDA cites numerous studies in support. Drawing on a voluminous literature, it addresses issues more specific to agriculture. A study in the early 1970s is reported to have found environmental costs for U.S. exports at 1.75 per cent of their total value and for U.S. imports at 1.5 per cent of their total value (Walter, 1975) A more recent study is reported to have estimated environmental regulation costs at about 1.85 per cent of total costs for 40 industries and between 1.85 and 2.89 per cent of total costs for 24 industries (Tobey, 1990). Additionally it is also reported that reductions in output caused by environmental control costs are insignificant on average, although significant for some individual sectors, and that there is little evidence of any significant effect on patterns of trade. The envisaged developed county - developing country tensions over environmental regulations also appear exaggerated. The same cities data to illustrate that developing countries adopting developed counties themselves adopting stricter standards had little effect on production and trade in the nonferrous and energy sectors. It is also reported that Mexico's exports would be reduced by less than 2 per cent if it adopted an environmental tax equality has improved in many countries, the effects on production trade and competitiveness remains small.

The Trade effects of environmental policies on agriculture dose not appear to be as adequately researched, as in the case of the other sectors, but it is felt that the above generalizations would apply (Krissoff et al., 1996). However, it is also pointed out that proposal agro-environmental regulation in some countries, especially developed countries,

could effect production costs output and trade. A case in point is the potential impact of banning methyl bromide for soil and product fumigation, or if pesticide use is to be cut. to the extent that alternative or more expensive, production losses could be associated with higher prices to consumers. Both export and imports would be affected in different countries depending on their quarantine regulations. Attempts to regulate nitrate levels in ground and surface water in the European Union, Japan and Taiwan, though controls on animal waist, could affect production and costs of livestock products (Krissoff et al., 1996).

8.3 Impact on Environment policy on Trade

There are two major views on the relationship between environmental regulation and international competitiveness:

1. It is claimed that stringent environmental regulations impose significant costs on the domestic firms and industries reducing their international competitiveness in terms of declining exports, increasing imports compared with those from countries which have lower environmental standards and regulations. The loss of competitiveness is said to be greater in the so-called " pollution-intensive" industries.

2. This is an entirely opposite view, mainly due to Poter (1991) was that environmental regulations leads to productivity improvements because a more cleaner environment leads to innovations due to stimulating effects of such regulations. Furthermore, countries adjusting early and investing in environmentally friendly technology would be able to create comparative advantage in these environmentally sensitive industries. Compliance with higher environmental regulations could also be an additional source of structural adjustments in particular for developing countries, as these regulations will promote less pollution-intensive industries (Sorasa, 1994).

There is a large body of literature, which uses neoclassical trade models to examine the impact of environmental regulations on competitiveness. (e.g. Copeland & Taylor, 1991). Although comparisons of these studies are difficult due to different methodologies used, Dean (1992) has summarized three major results of these studies. First, on average ECC is a smaller share of total costs of production. However, it has been shown that some individual industries such as construction, mining and plastics could suffer from loss of competitiveness

due to high ECC. Second, generally, reductions in output caused by abatement costs are insignificant although some individual sectors have been affected. Third, the patterns of trade have not been affected significantly by the costs associated with environmental regulations.

Sorsa (1994) analyses trade flows in environmentally sensitive industries and ECC in seven industrial countries (Austria, Finland, Norway, Sweden, Germany, Japan and the United States). All these countries are clamed to have high environmental standards. First Sorsa finds that there is no systematic relationship between higher ECC and competitiveness in environmentally sensitive industries. For Germany, Japan and the U.S., the correlation coefficients between changes in exports share and ECC are not significant while that for Austria is positive. Second, in general countries under studies have been able to maintain competitiveness in environmentally sensitive products all through the period covered.

8.3.1 Local Environmental regulation and Competitiveness

Some taxes, charges and standards designed to internalize environmental costs affect trade. It has been claimed by the business community that the goods and services subject to these levies become less competitiveness in the world markets compared with those sources from the countries which do not impose such taxes on business. However, as discussed before there is no evidence to prove that this claim is true. As regards imports, generally these taxes do not become barriers to trade as long as they are applied to both imports and domestically produced goods at the same rate. In the case of Sri Lanka, the major environmental measure affecting competitiveness of local industries are:

1. environmental protection licence (EPL) scheme, and
2. environmental impact assessment (EIA) scheme

Under EPL, an existing firms is required to obtain a licence to pollute from CEA which in turn issues a licence for a fixed fee, specifying the effluent standards that must be maintained by the firm. Currently, by and large these effluent standards are on water pollution. The EIA programme is applied to all new large industrial projects, under which firms are required to go through an approval process for environmental impact assessment by the CEA. In this analysis, two methods are used to examine whether the compliance cost associated with various environment standards and regulations has any effects on trade.

8.3.2 Compliance costs

The estimation of compliance costs due to existing effluent charges is not an easy task for various reasons. A countrywide survey of industries is needed to assess the costs associated with such charges. A study by the United Nations Development Programme has found that the capital costs of complying with the existing effluent charges are more than US $69 million in Sri Lanka. This number should be treated with caution as it was estimated subjected to a number of speculative assumptions. The breakdown of this estimate by industry is given in following table 3.1.

Table 3.1 Capital Cost of Effluent Standards for Wastewater Treatment

Industry/Product	**Capital cost (US $ million)**
Textile	14.6
Food and beverages	8.9
Tanning	4.7
Desiccated coconut	4.5
Metal Processing	7.4
Rubber	16.6
Paints and chemicals	2.0
Miscellaneous products	9.9

Source: Industrial Policy Review of Sri Lanka, 1995.

All in all, in the case of Sri Lanka, judging the available evidence from Textile, Leather, Paper and Rubber industries, one can suggest that the environmental compliance costs are not significant in total costs of production of most industries. This is mainly due to the fact that many firms do not abide by the required environmental standards and regulations.

8.3.3 The Analysis of International Competitiveness

The question being examined in this section is 'do domestic environmental standards and regulations lead to loss of international competitiveness of industries?' A well known concept, revealed comparative advantage (RCA), is used as a measure of international competitiveness to examine whether such regulations have affected adversely the competitiveness of Sri Lankan industries. In the absence of appropriate index showing the degree of stringency of environment regulations, industries are classified into Environment sensitive (ES) or damaging and Environmentally non-sensitive (ENS) categories to see

whether ES industries have experienced any loss of competitiveness over time. The ES industries are assumed to have relatively high compliance costs resulting from environmental regulation and standards.

Many studies have used the concept of RCA to measure a country's relative export performance in individual product category. The index takes the values between zero and infinity. A RCA value greater than unity indicates that the country has a comparative advantage in that commodity. Higher the value of RCA, the greater is the country's comparative advantage in the commodity concerned.

The analysis is conducted on major Sri Lankan exports using data from International Trade statistics of the United Nations. Major exporting industries are classified into ES and ENS using Central Environment Authority of Sri Lanka classification where thirty-one industries and services have been listed as high polluting. It is clear from the table 3.2 given below, in general, the ES products have not experienced any loss of international competitiveness compared with ENS products.

Table. 3.2 Estimates of Comparative Advantage by ES and ENS Products Categories

Product	ES/ ENS	1987	1988	1989	1990	1991	1992	1993	1994
Tea	ENS	382.5	414.4	343.1	335.1	305.1	220.5	214.8	239.2
Fruits	ENS	6.1	3.7	5.6	4.6	4.3	4.6	2.8	2.7
Spices	ENS	34.2	55.6	60.1	50.2	51.4	41.8	41.0	33.8
Tobacco	ES	0.6	1.0	1.9	1.4	1.8	10.0	9.2	8.8
Natural Rubber	ES	41.4	36.5	32.2	33.7	27.4	24.1	20.5	17.8
Charcoal	ES	107.8	59.3	44.2	22.9	22.1	12.4	3.3	9.2
Textile	ES	6.2	6.4	6.8	2.9	3.9	5.0	4.0	5.3
Mens'Outwear	ES	14.8	14.8	12.6	12.9	12.3	12.1	11.6	11.5
Women's Outwear	ES	2.3	19.6	25.9	15.9	16.6	20.2	19.2.	19.2
Under Garments	ES	20.6	18.1	24.2	18.9	17.4	20.4	19.8	17.4
Vegetable oils	ENS				3.7	0.4	0.7	0.6	0.7
Chemical products	ES	0.8	1.1	0.9	1.0	1.0	0.9	0.8	0.7
Rubber articles	ES	0.01	0.3	0.2	2.4	2.5	2.8	3.1	2.8
Wood manuf	ES	1.5	2.6	0.6	2.1	4.1	2.2	2.4	2.5

8.4 International Environmental Regulations and Competitiveness

Another type of environmental regulations which have been designed recently are eco-labeling, packaging, eco-standards and recycling requirements. The purpose of these is to internalize externalities and protect the environment. Eco-labeling can also take form of either 'single issue labels' or 'life-cycle' type. The first type is used for managing environmental quality such as energy efficiency in refrigerators while the second type of the labels are designed for 'cradle to grave' management of products. Similarly, eco-packing schemes are being used to encourage recycling, reuse and proper disposal of the waste. In addition, some countries use eco-standards for environmental management. For example, products such as pesticides, metals and foods are subjected to a variety of standards in many countries.

Although most standards based on products can be justified in terms of the WTO Agreement on Technical Barriers to Trade (TBT) and they are much better than the use of trade measures for environmental purpose, these measures have a great potential for misuse, acting as new trade barriers to trade. In particular, these measures can be used to favour domestic producers over importers and are likely to violate GATT/WTO principles. For example, it has been claimed that the German Packaging low introduced recently imposes enormous costs on exporters to the German market in relation to local German firms. Therefore, it is important for countries involved in trade to work towards mutual recognition and harmonization of such measures. These measures are being used by many countries including Europe, North America and certain Asian countries, which are important destinations of Sri Lankan exports. Analyzed below are the environmental-related barriers facing Sri Lankan exporters, based on some case studies, including the various environmental barriers facing Sri Lankan exports in other countries, in particular, Europe.

8.4.1 Textiles

There is a variety of environmentally -related legislation covering textile. Table 4.1 given below presents a list of them applicable to textile imports to some European countries including Germany, the Netherlands and Sweden. One of the good examples of such regulation is Azo dyes used in textile and leather production. This is proved to be harmful to human skin and banned in some Western countries (Germany and The Netherlands) and some countries are planning to ban such dyes and textiles made using such dyes.

Eco labels

Voluntary ecolabels can be used by any textile-producing firms to distinguish its product as 'green' from other similar products. There are many ecolabels in the field including Oko-Tex 100, Nordic Swan and the Eco-label (EU-flower). Some of these are 'health labels' and some others are for cleaner production. There are also some organic labels (IFOAM, KRAV, and EKO) to prove that they are produced organically.

Table 4.1 Overview of Direct legislation, Relevant to textile Products

	EU	Germany	The Netherlands	Sweden
Certain azo dyes	Possible future legislation	Prohibition	Prohibition	Possible future legislation
Formaldehyde	Possible future legislation	Compulsory labeling above 1500 ppm.	Possible future legislation	Possible future legislation
Pentachlorophenol (PCP)	Possible future legislation	5ppm	5ppm	Possible future legislation
Nickel	Skin contact: 0.5/ug/cm2/week	Skin contact: 0.5/ug/cm2/week , labeling	Future legislation	Skin contact: 0.5/ug/cm2/week
Certain flame retardant	Prohibition	Prohibition	Prohibition	Prohibition
Cadmium	Paint/stabilizer: 100ppm	stabilizer: 100ppm	Paint/stabilizer: 100ppm	Colouring agents or stabilizer: prohibition
Asbestos	Prohibition	Prohibition	Prohibition	Prohibition
Plycholorobiphenyles and terpnenyles	Prohibition	Prohibition	Prohibition	Prohibition

Source: Environmental Quick scan, CBI, The Netherlands

8.4.2 Foods Products

Europe is the biggest market for exports of food products such as processed fruits and vegetables, edible nuts, herbs and spices, coffee and tea from developing countries. Trade related environmental measures are becoming increasingly important in these markets. Some of these environment legislation applicable to imports in European countries such as Germany, The Netherlands, and Sweden are given in following table 4.2.

Table 4.2 Overview of Direct legislation, relevant to Food Products

EU legislation	
Pesticides residues-maximum residue levels, chemical contaminants	On-going programme of setting harmonized standards
Food additives	Legislation under development
Microbiological standards	Introduction of microbiological standards additional to standards for animal products under consideration
Radiological contamination	Maximum permitted levels
Irradiation	Directive under development /Prohibition
Food packing	Specific legislation

Source: CBI, The Netherlands

In addition to legislation and ecolabels, there are various other types of environmental requirements, which are useful for exporters from developing countries. These include the use of environment management system, such as ISO14001, the use of waste management policy (e.g., packing requirements) and cleaner production (e.g., the use effluent treatment facility). Although countries can set restrictions only on imported products (according to WTO provisions), there is a growing concern about the production process (e.g., the use of chemicals) and it is becoming an important marketing factor in many Western countries. In the years to come, exporters from developing countries will find it difficult to penetratre to these markets if their goods are not produced using environmentally friendly production methods.

It is clear now that trade-related environmental measures are becoming increasingly important in most developed countries. It is difficult to say how much Sri Lankan exporters are affected by the environmental instruments since there is no easy way to calculate the costs associated with these measures. However, the early adjustments to such measures will give a 'first mover' advantage to Sri Lankan exporters in penetrating these environmentally - sensitive markets. Not only can Sri Lankan continue to export the goods in which the country has comparative advantage but also create comparative advantage in new products related to environmentally sensitive sectors.

8.5 Concluding Remarks

As a country which has embarked upon an export-led industrial strategy as its development path and shown increasing concern over environmental protection, Sri Lanka can benefit from adjusting early and investing in environmentally-friendly technology which would

create comparative advantage in the environmentally-friendly exports. Judging from the available evidence one can suggests that the domestic environmental compliance costs are not significant in total costs of production of most industries in Sri Lanka. This is mainly due to the fact that many firms do not abide by the required environmental standards and regulation. The Analysis conducted using the revealed comparative advantage (RCA) concept, as a measure of international competitiveness, shows that international competitiveness of Sri Lankan industries has not been adversely affected by domestic environmental regulations. Various international environmental factors facing Sri Lankan exports in other countries, in particular, Europe have been examined and it is found that trade-related environmental measures are becoming increasingly important in most developed countries. The early adjustment to these measures will give a 'first mover' advantage to Sri Lankan exporters in penetrating these environmentally sensitive markets. It is also important for countries involved in trade to work towards mutual recognition and harmonization of such measures. Overall, it has been shown that the gains form trade more than compensate for environment damage arising from such trade. Beneficial effects of trade are enhanced when optimal environmental protection measures are in place.

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9 Trade and Environmental Standards and Migration of Dirty Industries: A Case Study of Bhutan

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9.1 Introduction

Of late, the debate on trade liberalization has incorporated the element of 'environment' into it, especially in the context of WTO. This suggests the use of environmental standards into trade. It is through linking trade agreements to environmental standards can the objective of using trade as a means of environmental protection be fulfilled. This order is called for because the expansion and deregulation of international trade will have a number of potentially threatening environmental implications for developing countries. It is argued that since developing countries mostly have weaker environmental laws and /or lax enforcement, the removal of barriers for investment will lead to the relocation of hazardous industries or toxic technological processes in these economies.

On the other hand, it has been pointed out that environmental standards like Sanitary and Phyto-Sanitary and requirements such as harmonization of national standards with international ones, are difficult to comply for developing countries and as such their exports have been negatively affected due to new trade norms. Critics are of the opinion that the emerging environmental standards are not only complex but they are also to be seen as non-tariff barriers against trade with developing countries.

Bhutan's experience with regard to the issue of linking trade with environment is extremely brief and limited. With more than 90 per cent trade ties with India, Bhutan represents a unique case in the South Asian region. Though Bhutan's trade composition does indicate that it has been trading in environmentally sensitive goods, no serious barrier so far has been reported on this count. Identified as one of the ten global 'hotspots' in biodiversity, Bhutan's environment is largely intact with 72 per cent of forest cover. Bhutan follows a strong conservation ethics as its development approach is geared to maintain a harmony between economic forces, environment and spiritual and cultural values. This has been summarized into the central development concept of maximizing Gross National Happiness.

Bhutan's development strategy has gradually started recognizing the benefits of globalization and increasing participation in international trade. Over the past 30 years, Bhutan's interaction with the outside world at the bilateral and multilateral levels has increased intensively. Today, not only the country aims at building up a strong export oriented economy to compete in the regional market but also aspiring to join the WTO in the future for which pre-accession

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conditions (more precisely pre-accession climate in terms of putting in place the WTO conforming regime in areas like TRIPS, TRIMS etc.) are being met with, albeit slowly.

Nevertheless, while a fully open economy and milestones like WTO membership are unlikely to happen in near future, Bhutan continues to face constraints in creating a niche for its products. The items of exports and imports are extremely limited. Exports are mainly electricity, mineral products such as cement, ferro-alloys, calcium carbide and coal, particleboard and fruits, such as oranges and apples. Imports mainly include capital goods, petroleum products and a large number of consumer goods. The value of Bhutan's imports continue to outweigh exports, reflected in the overall trade deficit of about 15 per cent of GDP in 1999-2000. This represents the widening of the trade deficit gap in comparison to 6 per cent and about 14 per cent of GDP witnessed in the preceeding years 1997-98 and 1998-99. Enhancement in the value of imports occurred mainly due to imports for new hydropower plants and related service payments. This has resulted into widening of the current account deficit gap to 26.7 per cent of GDP in 1999-2000. Undoubtedly, the production of hydropower forms the most important area of comparative advantage, it also points to the country's crucial dependence on this single source of export earnings. At this stage Bhutan can not afford to ignore the possibility of trade expansion and diversification in the areas of natural resource based primary products, food processing, mineral products and other manufacturing.

The present paper argues that such an opportunity does exist for Bhutan, having an environmental conservation policy deeply rooted in Buddhist tradition and culture and production units working under well regulated Environmental Impact Assessment (EIAs) system incorporating the import of environmentally sound technology. However, generating technical assistance in understanding how to establish a system for internalizing the external environmental costs would be needed in this regard. Finding out the ways in which environmental standards can provide with trading opportunities, especially outside the South Asian region would be another key area to be explored.

The paper is divided into six Sections. Section II provides a brief review of the strategy and achievements of planned economic development of Bhutan. Section III presents a review of the progress on external sector of the economy. Section IV looks into the environmental conservation policies and instruments and related goal of sustainable development. Section V deals with the challenges and prospects for Bhutan in the face of processes such as liberalization and linking trade with environment. The last Section presents concluding remarks.

9.2 Development Strategy and Achievements

Structural Transformation

The small landlocked country of South Asia – Bhutan is no longer a 'hidden and forbidden land'[1]. Over the last four decades of planned economic development, the country has undergone a considerable transformation and opening up. It has also achieved a fair amount of self-sufficiency over time. The structural transformation of the domestic economy is reflected in the basic socio- economic indicators (Table-2.1), sectoral shares to GDP (Table-2.2) and the progress in Human Development Index (Table-2.3).

In 1961, when the First Five Year Plan was launched, Bhutan's GNP per capita of US $ 51 was, perhaps, the lowest in the world. An examination of Table-2.1, however, suggests that in 1999 not only the observed GNP per capita of US $ 556 is one of the highest in the South Asia region; metamorphosis has also taken place in the field of health and education. There has been dramatic improvement in the life expectancy at birth and a substantial reduction in infant mortality rate. Even though the impact of overall socio- economic development in bridging the gap between birth rate (recorded at 39.9 per thousand in 1999) and death rate is yet to come about, the expansion of primary health services has brought down the crude death rate to an internationally comparable level (from 205 per thousand in 1977 to 9 per thousand in 1999). In the field of education, from just 400 students in 11 primary schools in 1961, the country has progressed to a level of targetting to establish an Engineering College by 2002 and a National University by 2007. The overall adult literacy rate has picked up to 54 per cent in 1999 with the primary school enrolment rate reaching 72 per cent.

Table-2.2 presents the share of major sectors to real GDP at factor cost. It indicates that the percentage share of primary sector as a whole to GDP has been declining since 1980, whereas the shares of secondary and tertiary sectors have been rising. In 2000, the share of primary sector to GDP stands at 33.9 per cent while the secondary and tertiary sectors contribute 30.9 and 35.1 per cent respectively. In the early 1980s the whole of primary sector alongwith trade accounted for about two-third of GDP while their contribution declined to about one half in 1990 and to a little more than one-third in 2000. Overtime the significance of electricity, manufacturing and construction increased tremendously.

During the 1980s the potentiality of the Southern watershed of the Himalayas was gradually tapped with the help of Indian technical and financial assistance. This resulted into the first major hydropower project in Chukha entering into production and export in 1986. As a result, the contribution of electricity to real GDP increased from a meager 0.2 per cent in 1980 to 9.1 per cent in 1990, 10.4 per cent in 1999 and 10.6 per cent in 2000.

The growth of electricity sector has also brought about an expansion of manufacturing and construction activities. While the share of manufacturing to real GDP increased substantially, from 3.2 per cent in 1980 to 9.4 per cent in 2000, the enhancement in the construction sector's contribution to GDP was the direct result of construction activities carried out by Kurichu, Tala and Basochu hydropower projects. With the introduction of water meters in urban areas like Thimphu and Phuentsholing in 1996 and to other towns later on, the contribution of water to GDP has increased by 0.7 per cent between 1998-99 (*NAS 1980-99*, CSO). The expansion of hydropower potential has proved to be the 'prime mover' of economic growth and the 'vehicle of change' in Bhutan. Even though, agriculture sector is still the largest contributor to GDP with its value addition equivalent to the aggregate of electricity, construction and manufacturing, Bhutan seems to have transformed from 'hermetically sealed' rural based barter economy to a relatively modern structure.

The qualitative dimension of this transformation has been reflected in the continuous improvement witnessed in the Human Development Index (HDI). The Planning Commission's estimate suggests an improvement in HDI from 0.325 in 1984 to 0.581 in 1998[2]. Remarkably, a

larger contribution to this improvement in HDI has come from health and education indexes rather than the income index. Between 1984-98, while health and education indexes have improved by about 30 and 40 per cent, income index improved on a comparatively lower side by about 10 per cent (see Table-2.3). Since health and education are largely public goods in Bhutan[3], the contribution of these two sectors in HDI reflects upon the large externalities in terms of social returns they are generating in the society. These sectors are at the core of country's development strategy, which emphasizes on the maximization of Gross National Happiness rather than the Gross National Product.

Development Strategy

The development strategy of Bhutan seeks to strike an appropriate balance among social, economic, political, cultural and environmental goals. While mapping the future development course, *Bhutan 2020: A Vision for Peace, Prosperity and Happiness* (Planning Commission, Royal Govt. of Bhutan) clearly brings out these goals in the 'Normative Architecture for Change and Development' (p.49)[4]. The various elements of this 'architecture' are put under the following broad categories.

Social	: Human Development
Economic	: Self- Reliance, Sustainability, Flexibility, Balanced and Equitable Development
Political	: Independence, Sovereignty and Security of the Nation- State and Governance.
Cultural	: Identity, Unity and Harmony, Preserving and Promoting Culture and Heritage.
Environmental	: Preservation through Environmentally Sustainable Development.

The development strategy places human development at the centre stage. A holistic approach to development has been designed to take care of material as well as spiritual needs of individuals. Health and education have been considered as priority areas for basic capacity development towards the generation of human capital. This is to be achieved within the framework of traditional values and ethics so that the "society in transformation" keeps on taking inspiration from the nation's cultural heritage [5]. While flexibility has been explained in terms of the country's ability to adapt and respond effectively to changes in order to assimilate the positive ones, sustainability requires to be observed in the fields of social, finance, economic, culture and environment alike. Sustainability is essentially to be observed because an untenable proposition in any field is likely to have impact on the sovereignty and security of the nation[6].

The national development vision puts the Gross National Happiness (GNH)[7] as the central development concept, an umbrella term encompassing goals, principles, objectives and the direction of development. The GNH as a "single unifying concept of development" does not essentially reject material progress, rather takes it as a precondition for enlarging self- reliance, opportunities and choices[8]. At the operational level, the theory of GNH would mean that every policy and every project is to be planned and evaluated not simply in terms of the enhancement it makes to GNP and the material basis of society but also by its contribution to the total well-being of individuals and society (*Development Towards Gross National Happiness*, 2000, p.22),

including the impact it will make on environment. The GNH is, therefore, "Bhutan's bridge over the gap between values and development"[9]. For a value-laden country like Bhutan, the doctrine of GNH has not only allowed the development process to emanate from the cultural roots; it has also provided a cautious and rational defence against the impoverishing and detrimental impact of global changes. This places Bhutan on a better footing, where it can exercise options and obtain judicious benefits from the process of liberalization.

Macroeconomic Performance

Over the decades of 1960s and 1970s, the focus of planning was basically on removing the major hurdle in terms of infrastructure and on creating the conditions for future growth. Accordingly, the First and Second Five Year Plans allocated 66 and 44 per cent of total outlay on the construction of road network, mainly with the help of Indian technical and financial assistance. While it is difficult to capture the growth performances for 60s and 70s due to lack of systematic data[10], the pursuit of growth received a set back over the decade of 1990s on account of political turbulence in the south[11]. However, with the commissioning of the Chukha hydropower project, the real GDP experienced a quantum jump of 18 per cent between 1986-87. This resulted into a consistently good performance of the economy over the second half of 1980s, produced a strong growth average of 8 per cent for the whole of decade.

The performance over the decade of 1990s could not match with that of 80s, the average real GDP growth of 6.0 per cent is much lower in comparison to 8 per cent of 1980s. However, the growth performance over the decade of 1990s has been much more stable and consistent, appears to have consolidated a great deal in the second-half of the decade. Table-2.4 presents the average annual growth rate of real GDP and some major sectors for the decade of 1990s. It suggests that growth rate of real GDP has been affected mainly because of the variations witnessed in sectors like electricity, manufacturing and construction. An examination of Table-2.4 reveals three periods in growth, recovery and slow down –

1) Slow down between 1990-92,
2) Recovery and growth between 1993-97, and
3) Slow down between 1998-2000

During the period 1990-92, growth rate suffered mainly because of the negative growth witnessed in electricity sector and a slow down in mining and quarrying activities. The real GDP growth picked up between 1993-97, reached the peak of 7.4 per cent in 1995, mainly due to strong recovery of electricity and mining sector. It came about with the commissioning of a ferro-alloy plant and a cement plant. One of the important contributory factors was the capacity expansion of the Chukha hydropower project and the enhancement in export tariff from Nu. 0.20 to Nu. 1.50/kwh. Once again between 1998-2000 with a slow down in electricity, mining and manufacturing sectors, real GDP growth suffered and averaged to 5.8 per cent in comparison to 6.6 per cent observed between 1993-97. Hydropower generation seems to have initiated development waves in the country. It has also caused the simultaneous growth of manufacturing, trade and other sectors, demonstrating a strong linkage-effect of investment. The construction sector, for example, has been largely affected by the pre-commissioning stage of hydropower projects. This is why it has demonstrated average growth trends of slowing down between 1993-

97 (the post-commissioning stage of Chukha project) and a strong recovery between 1998-2000 with the massive construction work taken up towards the installation of Tala hydropower project in 1997-98 and other projects at Kurichu and Basochu (see Table-2.4).

A perusal of Table-2.5 suggests that there has been a continuous improvement in tax- GDP ratio since 1992. This shows the strengthening of the revenue generation base in the country. Today the Government is in a position to meet the current expenditure with current revenue generation while it keeps on depending on foreign aid and loans for capital projects. The contribution of tax sources in total revenue generation has gone up to 41 per cent in 1998-99. In a drive to rationalize the tax structure and enhance the tax base, personal income tax has been effected from January 1, 2002. Activity wise, Bhutan keeps on depending upon the sale of energy exports, contributed Nu.1, 244.62 million or 35.4 per cent of total revenue in 1998-99[12]. Tourism is the fourth largest revenue generator in the country.

Between 1979-2000, the Consumer Price Index (CPI) has increased to become 612.9, witnessing more than 4-fold hike. The pace of increase, however, seems to have slowed down during the second half of 1990s. Prices in Bhutan have increased at a moderate rate of 9 per cent on average between 1979-2000. Between 1999-2000, the CPI growth rate slowed down to a paltry 2.5 per cent. The average rate of increase in both food and non-food prices seems to have slowed down (see Table-2.5), especially in the second half of 1990s. However, the purchasing power of Ngultrum while compared to 1979 has decelerated to 16 Chhetrum in 2000.

Major Tasks Ahead

First, while the total investment in the economy has increased tremendously, the share of private investment has not picked up much. Today, almost all the major financial institutions suffer from 'excess liquidity'. Private investment in manufacturing is extremely low, largely found being channelised into residential dwellings. Government's policy of divestment is ending up in 'distributing profits' of viable units rather than encouraging complementarities of investment. Despite host of initiatives and encouragements provided by the Government, a viable private sector is still a major task[13].

Second, with the expansion of education, rise in population and small size of private sector, the problem of unemployment has started surfacing in the economy. As per the official estimation, the present unemployment rate stands at 1.4 per cent in Bhutan[14]. This presents a unique situation of 'unemployment amidst labour shortage'. While the realisation that government can not be the sole provider of jobs for all time to come is gradually catching up, addressing this 'new problem' of unemployment in an adequate manner forms another major task of future economic management.

Third, even though the prices of non-food items have changed at a rate faster than the food-prices, there have been major fluctuations found in the prices of essential items (Pankaj, 1998)[15]. The study suggests that the sensibility of the variability of inflation to price level is smaller in Bhutan (p.45-46). This becomes more pressing given the fact that as high as 72.31 per cent of the total expenditure is spent on food items by general consumer in Bhutan (1979 Consumer Expenditure Survey, CSO). Also, the expenditure elasticity of food items, calculated on the basis

of field data collected in a family budget survey of Trashi Yangtse town and Pangthang village in Eastern Bhutan, was found positive and high (see Pankaj and Wangchuk, 2000). A high variability despite low level of price changes, most probably, cater to the notion—i) of structural constraint in the domestic supply of food, and ii) of large informal inflow of essential items from neighbouring regions of India, sometimes able to balance the demand with supply and sometimes not (Pankaj, 1998, p.48). Particularly, in the light of recent escalation of tension over Bodo/ULFA problem, which might affect the boarder trade with India and further add to the supply constraint, maintaining stability in the prices of essential items would be necessary to protect the interest of the poor. Price stability of essential items would go a long way in addressing the problem of poverty in the country.

Fourth, Bhutanese economy has recently witnessed the introduction of computers and Internet and has developed an IT master plan in an urge to modernize and globalize the economy. The post-technology society has started experiencing tremendous benefits, in terms of productivity and income enhancement. This has also been helpful in overcoming the difficulty posed by the rugged hilly terrain. However, at the same time their impact has also been felt on the changing facets of everyday life, which might have cultural implications. The related issues like 'digital divide'[16] and 'exclusion'[17] are being talked about. Today, Bhutan finds itself at a crossroad of technological advancement and a transition is underway. However, a society with minimum initial differences in technological sophistication and social pattern, Bhutan stands a better chance to cope with the transition[18]. However, a proper 'management of transition' would be a task ahead.

Lastly, since Bhutan aspires to achieve economic development along with the preservance and strengthening of traditional values and culture, pursuing its development philosophy in the face of globalization has been recognized as "the greatest challenge in the country's modern history"[19]. This task becomes even more formidable considering the fact that Bhutan has been adjudged as 'highly vulnerable' country on the yardstick of vulnerability index [20].

9.3 Progress on External Sector

Early Developments

Bhutan's link with the outside world had been severely constrained and conditioned by the physical barriers, basically due to natural geography and poor means of communication. Until 1958 Bhutan's major trade link was with Tibet. In the absence of proper means of transportation like road links, fixed routes via passes and valleys were being used. For example, Paro's trade followed the low pass of Termo La, while the merchants of Punakha travelled up the valley of the Mo Chu to Lingshi La on their journey to Gyantse and Shigatse[1]. Traders of eastern Bhutan mostly followed the Lhobrak and Dozam rivers. The exports of Bhutanese merchants were mainly rice, silk fabrics, vegetable dyes and brass utensils, while the items of imports from Tibet were salt, wool and precious metals.

Bhutan did not have a direct trade link with British India. The only link established was through the 19th century British treaty with Tibet, which opened the Indian trade post at Yatung and it

was through Chumbi valley in Tibet that the traders from India could approach western Bhutan. However, the trade routes between Bhutan and Tibet were closed in 1960. By this time Bhutan had already entered into the development partnership with India. This helped in redirecting Bhutan's trade towards India. With the construction of lateral roads linking Bengal-Assam plain to Phuentsholing and Phuentsholing to Paro in 1962, a new era in Bhutan's foreign trade began.

Patterns of Exports

An examination of Table-3.1 suggests that Bhutan is no longer an exporter of merely traditional, agricultural and forest based products. Today the list of exported items includes manufacturing, mining and novel items like philatellic products, coins as well. In 1999, according to the value of items exported to India and their percentage share in total exports, the top listed items are electricity (43 per cent), mineral products (14.8 per cent), product of chemical industries (12.1 per cent), base metals and products (11.4 per cent) and wood & wood products (6.3 per cent). For countries other than India, Bhutan's major exports are vegetable fats & oil (63.8 per cent), mineral products (21.9 per cent), textiles (5.8 per cent) and processed foodstuffs (2.9 per cent).

Hydropower generation being the most important area of comparative advantage and with the advantage of bilateral ties with India on its production and sales, Bhutan will continue to depend largely on this source for export earnings. However, significant improvements seem to have taken place in the field of manufacturing and mining. The linkage effect of investment in hydropower generation has been able to generate comparative advantages in the development of natural resource based industries, basically oriented towards the sub-regional market. In 1989 there were 168 manufacturing units in the country, which have gone up to become 486 in 1999. While the production of particle board and agro-based factory have increased considerably, the performance of power driven units like calcium carbide, ferro-alloys and cement have been particularly very impressive. The case of Bhutan Carbide and Chemicals Ltd. (BCCL), Bhutan Ferro Alloys Ltd. and Penden Cement Authority Ltd. can be illustrated as major success stories.

Table-3.2 presents the exports by major industries of Bhutan. It reveals that BCCL's exports have increased consistently to reach Nu.448.01 million in 2000 from Nu.356.13 million in 1993. The BCCL recorded an impressive return on investment and have witnessed dividends of more than 100 per cent since 1997[2]. Another success story is that of ferro-silicon exports by Bhutan Ferro Alloys Ltd., recorded an impressive increase in exports from Nu.369.99 million to Nu.428.36 million within a short span of five years, 1995-2000(see Table-3.2). Perhaps the achievement of Penden Cement Authority Ltd. in terms of exports has been most impressive. it has grown up from Nu.98.02 million in 1993 to Nu.236 million in 2000. These three performing industries can be termed as the *Triple-Gems*[3] of Bhutan's industrial economy. Among the forest product based industries the performance of Bhutan Board Products Ltd. and Bhutan Fruit Products Ltd. have been quite impressive. Another upcoming unit in this regard is Bhutan Agro Industries Ltd. whose exports have picked up to Nu.11.30 million by 2000[4]. Clearly the spillover of hydropower production in the country has helped expanding the production possibilities into hitherto untouched areas, which are not only catering to the ever-growing internal demands but also becoming the second best source of exports after electricity. Bhutan's experience pointed out that a major new resource-based industry could be established within 24 months of cheap power becoming available (*Bhutan 2020*, p.57). This suggests that once the

niche market is identified for such products, export is less likely to be affected by the 'production-lag' due to long gestation period.

Third country exports in vegetable fats and oils have picked up tremendously, accounting for 63.8 per cent of total third country exports in 1999. In value terms it stands at Nu. 176.77 million. The market for processed foodstuffs has also expanded. Mineral products are another important component in third country exports, constituting about 22 per cent of the total export.

Patterns of Imports

Bhutan depends on India and other countries for a wide range of products, from consumer items to intermediary goods and to the capital goods (see Table-3.3). According to the percentage share of items in total imports, machinery, mechanical appliances, base metals and electronic items top the list of imports in 1999, both from India (31.8 per cent) and the third country (83.8 per cent). While the value of these imports from India has increased from Nu.406.74 million in 1993 to Nu.1861.90 million in 1999, it has gone up to become Nu.1667.87 million (in 1999) from Nu.654.48 million (in 1993) for countries other than India. The other significant items of import from India, according to their share in 1999, constitute mineral products (14.4 per cent), cereals, vegetables, fruits, nuts, coffee, tea, spices and seeds (11.9 per cent), prepared foodstuffs (6.7 per cent), transport equipment (9.9 per cent) and the products of chemical industries (5.5 per cent).

Bhutan also imports several items other than machinery and electronic goods from countries other than India. However, they do not constitute significant proportion in total imports. The most significant of all such imports is medicines and pharmaceuticals, constituting about one per cent of total imports from third countries. Significantly, there has been no import reported from India in the field of medicines and pharmaceuticals over the period 1993-99. Imports of textiles (1.8 per cent of total imports in 1999) and mineral oils and fuel (2.9 per cent) have also picked up recently. It seems that while Bhutan is dependent on India for her requirements of capital goods, raw materials and basic consumer goods, it has been able to develop import ties with the countries other than India for the import of capital goods, medicines and pharmaceuticals and items of personal care.

Direction of Trade and BOP

Bhutan's trade is mainly directed towards India. Table-3.4 reveals that the Indian share in Bhutan's total exports increased from 86.39 per cent in1990 to 91.91 per cent in 1995 and to 94.45 per cent in 1999. The proportionate imports from India is slightly on the lower side in comparison to exports. Bhutan received 82.31 per cent of its total imports from India in 1990 which has gone down to become 74.61 per cent in 1999. In the area of exports the country has been able to identify potential market for horticulture products in Bangladesh during the 1980s, which was consolidated a great deal during the 1990s. The value of exports to Bangladesh has increased from Nu.127.75 million in 1990 to Nu.209.45 million in 1999. However, as a proportion to total exports, it has gone down from 10.46 per cent in 1990 to 4.20 per cent in 1999 due to increased volume of exports to India. Exports to countries other than India and Bangladesh are taking place mostly outside the sub-region, though yet to pick up in a significant

way. The value of such exports has gone up moderately from Nu.38.50 million in 1990 to Nu.67.29 million in 1999, slided down sharply as a proportion to total exports from 3.15 per cent in 1990 to 1.35 per cent in 1999 (see Table-3.4).

In the total imports of Bhutan, other than India, Singapore was at the top of the list in 1999 with a share of 12.74 per cent. This indicates that the imports from Singapore have picked up significantly during the 1990s, with percentage shares of 0.98 and 5.33 in 1990 and 1995 (see Table-3.4). The other countries with whom Bhutan has developed an import ties are Japan, Germany, United States, United Kingdom, Thailand and the Netherlands. However, imports are often seem to be done on 'as and when required' basis rather than a continuous one, the way it has been taking place with India.

Bhutan's imports have been growing at a rate faster than exports. During 1990s, while exports grew at an average rate of 17.4 per cent, growth rate of imports averaged 22.6 per cent. In 1999, the total value of exports to GDP was 28 per cent whereas that of the value of imports to GDP stood at 51 per cent. This has resulted into a consistently negative trade and current account balance. Trade balance experienced a negative figure of Nu. 216.96 million in 1990-91, increased to minus Nu.2453.67 million in 1998-99. This is further expected to go up to minus Nu.3086.86 million by 1999-2000 (see Table-3.5). During recent years, there have been faster enlargements in current account deficits due to imports for the newly initiated power projects. The widening of the current account deficit is expected to continue until the completion of these projects.

Foreign Capital

Foreign capital in Bhutan has been flowing mostly in the form of official development assistance (ODA) and concessional debt. Very little has been received so far in the form of foreign direct investment (FDI). The ODA to Bhutan is mostly donar funded in the form of grants, directed chiefly towards development projects. The country has been depending on foreign aid for most of its massive development projects, requiring huge capital. This has been reflected in the total inflow of foreign aid, which has increased from Nu.1037.36 million in 1990-91 to Nu.6550.82 million in 1998-99. This is further expected to go up to Nu.73353.12 million by 1999-2000 (see Table-3.5). The aid inflow in Bhutan is mostly coming from bilateral donors, those who are also Bhutan's development partners. India has been the most important development partner of Bhutan. While such bilateral aid flows, averaged about 62 per cent of the total during 1990s, about 15 per cent on average had been received by the UN systems[6]. The sector-wise inflow of foreign aid over the decade of 1990s suggests that on average the Renewable Natural Resources sector received the maximum of 19 per cent, followed by Transport and Communication (16 per cent), Human Resource Development (14 per cent), Health (11 per cent), Development Administration (11 per cent), Energy (8 per cent), Industries (4 per cent) and social development (7 per cent)[7].

Bhutan follows the principle of achieving self-reliance in the course of economic progress and sustainability in each aspects of the development process. This underscores the idea that the development should not be financially unsustainable by resulting into investments which can be ill afforded. More precisely, there should not be untenable increases in debt service obligations,

particularly towards the foreign institutions, in the blind pursuit of development (*Bhutan 2020*, pp.44-45). Such guidelines have helped the country in utilizing the foreign aid resources quite efficiently and effectively. Also, most of the aid has been well directed and was in the form of technical co-operation, project assistance and investment related technical assistance.

Bhutan's cautious policy towards foreign capital has resulted into the acceptance of loans strictly on concessional terms. Even though the volume of such debt has increased over time, the overall situation seems comfortable. This has been reflected in the debt-GDP ratio, which has gone down to 38 per cent in 1998-99 from 44.3 per cent in 1990-91 (see Table-3.5). However, this is expected to go up slightly by 1999-2000 in the wake of increased borrowings for the construction of power projects. The overall debt portfolio suggests that the maximum outstanding commitment of US $ 194.86 million (more than 50 per cent of total loan commitment) falls in the energy sector, 90 per cent comes from India as Rupee loans. About US $ 73.37 million outstanding loan commitment stands towards ADB, World Bank and other international institutions, basically being utilized in the Renewal Natural Resources sector[8].

Bhutan does not have a policy of promoting foreign direct investment. This is a part of Bhutanese policy of cautious approach towards foreign capital. Nevertheless, with gradual opening up and increased integration with the world economy a more liberal policy towards FDI is emerging. Recently, permission has been granted to an Indian hotel multinational group to open its branch in Bhutan in order to promote tourism. Foreign equity participation has been allowed in many companies and most of them are performing well, for example, Bank of Bhutan and Bhutan Ferro Alloys Ltd. are among the best performers.

'Dependency amidst Plenty'

External sector is very crucial for Bhutan's economy. The socio-economic development of the country has been affected by and depended on the contribution of external sector. However, at the same time it presents a paradoxical situation. The two major sources of growth-- hydropower production and exports earning there from and foreign aid, also point to the vulnerability of the national economy in terms of excessive dependence on them. Moreover, the exports of electricity represents 'one commodity-one country' case for Bhutan. The moot point here is – what if India becomes self-sufficient in electricity generation after tapping the equally abundant water resources available in the northeast, particularly Arunachal Pradesh? While the proposition can be rejected for being hypothetical, in all probability a change in the economic environment or policy in India is likely to affect Bhutanese economy a great deal. For example, mid-90s industrial slackness in India most probably affected the exports of Bhutan, which have gone down by the end of 1990s. Particularly, between 1999-2000 a declaration has been observed in the export values of almost all major industries, except Bhutan Polythene Company and Druk Satair Corporation Ltd. for which there had been acceleration (see Table-3.2, figures in bracket)[9].

Further, with the completion of each hydropower projects there is going to be a big addition to GDP. Since, Bhutan has the advantage of small population base and the growth rate of population sliding down, there will be a faster increase in per capita income. In the face of the country's dependency on imports, enlargement of 'hydro-Ngultrum' is likely to create the

paradox of 'increased dependency amidst plenty'. For example, the commissioning of the Tala hydropower project of 1020 MW by 2004-05 is expected to increase the GDP growth to 18.1 per cent by 2006-07, which is likely to induce the real GDP per capita further by 40 per cent with an expected population base of 0.792 million[10]. Since the share of manufacturing is expected to reach 30 per cent of GDP only by 2012, this newly generated 'hydro-Ngultrum' will further increase the demand for imports.

Thus, while Bhutan's economy has gained strength on account of certain advantageous factors, these have also constrained the competitiveness of other sectors[11] and have undermined the diversification of industrial sector.

9.4 Environmental Conservation Strategy and Policy Instruments

The 'WF&M Factor'

Located in the east Himalayas, the kingdom of Bhutan has a unique natural set up with its young and fragile mountains. The country represents almost all major climatic zones of the world viz. from almost tropical and sub-tropical to temperate and alpine with various intermediate and small micro-climate conditions[1]. Bhutan is one of the ten global 'hotspots' for the conservation of biological diversity. The country is endowed with abundant water and forests resources. In the course of development various mineral deposits have also been discovered and exploited. In fact, the three natural resources – Water, Forests and Minerals (WF&M) have basically steered Bhutan's growth profile over time.

As far as water resources are concerned, chains of rivers seem to join the whole of Bhutan. From west to east, the main rivers are the Amo Chu, Wong Chu, Mo Chu and the Manas. The Mo Chu, also known as Sankosh drains the entire Great Himalaya between the Chomo Lhari (7,320m) and Kula Kangri (7,554m). While the Tongsa Chu rises in the northern Bhutan, the Bumthang river (also called the Murchangpu Chu) joins the Tongsa in southern Bhutan. Most rivers in Bhutan flow rapidly at a high altitude between precipitous mountains and over a bed of large boulders. For example, even during the winter the Amo Chu or Torsa will have fierce and swift streams with an average depth of at least one and half meter[2]. Such powerful and fast flowing rivers have enabled the country to start the cost-effective 'run-on-the river' projects for hydropower generation. The present installed capacity is equivalent to 360 MW, which has the potentiality of climbing up to 30,000 MW in the future; that too with the help of just four major rivers of the country[3].

Bhutan has an impressive forest cover of 72.5 per cent, representing one of the richest 'green-patch' in South Asia. The 1974-79 Aerial Survey undertaken by the Department of Forests suggested that out of the total surveyed area of 29,176 sq. km., 21,593 sq. km. (about 74 per cent) was under forests cover (see Table-4.1). The per capita forest area in Bhutan has been worked out at 3.52 ha in 1990, which was much higher compared to 0.31 ha in Nepal, 0.84 ha in Sikkim, 0.36 ha in Kashmir, 0.51 ha in Himachal Pradesh and 0.05 ha in Garhwal/Kumaoun Himalaya[4]. Further, unlike the other countries in South Asia, there has not been much variation in the regional distribution of forests in Bhutan. Forests occupy more than 60 per cent each of Bhutan's major regions (see Table- 4.2), the highest of about 81 per cent in southern region and

the lowest of about 63 per cent in western region. Bhutan's prestine nature and the associated bio-diversity has helped the growth of industries based on forest products. While many industries, such as horticulture, have developed as a direct outcome of such resources, it also underscores the enormous possibilities for future growth of industries in the country.

One of the unique features of Bhutan Himalaya has been the presence of various mineral deposits, most of them being commercially exploitable in quality. Limestone and dolmite are found in large quantity. There has been the presence of coal bearing rocks in the Damuda group in the Bhangtar area, which is a part of the Gondwana sequence. The deposition of red quartzite and gypsum has been found and being mined in Pemaghastel area. There is a slate mine near Wangdiphodrang, a marble quarry near Paro, and three coal mines in south eastern Bhutan. The other mineral resources found in Bhutan include tungsten, graphite, copper, lead, zinc and talc. Mining operations have been quite profitable in the country. It has been an important source of export earning as well as the source for the expansion of manufacturing activities in the country.

Obviously, the 'WF& M Factor' has been very crucial and provided the main resources for country's development. However, it has also been the factor in exerting tremendous pressure on environment. The continuous exploitation of natural resources for development has caused environmental degradation. This has called for a judicious and delicate balancing between environment and development.

Pressure on Environment

The pressure on country's pristine environment has already started surfacing. This has come about mainly due to the close and constant interaction of the people with the natural environment, which has sharpened their insight into adaptive and alternative resource use strategies. The process of planned economic development has set in motion great many changes in the socio-economic sphere of the country. These changes in the beginning affected only the larger settlements, however, over time permeated into the remotest areas, where the traditional ways of life and livelihood started getting affected. The process, overtime, tended to affect the overall environmental and ecological balance between people and the environment. For example, in some part of the country it has led to increased use of marginal, easily eroded land and to the over grazing of fragile upland pasture areas[5]. There has been clearing of forests for agricultural purposes. Field studies near Mongar and Tongsa suggested substantial loss of forested areas due to farming, which unfortunately has also been found suffering from low crop yeilds[6].

A whole range of factors has been responsible for exerting pressure on environment. These include factors mainly related to population growth and economic development. A part of the pressure has also come from outside influences and some other factors, including the attitudinal one. A summary presentation of all such possible factors is made as follows.

1. Population Pressure
    i) Migration of population
    ii) Housing demand
    iii) Sewage and Waste disposal
    iv) Competition for available land
    v) Poverty
    vi) Shifting-cultivation
    vii) Fire wood demand

2. Economic Development

    i) Hydropower development
    ii) Mineral extraction
    iii) Industrialization
    iv) Road construction

3. Outside Influences

    i) Tourism
    ii) Globalization

4. Attitudinal
    i) Tendency to regard natural environment as a free resource

5. Others
    i) Forest fire
    ii) Over grazing

The growth of population has put pressure on land and as the environmental conditions in the highlands deteriorate, many people have migrated to the lowlands and to the urban centres[7]. With the urbanization picking up in the country, the migration of population from rural to urban areas has gone up considerably. Such migration has been prompted by pull factors like better health facilities, better infrastructure, employment opportunities, and relatively 'modern' life and business avenues. As the number of contacts in urban areas and the aspiration of being in the 'mainstream' will grow, there is likely to be more migration happening from rural to urban centres. This migration has created housing problems in the towns and has accelerated the destruction of the lowland forests. In rural areas, the pressure on shifting-cultivation (which is of 'slash-and-burn' type, locally known as *tseri*) has resulted into the contraction of the average cycle. Even though Bhutan does not have the problem of absolute poverty, the changing and growing requirements of the rural poor will keep on putting pressure on the natural environment. As a direct off shoot of the rise in population, there has been tremendous increase in the fuel wood demand in the country. Though factors like enhancement in agricultural residue, technological change (eg. introduction of fuel saving stoves) and a rise in the opportunity cost of collection time have put some positive impact, the demand for fuel wood is likely to increase with increased per capita income.

Factors associated with economic development are basically related to the exploitation of natural resources like water, forests and minerals. They are necessarily to be utilized for hydropower development, mineral extraction and industrialisation. Road and other infrastructure have also claimed a substantial forest cover in the country. The outside influence on Bhutan's environment is mainly due to the arrival of tourists, requiring the development of destination/spots and the associated facilities. Since Bhutan is committed for globalization, the process of meeting the requirements and encashing the benefits is unlikely to go without possible impact on environment. Bhutan's fragile Himalaya is also bristling with a typical problem of forest fire, which often causes a substantial loss of forests. Bhutan's high livestock population compared to that of wild life has exposed it to the risk of overgrazing, particularly of loose forests.

All these present a "complex array of forces"[8], posing pressure on the natural environment. Although, the country has been able to avoid any serious damage to environment so far, the pressure in the future may become formidable. For example, problems such as soil erosion due to deforestation, pollution especially in major and budding towns and depletion of fresh water due to decrease in level of ground water table and subsequent drying of springs have already been reported as some of the more recent concerns[9]. The task of the future policy for safeguarding environment while still pursuing the goal of development becomes more difficult in the face of the general attitude which is often inclined to regard natural environment as a free resource[10].

Conservation Philosophy and Strategy

Bhutan's environmental conservation strategy is deeply rooted in the Buddhist philosophy and religion which Bhutanese people have cherished and nurtured over centuries. In rural Bhutan, for example, nature is interpreted as a living system rather than just a resource-base to be exploited for material gain. People consider themselves as a part of the whole of the living system. This kind of outlook is the result of the fusion of Tantric Buddhism and animistic Bonism, which is further assimilated into the mainstream beliefs and values (*Bhutan 2020*, p.23)[11]. Places are identified with deities, divinities and spirits, and a large part of the landscape is mapped in such terms in the minds of Bhutanese people[12]. However, in the pursuit of development and the emerging need for environmental protection, keeping such mysticism alive for all time to come would be a real challenge. Bhutan's conservation strategy, while taking special note of this fact, recognizes a clear link between environmental conservation and the conservation of cultural heritage. In fact, environmental conservation is a part of the larger concern for maximizing the Gross National Happiness, and cannot be seen in isolation with the other segments of the general policy.

Bhutan's first strategy towards environmental conservation is to maintain 60 per cent of forests for all time to come. This limits the pursuit of deforestation to a larger extent. With an extensive aforestation programme, such a limit provides sustainable space to exploit natural resources for economic development. This is the part of the overall *middle-path* philosophy (*The Middle Path: National Environment Strategy for Bhutan*, NEC, 1998) pursued for environmental conservation.

Environmental conservation includes the maintenance of rich bio-diversity of the nation. However, in case the twin goals come to contradict each other the emphasis has to be on environmental conservation, even if this means loss in bio-diversity. For example, the government has taken a decision to eliminate shifting-cultivation practices in the country. Such a decision is taken on environmental ground, though this amount to a loss of several species of millet and *sorghum* that only grew in conditions associated with shifting cultivation[13]. While such decisions have to be taken only in limited cases, a simultaneous strategy of forests regeneration and bio diversity conservation is followed.

An effective watershed management is considered as a key component of conservation strategy towards sustainable development. There are five main watersheds identified for future management, which are going to be crucial in maintaining the environmental and ecological balance in the country. These are related to hydropower development, farming, livestock, settlement and the exploitation of timber and logging.

The environmental conservation strategy has "deliberately chosen to forgo immediate economic gains from the indiscriminate development of sectors like tourism and mineral quarrying "(*Bhutan NHDR 2000*, p.49). In order to ward off the negative effects of mass tourism, Bhutan has consciously followed a high value tourism policy and promoted cultural tourism, eco-tourism and adventure/sports tourism. As a part of the development strategy, a guideline for Environmental Impact Assessment (EIAs) has been developed. Under EIAs, all projects are to be assessed for their impact on environment.

While Bhutan is consciously forgoing the economic gains by refusing to fully exploit resources, on the other hand the cost of maintaining and managing the environment and of capacity development has been rising. Moreover, Bhutan lacks in technical knowledge and manpower for the effective implementation of these conservation goals. In view of this, foreign collaboration is sought in the area of knowledge sharing and manpower development. Overtime, Bhutan's idea of conservation is substantiated and made amenable for practical implementation through a series of policy instruments that include passing of necessary legislation, capacity development for EIAs, idea of the greening of national accounts, and entering into collaborative arrangements.

Policy Instruments

The foundation for the conservation of environment and the preservation of bio-diversity was laid formally at the Paro Workshop in 1990, which prescribed the concept and strategies of sustainable development based on *middle-path* philosophy for all development plans in the country. Forest is seen as the base line requirement for environmental sustenance and the central theme of sustainable development. The Division of Forest with its various governmental and semi-governmental wings has assumed the responsibility of protecting and promoting forests, wild life, and the sustainable use of resources. The Division carries out its tasks mainly through forestry management units, maintenance of national parks and protected areas. Similarly, the Renewable Natural Resource (RNR) sector or 'green sector' is the domain of the Ministry of Agriculture, which implies an integrated approach to the farming and technological change in agriculture.

Environmental legislation have been enacted to provide legal framework and support to the conservation activities in the country. One of the earliest legislation was passed as back as 1969 in the form of Forest Act of Bhutan. However, not much has been done during the decades of 1970s and 1980s. During 1990s, there has been a resurgence of the need felt in this crucial field and several attempts are made to fill in the gap. The Forest and Nature Conservation Act was passed in 1995 and a National Forestry Master Plan for the period 1996-2010 was made. The decade also witnessed the upgradation of the National Environment Committee of 1989 to the status of National Environment Commission. The National Biodiversity Action Plan was brought into operation. While the national environment strategy was further consolidated in 1998 for the articulation of long term visioning, the Environmental Assessment Act was passed in July 2000. Some related legislation such as the Inheritance Act, the Land Act and the Livestock Act are already put in operation. All these legislation do cover a lot of grounds in safeguarding the national interest, still the need for a comprehensive legislation incorporating the latest environmental concerns like pollution and problems of cross-boarder nature is being felt. The proposed National Environment Protection Act can be expected to cover a lot of ground in this regard.

The system of Environmental Impact Assessment (EIAs) is one of the most important enforcement measures developed towards environmental management. The EIAs are made compulsory for the establishment of all projects in the country. The EIAs are designed to ensure the followings (*Bhutan 2020,* p.89):

1. Development projects are environmentally and economically sound in the long run.
2. Development projects have minimum environmental, economic, cultural and social impacts.
3. A prior evaluation of environmental impacts on ecologically fragile systems is undertaken,
4. There is a systematic assessment of the effects of development pressures on the natural resource base as well as communities and culture.
5. Project benefits are optimized.

The EIAs are made an integral part of the planning process and are expected to go a long way in environmental management. However, a lot of ground is yet to be covered in the field of institutionalizing of capacities for EIAs. Efforts are required to develop the EIAs 'tools' which are sound, contextual and enforceable in local conditions. While the EIA legislation is in the pipeline, enhancement of technical knowledge in this field is called for.

Another novel attempt in the field of environmental management towards sustainable development is the 'greening' of national accounts in the country, to be achieved by 2002[14]. It is proposed to introduce the 'environmental satellite accounts' in the existing UN based national accounts system. Such a system will provide an edge for strengthening the institutional capacity. It can be helpful in developing a system whereby the process of internalizing the external environmental costs is initiated. The 'greening' of national accounts is also expected to contribute to the quantification of Gross National Happiness [15].

Among the five watershed management areas identified, the action plan has already begun in the field of water management, expected to ensure fully elaborated water quality standards by 2002. The plan for the management of Wang Chu river is completed and the plans for other major rivers like Puna Tsang Chu, Mangde Chu, Kuri Chu and Dangme Chu are being prepared. While the master plans for the watershed areas like farming, livestock, settlement and logging are still awaited, there is a need for the revision of related laws in the light of new requirements. An elaborate land-use planning is also called for.

Some instruments in the form of pricing policy have also been introduced in the country. Two prominent examples in this regard are the introduction of water and sewerage charges in selected urban centres and the use of high tariff and pricing system in tourism. The introduction of water meters have resulted into a reduction of water wastage (from 50-75 per cent to 24-30 per cent), reduction in per capita consumption of water (from 210-300 lt to 103-178 lt a day) and a marked improvement in water supply[16]. A high priced tourism has been successful in restricting 'mass tourism' in the country. The total earnings from tourism has increased from US $ 1.91 million in 1990 to US $ 8.87 million in 1999, representing the policy of 'high value - low volume' tourism. Another example of the indirect use of pricing instrument to ward off the negative environmental impact in the country can be cited in the recently effected heavy reduction in import tariffs on electric rice-cookers, being imported mainly from Thailand. By making the electric rice-cooker cheaper by 40-50 per cent, it is expected to bring down the demand for fuelwood in the country.

A major impetus to the environmental management in Bhutan comes from foreign assistance and collaboration. Bhutan became a signatory to the global Biological Diversity and Climate Change convention in 1992 and entered into Sustainable Development Agreement with the Netherlands in 1994. This has helped in strengthening the country's capacity for environmental management. For example, the Gedu Wood Manufacturing Corporation, the largest logging operator in the country, was closed down and the debt obligation thereof was met with the assistance of the Netherlands, under *debt-for-nature* swap scheme.

The Bhutan Trust Fund, a major funding agency for launching of programmes and undertaking researches towards strengthening of environmental conservation, is based on the involvement of donors and the government. While Bhutan will keep on requiring such collaborations, these should also be extended in the field of technical knowledge sharing for capacity building.

9.5 Linking Trade with the Environment

The Setting

At present the major exports of Bhutan are related to or based on primary products and the environmental impact of trade is currently mainly focused on the natural resource sector. In the future, some manufacturing can be expected to increase in importance and the environmental implications will broaden to include pollution, energy efficiency and waste disposal. These environmental problems, however, have already started surfacing as recent concerns, though not as a result of expanding manufacturing and exports. Such problems have arisen due to urbanization, population increase and migration of people from rural to urban centers. Perhaps, Bhutan does not truly represent a typical case of developing countries. Some of the most

pressing problems such as poverty, unemployment and inequality which most developing countries are suffering from do not constitute a major concern for Bhutan. With a relatively small population base, Bhutan also has the advantage of 'starting late'. This has helped in learning from the experiences of other countries and in following a 'cautious approach'. The *Bhutan National Human Development Report 2000* mentions in clear terms – "To prevent over-exploitation of Bhutan's natural resources, the Government has deliberately chosen to forgo immediate economic gains..."(p.49). Therefore, environmental values are not invoked in support of more human centred but 'divisive projects', as has been the case of most developing countries.

In fact, Bhutan has been able to minimize the impact of economic growth upon the environment, which is largely intact and is expected to continue to be so as a matter of policy. Bhutan's stand on the balance between economic growth and environment is more akin to the concept of 'ecological modernization', whose central proposition is that economic growth can be adapted to meet environmental goals. Importantly, the experience of Bhutan suggests that such an adaptation to achieve the 'green goals' such as sustainable development has not proved incompatible with the objective of attaining a high standard of living through trade; trade being crucial in raising the per capita income and in brining about better health and education standards. Nevertheless, a lot of ground is yet to be covered, especially towards self-sufficiency, economic diversification, modernization, social sector and equity. In the pursuit of achieving these goals, trade will continue to play a vital role. With environmental concerns gradually becoming more and more pressing, the issue of linking trade with environment will be of utmost significance for Bhutan. It can subserve the twin objectives of raising exports earning and more importantly an additional tool for effective environmental management.

Trade in ESGs

Bhutan has been trading in Environmentally Sensitive Goods (ESGs), constituted about 90 per cent and about 98 per cent of total exports to India and other countries in 1999. The main items of exports with both obvious and possible environmentally degrading effects are mineral products, hydropower, wood & products, plastic and rubber products, cement and chemical products. Bhutan also exports prepared/processed food stuffs and horticulture products in large quantity, which may be associated with product labelling and packaging standards.

Hydropower is the single most important item of exports of Bhutan. It produces 'clean electricity' at least cost, as the production is undertaken through "run-on-the-river" type projects. Although hydropower is a renewable form of energy, it is not completely free from environmental problems. The main issues concerning hydroelectric development relate to the threat of watershed degradation, loss of forests and ecological disturbances. This can also have effect on wildlife because of disturbances in their seasonal migration routes etc. While watershed management programme is already under way, a compensatory afforestation may be required. At present, Bhutan does not have an alternative to hydropower exports. If the exports of wood or mineral products are stepped up as an alternative the magnitude of environmental damage will be much more. Therefore, it is in the interest of Bhutan to continue tapping water resources for power generation. However, Bhutan should keep on watching for the associated dangers. In the future, Bhutan can also work out the possibility of exporting hydropower to the

neighbouring countries like Nepal, Bangladesh and Sri Lanka. This can be done directly or through Indian grids, to be deemed as direct export.

Another major exports of Bhutan constitute forestry products. Logging operation for exports has caused deforestation. Timber and other woods have been the items of major exports to India. The government identified this area quite early and regulated the logging operations to a larger extent. The largest logging operator in the country Gedu Wood Manufacturing Corporation was closed down. As a result, the value of wood and wood product exports to India has declined from a peak of Nu.614.48 million in 1995 to Nu.297.97 million in 1999.

However, despite strict regulations the possibility of illegal logging can not be ruled out. The use of market instruments such as high license fee, export tax on wood and an excise tax on domestic saw mills may work effectively via reducing the profitability and hence incentives to cut forests. Such a system can help in internalizing the costs of regenerating the forests into logging costs, at least partly to being with.

Another source of environmental degradation in Bhutan is due to the exports of mineral products and manufacturing items like cement and products of chemical industries. Since industrial development is at an early stage in Bhutan and these sectors are small, no serious damage is reported to have been caused by them. However, some concerns over water and air quality have been raised recently. Fumes emitted by vehicles are gradually polluting the air in urban centers. Sewage from residential quarters and some factories are causing water pollution. These have been taken up seriously in the policy circle and a fully elaborated water and air quality is targetted to be achieved by 2002 and 2007. However, the problem seems to be associated with the adoption of standards and the use of instruments. A single standard may not be justifiable for all industries because the marginal cost of reducing pollution will differ from industry to industry. At the same time, high standards for air and water quality, especially those adopted by some developed countries, may not be appropriate for Bhutan. Due to largely intact environment, the pollution absorptive capacity of environment in Bhutan is much higher and in this case a locally suitable standards can be adopted, which also do not compromise the social costs. As far as economic instruments are concerned the use of pollution taxes based on a fully conceptualized polluters-to-pay principle (PPP) may not make sense in Bhutan because of already existing high ambient air and water quality. At this stage, a warning system for all types of polluters and pre-guard measures in the form of charges (as has been adopted in some urban centers in the form of water and sewage charges) may serve the purpose.

The issue with regard to the exports of prepared/processed foodstuffs and horticulture products will be more associated with labelling, packaging and sanitary standards. Bhutan has not faced any serious problem so far in the exports of these items arising due to environmental standards. However, this may happen because most exports in this category is that of vegetables, fruits, nuts and spices (processed/prepared foods constitute 3-5 per cent of the total exports), and are often directed towards the countries in the sub-region where the practice of 'green-purchasing' is yet to pick up. However, Bhandari (1997, p.106) quotes an isolated example related to quality control when some resistance took place over the packaging of apple exports to Bangladesh. This happened when the previous practice of using wooden boxes was replaced by cardboard boxes for the purpose of promoting the shelf life of apples and decreasing the use of timber in Bhutan.

This move also brought the packaging practice nearer to the internationally accepted ones. The resistance was basically because of the belief that wooden boxes are more durable and survive better during their rough handling and transportation.

Exploring Possibilities

Even though Bhutan's small industrial economy has not provided much opportunity to interact in a multilateral trading environment, the country has an urge to move gradually towards realization of this goal. Finding out the possibilities for trade expansion through linking trade with environment may prove beneficial for Bhutan in moving towards this goal.

Bhutan must explore the possibility of identifying niche markets within the sub-region and also outside the region. The potential for diversification exists in the areas of agricultural products, traditional handicrafts, manufacturing, beverages, herbs based pharmaceuticals and products based on bioprospecting and genetic engineering. By incorporating the environmental standards in production and packaging, Bhutan can expand the market of some of the currently produced/processed food items such as red-rice, cheese, honey, mushrooms and beverages. The future possibility in the production of organic agricultural products (OAPs) for export market can also be explored. Studies suggest that the market for OAPs have expanded tremendously, especially in the developed countries (UN, 2001). With chemical intensive commercial farming yet to gain ground, Bhutan's natural soil conditions provide enormous opportunity to use the heritage of ancient wisdom towards the production of OAPs.

Several types of useful herbs grow in the Himalayan environment and the potentiality of trade in such herbs does exist (Aryal, 1993). Eastern Himalaya of Bhutan holds enormous possibilities in the exports of medicinal and other herbs. It is to be noted that Bhutan has an indigenous medicinal system, known as *So-Wa-Rigpa*, which is being promoted actively by the government. The service is offered through the indigenous hospital in Thimphu and 11 indigenous dispensaries spread all over the country (*Bhutan NHDR 2000,* p.27). This traditional medical system uses Himalayan herbs and flora having medicinal values. Such products can be standardized and explored for export possibilities.

Similarly, export market can be explored for *dyesho*, the Bhutanese paper of tremendous aesthetic value. Traditional handicrafts, textiles and ethnic designs form another advantageous area for Bhutan. Perhaps, the most promising area in the future development of Bhutan will be the use of its rich biodiveristy as a development asset. The development of environmentally clean industries based on bioprospecting and genetic engineering can "place Bhutan in the vanguard of scientific advance" (*Bhutan 2020,* p.88).

Bhutan's Strong Points

Today, Bhutan is in a position to go for trade diversification and in the process also utilize the emerging new environmental norms in trade to its utmost advantage. There are certain strong points in favour of Bhutan which can make the task little easier.

First, environmental conservation and promotion towards sustainable development is an integral part of the main development strategy and therefore the objectives of economic development and environmental protection are mutually compatible. Evolving a synergy between environmental protection and economic development may not be difficult for Bhutan. This can provide keys to making trade and environment policies mutually compatible.

Second, the prime mover is government, which helps in providing a broader context than is usually provided by environmental policy alone, such as the central development concept of Gross National Happiness emanating from the traditional, cultural and spiritual legacy of the nation. This means the creation of new products and services can have the potentiality of demonstrating improved environmental and economic performance rather than causing its deterioration.

Third, this means the mental gap of the society, including producers and businessmen, for understanding and effecting this synergy is at the minimum. Today environmental education and management activities have taken roots in the country with formal and informal education reaching across the various strata of society, viz., school children to general population and civil servants to business community.

Fourth, necessary policy and legal framework, which can be moulded to provide support to link trade with environment, are already developed, and

Fifth, poverty is not a formidable problem in Bhutan.

Major Thrust Areas

The pursuit of linking trade with environment does not require a change in Bhutan's development strategy, rather the government must continue along the paths pursued in recent years. A lot of progress has already taken place in making the system transparent, flexible and sustainable. The policy makers are aware of further improvements which will be taking place in time. Nevertheless, it underscores the fact that most imperatives for development still come from the government. Further, while Bhutan's trade is likely to be followed on the similar line in the near future, meanwhile attempt can be made to fill in gaps in certain areas for further strengthening of the economy. These areas are basically related to manpower development, acquisition of technical knowledge, mobilization of funds, creation of database and inventories and enhancing further cooperation and trade.

A major thrust area is the development of manpower and the acquisition of technical knowledge. Studies can be initiated on development of environmental and trade policies, which are supportive of the principle of sustainable development, including studies on programme evaluation and impact assessment. While the government is committed to bring out a list of inventory in bio diversity by 2002 (*Bhutan 2020*, p.91), there is a need for promoting studies in bio diversity, database generation on the status of flora and fauna and identification of economically useful natural resources and the possibilities of their sustainable utilization (*Bhattarai, 2001*,pp.68-69). There is also a need to establish mechanisms which will enable the

government, researchers and private sector to interact with each other. This will establish necessary information linkage and promote informed decision making.

For developing countries while the potential opportunities for improved trade access exist in the wake of liberalization and 'greening of trade', apprehensions have also been raised for its possible negative impact. It has been indicated that environmental standards introduced in trade can actually hamper the trade of developing countries and that these policies have protectionist intent. While it is difficult to follow the environmental standards due to multiplicity of stringent norms and lack of technical knowledge, it is important that the developed standards are also in conformity with social, cultural and development goals of the country. Bhutan has been able to develop its own polices related to process and production methods (PPMs) based on social, cultural and development goals. However, a simultaneous attempt can be made to incorporate the possible elements from international standards set in this regard. Developing its own eco-lebelling, which will be based on sustainable production of commodities, may prove helpful in searching niche market.

While the potential for trade expansion through linking it to environment exists for Bhutan, there seems to be an urgent priority for achieving the goals of expansion and diversification of the domestic economy. Once this is achieved, it will also contribute to trade diversification. There are, however, limiting factors inhibiting such diversification. Small size of population deters the manufacturing to grow especially that of consumer goods. Since most activities become unviable due to small size of demand within the domestic economy, it does not allow the private sector to grow despite favourable government policies. However, Bhutan has the advantage of huge market in India and other South Asian countries, which can be tapped for manufacturing and other products. Some of the items of imports can be identified, e.g., basic consumer items to begin with, and produced within the country, to be directed towards domestic consumers as well as towards exports. Such an 'export-oriented production, based on import-substitution' may prove helpful in achieving the goals of self-sufficiency and exports earning. This can also prove vital for the expansion of private sector. However, this dual strategy of 'import substitution-led-export' will have its own problems and limitations, which need to be addressed in detail.

Nevertheless, in developing the institutional capacities for realizing the goal of sustainable development and making headway for 'green trade' the role of international organizations in assisting Bhutan will be important. Such assistance can come about in the areas of capacity development on EIAs, environmental information, education and training, and management of environmental problems such as soil erosion, pollution and waste management etc.

Further, regional cooperation forum such as SAARC is extremely important for Bhutan, as its major trade is likely to take place within the South Asia region in the near future. It is in the interest of Bhutan to become an active partner on environmental related issues within SAARC. In fact, Bhutan has the potentiality to spearhead the context of environmental management towards sustainable development in South Asia. Meanwhile, Bhutan can sort out problems related to trade and environment in the regional forum of SAARC.

9.6 Concluding Remarks

The small landlocked country of South Asia-Bhutan has made considerable progress over the past four decades of planned economic development. It has achieved a fair amount of self-sufficiency and has undergone structural transformation. The progress is reflected in the basic socio-economic indicators, sectoral shares to GDP and the progress in HDI. Bhutan follows a development strategy which seeks to strike an appropriate balance among social, economic, political, cultural and environmental goals. A holistic approach to development is followed designed to take care of material as well as spiritual needs of individuals. A unique concept of Gross National Happiness has been evolved as the central development concept.

The growth of hydroelectricity is the main driving force of development in the country. It has also generated a considerable linkage effects, resulted into a simultaneous growth of manufacturing, trade and construction sectors. While Bhutan's current revenue generation is in a position to meet current expenditure, it keeps on depending on foreign aid and loans for capital projects. The changes in CPI in the country has tended to be fairly more stable during the second half of 1990s and are generally on the lower side.

External sector is extremely important for Bhutan. It provides the two most important sources of growth - exports earning and foreign aid. The top listed items of exports are electricity, mineral products, products of chemical industries, base metals and products, wood & wood products and processed foodstuffs. Bhutan is dependent on imports for its requirements of capital goods, raw materials, basic consumer goods and medicine and pharmaceuticals. Bhutan's trade is mainly directed towards India and the sub-region. Some trade ties are also developed with countries outside the sub-region. Imports continue to outweigh exports, reflected in trade and current account deficits. Bhutan receives foreign capital mostly in the forms of ODA and concessional loans. While the economy has gained strength on account of certain advantageous factors, these have simultaneously constrained the competitiveness of other sectors, reflected in the 'dependency amidst plenty' paradox.

Bhutan is endowed with an extremely rich natural resources and biodiversity. While Bhutan's natural environment is largely intact, the pressure has begun to surface. The factors affecting environment in Bhutan are related to population pressure, economic development, outside influences, attitudinal and others. Bhutan's environmental conservation strategy is aimed towards sustainable development. It is based on *middle-path* philosophy deeply rooted in the Buddhist tradition. Various policy instruments have been developed, including legislation, environmental impact assessment (EIAs), greening of national accounts and entering collaboration and treaties. Some market-based measures have also been adopted.

Linking trade with environment is very crucial for Bhutan. It is likely to result in improved trade performances. Simultaneously, it can also prove vital in setting environmental standards in pursuit of achieving the goal of sustainable development. However, Bhutan's experience on the issue of linking trade with environment is only brief and limited. It does not provide evidences either to support or to reject the current debate on trade liberalization involving the issue of linking trade with environment. Meanwhile, Bhutan seems to continue with trade in several environmentally sensitive goods (ESGs), though they have not resulted into any major

environmental damage so far. However, some concerns like soil erosion and pollution has gradually started surfacing.

Bhutan must explore the possibility of identifying niche markets within the sub-region and also outside the region. The potentiality of such an expansion will be more if Bhutan gives a consideration to the emerging environmental standards. It is in the interest of Bhutan to develop its own standards based on sustainable production of commodities. The potentiality can be explored in the areas of organic agricultural products (OAPs), traditional handicrafts, manufacturing, beverages, herbs based pharmaceuticals and products based on bioprospecting etc.

While the potential for trade expansion through linking it to environment exists for Bhutan, there are limiting factors which will keep on undermining its capacity to do so. These factors are related to manpower development, acquisition of technical knowledge, mobilization of funds, creation of database and inventories and furthering cooperation and trade etc. These are also the areas where the potential role of international organizations in assisting Bhutan exists. Regional forum like SAARC is extremely important for Bhutan. It is in this forum that Bhutan can address problems related to trade and environment and gain advantages out of it. Meanwhile, it is in the interest of Bhutan to keep a close watch on the latest trend in liberalization and the issue of 'green trade', particularly from the point of view of developing countries and from its own interest.

End Notes

Section 2

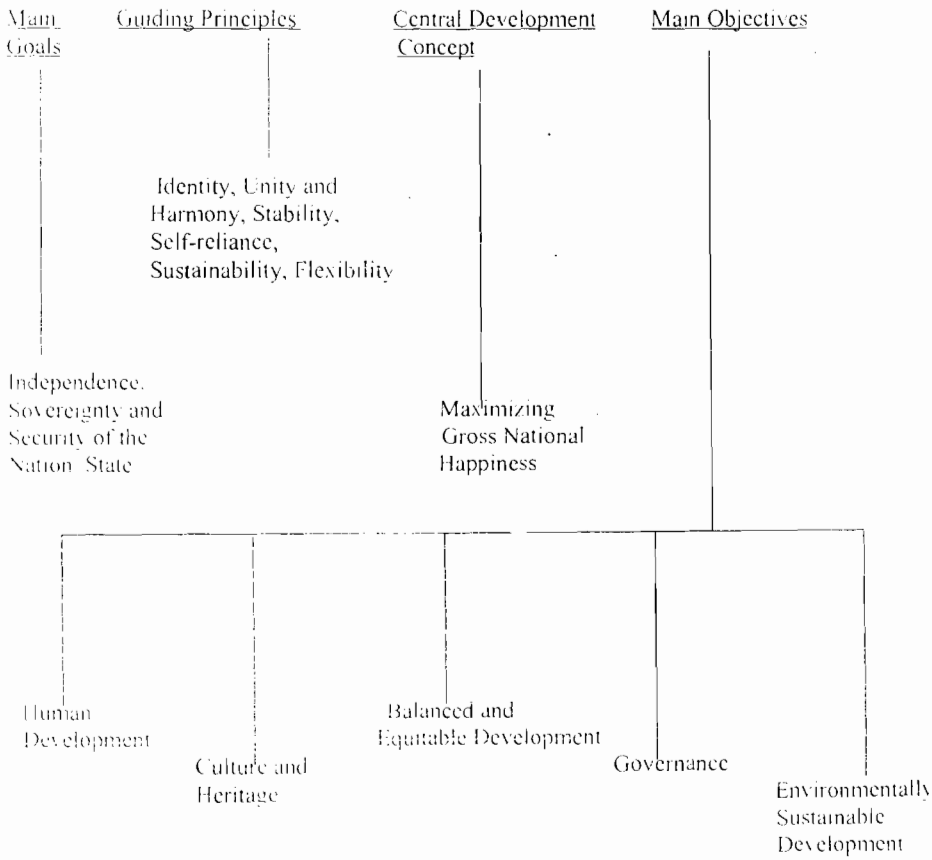
1. Only scanty records are available about the early history of Bhutan. Historians point out that the life in Bhutan in the olden days was highly fragmented and isolated. Guru Padmasambhava, popularly known as Guru Rinpoche, who visited Bhutan in the 7th Century and preached Buddhism, brought in the first major change. Before the visit of Guru Rinpoche an animistic religion Bonism was practiced in most part of the country. Zhabdrung Ngawang Namgyal, a lama of the Drukpa Kagyue sect, has been credited for unifying the country in 1616 by introducing for the first time a system of administration and a code of law. However, the history of Bhutan continued to be marked by years of internal strife, instability, civil wars and isolation, as late as by the close of the 19th century (Dorji and Pelgan, 2000). In contrast, the 20th century marked the beginning of stability and consolidation phase in Bhutan. It all began with Trongsa Penlop Ugyen Wangchuck emerging as the de-facto ruler of the country after being conferred with the insignia of the Knight Commander of the Indian Empire on his successful mission to Tibet in 1904. In fact the history of modern Bhutan as a unified political entity began in 1907 when Sir Ugyen Wangchuck finally assumed the throne with the title of Druk Gyalpo. Earlier the local Penlops had held the power in different regions. The struggle of power was fought mainly between the Penlop of Paro and Trongsa. In 1926, Ugyen Wangchuck was succeeded by his son Jigme Wangchuck, who ruled until 1952. March 1952 heralded the beginning of a new era of Bhutan's development when Jigme Dorji Wangchuck ascended the throne as the third Druk Gyalpo. In 1953 National Assembly was established, laws of the country were codified and administration was streamlined. The visit of Indian Prime Minister Jawaharlal Nehru in 1958 at the invitation of King Jigme Dorji Wangchuck marked a big stride in the field of cooperation and development between Bhutan and India. This paved the way for the planned economic development in Bhutan and gradual strengthening of the domestic economy, proved vital in breaking up of the 'self-imposed isolation'
2. In comparison to the Planning Commission's estimates, the UNDP estimates presented in *Human Development Report* puts Bhutan's HDI on a lower side. The differences lie in the value of indicators used by these two estimates. For example, *Bhutan National Human Development Report 2000* acknowledges the following differences pertaining to the year 1998

Indicator	Value of indicator used by Global HDI	Bhutan NHDI
Life expectancy at birth (years)	60.7	66.1
Adult literacy (%)	44.2	54.0
Combined enrolment ratio	12.0	72.0
Real GDP per capita (PPP$)	1,467	1,534
HDI	0.459	0.581

Bhutan NHDR 2000 clearly spells out that the source of above differences lie in the use of demographic variables. While the RGoB estimate is based on the most recent demographic survey carried out in Bhutan, the UN's estimate is based on demographic projections and the use of the population total of 1.9 million instead of 0.636 million for various calculations (*Bhutan NHDR 2000*, p.55). However, such differences are bound to occur in the absence of a systematic population census which is long overdue in the country.

3 The cost of health and educational services is almost entirely borne by the government. Only a part of health expenditure is met with by making the government employees pay 1 per cent of gross salary as health contribution. Recently, the government has decided to realize part of the charges involved in dental services. This will reduce the burden on the government exchequer and help in achieving self-sufficiency in terms of meeting current expenditure from the current revenue. While the cost of education, including higher education, continues to be borne by the government, some private schools have started catering to the growing needs of the society in the urban areas like Thimphu and Phuntsholing. In terms of budget allocation, government spends more than 20 per cent of its total expenditure on health, education, water supply and sanitation (*Bhutan NHDR 2000*, p.46)

4 **The Normative Architecture for Change and Development**



Bhutan 2020, pp.47-48.

Bhutan 2020, p.45.

The concept of GNH has been propounded by His Majesty King Jigme Singye Wangchuck who considered Gross National Happiness as more important than Gross National Product. This vision of GNH has been articulated and groomed into the overall guiding principle for the development of Bhutanese society and the economy. The expression GNH is essentially a summarization of the basic tenets of Vajrayana Buddhism, the state religion of Bhutan, which spreads the culture of harmony and compassion.

8. *Bhutan 2020*, p.47.
9. *Development Towards Gross National Happiness*(2000), p.23.
10. Time series data for the decades of 1960s and 1970s are not available. The system of national accounts in Bhutan started only as late as 1987. Backward interpolation has been done for the period 1980-86.
11. For detail see the section 'Setback to Human Development' in *National HDR 2000*,pp.1-32.
12. *UN: Country Presentation for Bhutan*(2001), p.32.
13. For detail analysis of present situation, problems and initiatives see Development *Towards GNH(2000)*, pp.83-86.
14. *Development Towards Gross National Happiness(* 2000),p.11.
15. The study suggests that between 1991-98, the changes in the prices of food articles have fluctuated more than 50 per cent in its magnitude while changes in non-food prices have witnessed a relative stability. Among food items pulses, vegetables, fruits, edible oils, fats and spices have demonstrated larger fluctuations in the changes of their respective prices, so much so that the calculated coefficient of variations over 1991-98 have not been found less than 100 per cent in each case. Among all the items only two broad groups –other food & intoxicants and clothing & footwear have been able to maintain a relative stability (Pankaj,1998, p.45).
16. See *Development Towards Gross National Happiness(*2000), pp. 72-73; Editorial, *Kuensel*, June 9, 2001.
17. Pankaj (2001).
18. Pankaj (2001).
19. *Development Towards Gross National Happiness(* 2000), p.63.
20. *Small States : Meeting challenges in the Global Economy*, Report by Commonwealth Secretariat/World Bank Task Force, 1998; quoted in *UN: Country Presentation for Bhutan*(2001), p.37

Section 3

1. Karan (1990), p.110.
2. *UN: Country Presentation for Bhutan*(2001),p.15.
3. In Bhutanese religion and tradition the finest blessings are sought from the *Triple-Gems* deity.
4. *Selected Economic Indicators*, June 2001, p. 10.
5. *UN: Country Presentation for Bhutan*(2001), p.11.
6. *UN: Country Presentation for Bhutan*(2001), p.35.
7. *UN: Country Presentation for Bhutan*(2001), p.35.
8. *UN: Country Presentation for Bhutan*(2001), p.36.
9. However, this slow down may have been effected partly by further depreciation of Ngultrum against US dollar and recent escalation of tension over Bodo/ULFA issues, temporarily disrupting the road transportation across the border.
10. *Eighth Five Year Plan*, Vol.I.
11. *UN: Country Presentation for Bhutan*(2001), p.38.

Section 4

1. Bhattarai, Shivaraj(2001), p.67.
2. Karan, P.P.(1990), pp. 9-11.
3. *Bhutan NHDR 2000*, p.49.
4. Karan, P.P. (1990), pp.79.
5. Karan, P.P. (1990), pp.119.
6. Karan, P.P. (1990), pp.120-21.
7. Karan, P.P. (1990), pp.119.
8. *Bhutan 2020*, p.38.
9. Bhattarai, Shivraj (2001), p.68.
10. *Bhutan 2020*, p.38.
11. " Bhutanese society is one that has evolved in terms of relationships with the environment that have given rise to a complex of institutions, rules, customs and folklore governing the use of natural resources. Bhutan is a country that has been practicing environmental conservation long before it was referred to as such" (*Bhutan 2020*, p.23.).
12. *Bhutan 2020*, p.87.
13. *Bhutan 2020*, p.88.
14. *Bhutan 2020*, p.91.
15. *Bhutan 2020*, p.88.
16. *UN: Country Presentation for Bhutan*(2001), p.21.

TABLES

Table-2.1 : Selected Socio-Economic Indicators of Bhutan

Sl. No	Indicator	1961	1970	1980	1999
1.	Crude birth rate (per thousand)	n.a	n.a	43.6(1977)	39.9
2.	Crude death rate (per thousand)	n.a	n.a	20.5(1977)	9.0
3.	Life expectancy (years)	35	45	46.1	66.1
4.	Infant mortality rate(per 1000 live births)	203	158	142(1984)	70.7
5.	Number of schools	11	98	150	343
6.	Primary school enrolment rate(%)	n.a	n.a	n.a	72
7.	Adult literacy rate (pilot)(%)	n.a	10	17.5	54
8	Rural population with access to portable water (%)	n.a	n.a	31(1977)	58
9	Rural population with access to safe sanitation (%)	n.a	n.a	n.a	80
10.	GNP per capita (US$)	51	n.a	116	556

Source : CSO, Planning Commission, Royal Government of Bhutan.

Table-2.2: Sectoral Shares to Real GDP of Bhutan

Sl no	Sectors	Percentage share to Real GDP(at 1980 prices) 1980	1990	1999	2000
1	Primary sector	56.4	45.0	35.1	33.9
	Agriculture	27.8	23.6	16.8	16.2
	Forestry & logging	15.5	11.1	9.6	9.2
	Livestock & fishing	12.5	9.4	7.3	7.1
	Mining and quarrying	0.6	0.9	1.4	1.4
2	Secondary sector	11.3	22.2	29.7	30.9
	Manufacturing	3.2	7.0	9.6	9.4
	Electricity, water, gas	0.2	9.1	10.4	10.6
	Construction	7.9	6.1	9.7	10.9
3	Tertiary sector	32.3	32.9	35.2	35.1
	Wholesale & retail trade, restaurants and hotels	10.9	6.0	6.1	6.0
	Transport, storage and communications	4.3	7.6	10.0	16.6
	Financing insurance & real state	6.3	9.4	8.7	8.4
	Community, social & personal service (Govt)	10.8	9.9	10.4	10.1

Source:

i. *National Accounts Statistics Report 1980-1999*,CSO, Planning Commission , Royal Govt of Bhutan.
ii. *Selected Economic Indicators*, June 2001, Royal Monetary Authority, Royal Govt. of Bhutan.

Table-2.3: Human Development Index of Bhutan

Year	Life Expectancy Index	Education Index	GDP Index	Human Development Index
1984	0.373	0.235	0.367	0.325
1991	0.517	0.345	0.420	0.427
1994	0.683	0.447	0.433	0.521
1998	0.683	0.600	0.460	0.581

Source: *Bhutan National Human Development Report.2000*, Planning Commission, Royal Government of Bhutan.

Table-2.4 : Average Annual Growth Rate.(%) of Real GDP and Major Sectors of Bhutan

Year	**GDP**	**Agriculture**	**Mining &quarrying**	**Manufacturing**	**Electrical & gas**	**Construction**	**Wholesale & retail trade**	**Transport & communication**
1990	6.6	3.1	(-)11.1	22.4	(-) 8.2	0.4	0.8	20.9
1991	3.5	2.6	42.0	18.1	(-)1.8	(-)15.1	7.7	5.8
1992	4.5	2.0	(-)14.2	11.8	4.8	45.0	10.8	5.7
1993	6.1	1.5	11.5	4.9	10.5	5.7	1.9	22.0
1994	6.4	2.6	24.8	6.4	11.6	24.4	3.9	2.9
1995	7.4	1.1	6.4	15.8	25.6	9.7	4.6	1.6
1996	6.1	2.5	32.8	16.4	5.4	0.1	14.1	11.9
1997	7.3	3.3	(-)5.4	3.6	3.2	6.6	7.4	14.0
1998	5.5	1.1	16.2	5.7	3.9	14.1	2.9	12.3
1999	5.9	2.5	8.3	6.3	8.4	25.3	3.3	9.0
2000	6.1	2.3	6.4	4.0	8.0	19.7	4.5	11.8
1980s	8.0	-	-	-	-	-	-	-
1990s	6.0	2.2	8.7	7.5	7.1	15.6	5.1	11.2
1990-1992	4.9	2.6	5.6	17.4	(-)1.7	10.1	6.4	10.8
1993-1997	6.6	2.2	14.0	9.4	12.2	9.3	6.4	10.5
1998-2000	5.8	2.0	10.3	5.3	6.8	19.7	3.6	11.0

Source: *National Accounts Statistics Report 1980-1999*, CSO, Planning Commission ,Royal Govt. of Bhutan.

i. *Selected Economic Indicators*, June 2001, Royal Monetary Authority ,Royal Govt. of Bhutan.

Table-2.5 : Tax –GDP Ratio, Changes is CPI and Purchasing Power of Ngultrum (PPN) of Bhutan

Sl no	Indicator	1990-92	1993-97	1998-2000
1	Tax-GDP ratio (%)	5.1	6.9	8[a]
2	Changes in CPI(%)	13.7	8.3	3.5
i.	Changes in food prices (%)	15.7[b]	6.8	2.2
ii.	Changes in non-food prices (%)	12.4[b]	11.5	5.5
3	PPN(December 1979 = Nu.1)	0.32[b]	0.23	0.17

Source:

i. *CPI Bulletin*, Catelogue No.201. September 1998, CSO, Planning Commission Royal Govt. of Bhutan; CPI figure for 1990 is taken from RIS, *SAARC Survey*, 1998-99 , India Habitat Centre ,New Delhi, p.39.

ii *Selected Economic Indicators* ,RMA, June 2001, p.27

iii Averaged on the basis of data taken from *UN: Country Presentation for Bhutan*, 2001, p.33.

a Figure pertains to 1998.

b Calculated for 1991-92.

Table-3.1 : Bhutan's Exports Composition with India and Third Countries

(Millions of Ngultrum)

Sl No	Items	1993		1999		Percentage share in 1999	
		India	Third Country	India	Third Country	India	Third Country
1.	Live animals and animal products	0.01	0.00	0.70	0.00	0.0	0.0
2.	Vegetables, fruits, nuts,coffee, tea & spices	139.72	0.00	261.83	0.00	5.6	0.0
3.	Vegetable fats & oil	0.01	182.13	0.00	176.67	0.0	63.8
4.	Prepared processed food stuffs	135.78	4.41	222.13	8.05	4.7	2.9
5.	Mineral product	267.67	6.93	695.37	60.70	14.8	21.9
6.	Electricity	537.3	0.00	2018.36	0.00	43.0	0.0
7.	Plastic and rubber product	6.17	0.00	12.73	0.70	0.3	0.2
8.	Row hide & skin	1.74	0.00	2.34	0.00	0.0	0.0
9.	Wood and wood product	328.68	2.36	297.47	6.60	6.3	2.4
10.	Wood pulp products	0.17	0.05	0.10	0.31	0.0	0.1
11.	Textiles	0.16	0.14	1.44	16.20	0.0	5.8
12.	Footwear, headgear & clothing accessories	0.01	.0.00	0.00	0.00	0.0	0.0
13.	Stone plaster, cement and asbestos products	1.70	0.00	6.26	0.00	0.1	0.0
14.	Base metal & products	0.88	0.00	533.19	0.00	11.4	0.0
15.	Machinery &Mechanical appliances	0.29	0.00	6.49	6.59	0.1	2.4
16.	Transporting equipment	0.02	0.00	.84	0.00	0.0	0.0
17.	Optical, photographic and measuring equipment	0.00	0.00	0.00	0.00	0.0	0.0
18.	Misc. manufactures articles	0.13	0.00	66.23	0.00	1.4	0.0
19.	Products of chemical industries	365.55	0.00	565.75	0.00	12.1	0.0
	Total	1785.98	136.87	4691.23	276.75	100.0	100.0

Source: i) *Selected Economic Indicators*, September 2000, Royal Monetary Authority, RGoB.

ii) *Selected Economic Indicators*, June 2001, Royal Monetary Authority, Royal Govt. of Bhutan.

Table 3.2 : Bhutan's Exports by Major Industries

Sl. No	Industry	1993			2000		
		India	Third Country	Total	India	Third Country	Total
1.	Army Welfare Project (alcoholic beverages)	45.45	0.00	45.45	55.75 (64.57)	0.00	55.75 (64.57)
2.	Bhutan Board Products Ltd. (particle board)	165.86	0.00	165.86	213.88 (247.58)	0.00	213.88 (247.58)
3.	Bhutan Carbide and Chemicals Ltd. (calcium carbide)	355.58	0.55	356.13	448.01 (546.76)	0.00	448.01 (546.76)
4.	Bhutan Fruit Products Ltd. (squashes, jam, juice, pickle, canned fruits & processed vegetables)	81.10	4.40	85.50	89.16 (104.90)	7.35 (7.76)	96.51 (112.66)
5.	Bhutan Polythene Company (high density polythene pipe)	6.24	0.02*	6.26	8.64 (0.96)	0.00 (9.06)*	8.64 (10.02)
6.	Penden Cement Authority Ltd. (Cement)	95.92	2.10	98.02	236.00 (433.67)	0.00	236.00 (433.67)
7.	Bhutan Ferro-Alloys Ltd. (ferro-silicon)	339.20 (1995)	30.70 (1995)	369.99 (1995)	428.36 (534.73)	0.00	428.36 (534.73)
8.	Eastern Bhutan Coal Ltd. (coal)	24.24 (1996)	14.47 (1996)	38.71 (1996)	10.53 (41.41)	56.15 (26.67)	67.68 (68.08)
9.	Druk Satair Corporation Ltd. (gypsum dust and gypsum boulders)	38.79 (1996)	0.00 (1996)	38.79 (1996)	79.74 (62.32)	7.13 (1.56)	86.87 (63.88)

Source : I) *Selected Economic Indicators*, September 2000, Royal Monetary Authority, Royal Govt. of Bhutan.
ii) *Selected Economic Indicators*, June 2001, Royal Monetary Authority, Royal Govt. of Bhutan.
* deemed export Note : Figures within bracket pertain to 1999.

Table-3.3 : Bhutan's Imports Composition with India and Third Countries

(Millions of Ngultrum)

Sl. No	Items	1993		1999		Percentage share in 1999	
		India	Third Country	India	Third Country	India	Third Country
1.	Live animals and animal products	54.16	14.40	171.85	0.99	2.9	0.0
2.	Cereals, vegetables, fruits, nuts,coffee, tea , spices & seeds	254.96	11.88	697.43	12.22	11.9	0.6
3.	Vegetable fats & oil	78.49	19.82	167.59	13.22	2.8	0.7
4.	Whiskies & prepared/processed food stuffs	154.59	9.54	388.64	34.92	6.7	1.7
5.	Mineral product	283.46	0.00	840.45	56.86	14.4	2.9
6.	Products of Chemical industries	147.91	63.30	318.34	7.45	5.5	0.4
7.	Plastic and rubber product	83.37	3.81	177.57	70.26	3.0	3.5
8.	Raw hides & skins	3.23	0.00	4.29	0.00	0.1	0.0
9.	Wood and wood product	40.98	0.00	110.57	7.00	1.9	0.3
10.	Wood pulp products	59.80	15.47	117.59	26.34	2.0	1.3
11.	Textiles	80.58	6.07	157.05	35.94	2.7	1.8
12.	Footwear, headgear, clothing accessories & carpet	28.91	2.13	44.56	7.60	0.8	0.4
13.	Stone plaster, cement and asbestos products	83.79	0.00	86.70	0.00	1.5	0.0
14.	Precious and semi- precious metal products	0.10	0.00	0.18	7.75	0.0	0.4
15.	Machinery &mechanical appliances,	406.74	654.48	1861.90	1667.87	31.8	83.8

	base metals & electronic items						
16	Transporting equipment	132.41	0.00	579.11	0.00	9.9	0.0
17	Optical, photographic and measuring equipment	14.67	0.00	63.75	0.12	1.1	0.0
18	Misc. manufactures articles	22.04	0.00	63.70	9.10	1.1	0.5
19	Works of arts, antiques and special transactions	0.11	0.00	0.01	0.00	0.0	0.0
20	Medicines and pharmaceuticals	0.00	10.17	0.00	19.56	0.0	1.0
21	Ceramic & melamine products	0.00	3.91	0.00	3.14	0.0	0.2
22	Tobacco & Cigrattee	0.00	0.00	0.00	6.40	0.0	0.3
23	Goods of personal effects	0.00	0.00	0.00	3.34	0.0	0.2
	Total	1930.33	814.98	5845.28	1989.58	100.0	100.0

Source: i) *Selected Economic Indicators*, September 2000, Royal Monetary Authority, Royal Govt. of Bhutan.
ii) *Selected Economic Indicators* June 2001, Royal Monetary Authority, Royal Govt. of Bhutan.

Table-3.4: Bhutan's Direction of Trade (percentage)

	1990	1995	1999
Export			
India	86.39	91.91	94.45
Bangladesh	10.46	6.00	4.20
Others	3.15	2.09	1.35
Total	**100.00**	**100.00**	**100.00**
Import			
India	82.31	72.22	74.61
Japan	5.16	11.31	3.32
Germany	1.60	1.94	0.00
United States	1.23	0.35	0.29
United Kingdom	0.61	1.58	0.40
Singapore	0.98	5.33	12.74
Others	8.11	7.27	8.65
Total	**100.00**	**100.00**	**100.00**

Source : *Selected Economic Indicators*, June 2001,Royal Monetary Authority, Royal Government of Bhutan.

Table-3.5: Balance of Payments, Foreign Aid and Debt-GDP Ratio of Bhutan

(Millions of Ngultrum)

Sl no	Head	1990-91	1995-96	1999-2000*
1	Trade balance	(-)216.96	(-)453.21	(-)3086.86 (- 2453.67)
2	Current account balance	(-)313.27	(-)1272.45	(-)5531.34 (- 4170.06)
3	Foreign aid	1037.36	2396.50	7353.12 (6550.82)
4	Debt-GDP Ratio (%)	44.3	41.4	39.4 (38)

Sources:
(i) *Selected Economic Indicators*, September 2000, Royal Monetary Authority, Royal Govt. of Bhutan.
(ii) *Selected Economic Indicators*, June 2001, Royal Monetary Authority, Royal Govt. of Bhutan.
(iii) *National Budget and Accounts*; quoted in *UN. Country Presentation for Bhutan* 2001, p.36.

Note: Figures within brackets pertain to 1998-99.
- Provisional

Table-4.1: Pattern of Land Distribution in Bhutan, 1974-79 Aerial Survey.

		Area Surveyed	
Sl no.	Head	Sq. Km	Per cent of total
1.	Forests	21,593	74.0
2.	Crop land	2,492	8.5
3.	Alpine pasture	1,924	6.6
4.	Snow ice and barren land	3,050	10.5
5.	Area under cloud cover	117	0.4
	Total	29,176	100.0

Source: 1974-79 Aerial Survey, Department of Forests, Royal Government of Bhutan : taken from Karan , P.P. (1990), p.139.

Table-4.2 : Regional Distribution of Forests in Bhutan, 1974-79 Aerial Survey*.

	Per cent of area Surveyed			
Region	Conifer	Conifer & Decidious	Decidious	Total
West	37.2	6.2	19.8	63.2
Central	24.5	9.3	42.9	76.7
East	18.1	9.2	46.6	73.9
South	4.8	3.6	72.2	80.6
All Bhutan	20.1	6.4	47.5	74.0

Source : 1974-79 Aerial Survey, Department of Forests, Royal Government of Bhutan; taken from Karan, P.P. (1990), p.145.
* Northern Bhutan was excluded from the survey.

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10 Environmental Trade Barriers and South Asian Exports: Lessons for National, International and Regional Action

Nagesh Kumar*

10.1 The Context and Introduction

The case studies of different South Asian countries prepared as a part of this project and other literature and experiences that have become available bring out a number of issues. It is clear that the emerging environmental trade barriers (ETBs) as they have been broadly defined have become a very potent trade barriers threatening a substantial proportion of South Asian exports. The WTO Agreements on SPS (Sanitary and Phytosanitary Measures) and TBT (Technical Barriers to Trade) aim to ensure that these standards and regulations are not used for protectionist purposes and do not cause adverse impacts on trade. However, at present there is considerable discretion available to importing countries to impose their own rules regarding these standards and other regulations such as inspection of imported products, specific treatment or processing of products, fixing of minimum allowable levels of pesticide residue, labelling and packaging requirements, good manufacturing practices etc. The flexibility in these Agreements has been exploited by developed countries to impose stringent environmental norms and standards that are acting as significant barrier for exports of developing countries. For instance, the SPS Agreement allows importing countries to impose SPS norms that are higher than international standards, provided there is a scientific basis. This provision has been used by various countries to check market access of specific countries. A case in point is unmanufactured tobacco where Japan insists on a DDT residue level of 0.4 particles per million (PPM) while the international standard is 6 PPM. Indian tobacco has a DDT residue level of 1-2 PPM which is well below the internationally permissible levels. But Japan does not allow tobacco imports from India on phytosanitary grounds. Very often very flimsy grounds and very minute risks assessments are used to justify imposition of these higher standards. For instance, adoption of a new aflatoxin standard in the European Union that would reduce health risk by approximately 1.4 deaths per billion a year. While there are not a billion people in the whole of EU, African exports of creals, dried

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fruits and nuts to EU are expected to decline by 64 per cent as a result of adoption of these standard with an estimated loss of export earnings of the order of US$ 670 million.[1] Even though international standards such as Codex are evolved by developed countries, they themselves do not adopt them.

Another problem is the wide variation in the standards adopted by different importing countries. Different countries follow different norms of aflatoxins and pesticide residue increasing the compliance cost for the exporting countries. The European Union countries have gone as far as to adopt a single currency. However, their standards with respect to pesticide residue vary widely, for instance, from 0.01 PPM in the case of the UK to 0.03 in the Netherlands to 0.10 PPM in Germany for Aldrin and Dieldrin[2]. Many of these environment related standards are imposed in a less than transparent manner and some times are accompanied by other requirements such as Good Manufacturing Practice. There are cases of detention of consignments of Indian spices in Spain, Italy and Germany without any satisfactory explanation forthcoming on the changes made in their regulations on microbial contamination and pesticide residue despite transparency obligation under the Article 7 of SPS Agreement.[3]

Sometimes additional standards are just imposed informally by the importing countries on their exporters as pre-conditions for doing business, as the case study of grapes exports by India has demonstrated. Often importers use these standards to depress prices of imports. For instance foreign buyers reportedly paid lower prices for leather products from Bangladesh because of the poor environmental conditions in the tanning sector in Dhaka[4]. The experience of India in the case of export of flowers to Japan is also similar.[5]

Another thing that is clear is that the cost of compliance is substantial and often beyond the competence of many of the enterprises especially the smaller ones. A rough estimate for setting up a moderate lab for testing and analysing samples of

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[1] Findings of a World Bank study cited by Jha et al. 2001a.
[2] (see Kithu 2001)
[3] op.cit.
[4] (UNCTAD, 1998:145)
[5] (Chaturvedi and Nagpal in this volume).

spices comes to about Rs four million[6]. Furthermore, in a number of cases the technology for compliance with the standards may not be available easily in developing countries.

Many developing countries have experienced losses in exports because of difficulties in complying with these emerging standards and regulations. South Asian countries, in particular, are affected badly as some of their major items of their export interest such as textiles, marine products, spices, among others, are those affected by these barriers. There is an urgent need to respond to this challenge. Besides the policy responses at the national, actions at the international and at the regional levels would be often necessary for mitigating the adverse effect of these emerging trade barriers on South Asian countries. In this chapter we provide an inventory of such policy responses to at the national, international and regional levels.

10.2 Issues for Action at the National Level

It is quiet clear that governments do have to play an important role because especially when the exporters are small and medium enterprises and it may be beyond their capacity to comply with the new standards. In what follows we

10.2.1 Information Sharing

Governments should create mechanisms for disseminating information on the new emerging standards adopted by different countries to the exporters especially the SMEs. This information dissemination could help in reducing the rate of rejections of export consignments and thus help avoid the costly process of bringing them back or destroy them.

10.2.2 Capacity Building for Compliance

Given the high cost of compliance which may be beyond the capacity of smaller enterprises, it may be of critical importance to create common infrastructural facilities such as test laboratories with international accreditation. The government agencies may assist the smaller enterprises in compliance with the new standards through provision of technology and necessary raw materials. The capacity building could also

[6] Kithu, op. cit.

include organization of extension programmes which cover training of entrepreneurs, managers and different levels of workers in compliance of the required standards. Governments could also facilitate formation of cooperatives and self-help groups of exporters so that they could share costs and create common facilities such as test laboratories, water treatment plants, affluent treatment plants besides information dissemination. The patterns of clustering or agglomeration of exporters specialized in one product in certain areas that exist in the region (e.g. knitwear makers in Ludhiana) suggest that formation of these self-help groups/cooperatives could be effective. Furthermore, the governments have a role to play in ensuring the availability of all necessary raw materials for compliance with specific standards. For instance, the Nepal case study shows that the non-azo dyes for the carpet industry are not available in the country thus impeding the compliance with ban on azo dyes imposed in the European Union[7]. So governments has to make sure that substitutes of azo dyes are available to the carpet manufacturers. The relevant governments could consider setting up Exporters Assistance Centres as one-stop shops to cover all different tasks such as dissemination of information, creation of test facilities, the provision of technical assistance and training etc.

10.2.3 Evolve National Standards

As a result of the liberalization of trade regimes, the South Asian economies have become increasingly open to import of goods from abroad. In particular, a lot of imported fruits and vegetables are finding their way to the South Asian markets. There is a fear that these imports might become carriers to new pests and other harmful germs to the region. It is important for the governments to evolve their own environmental standards and quarantine regulations which should be strictly enforced.

10.2.4 Effective Participation in International Standards Setting

The experience of past years suggests that the international standards such those in Codex Commission are evolved with very little participation of developing countries. Therefore, what developed countries propose gets approved as a default. We need to participate in these events effectively with our own preparation of implications and other issues and concerns of alternative standards.

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[7] See UNCTAD 1998, for more details.

10.2.5 Generating Consciousness about Environmental Concerns in the Industry

The governments can play an important role in generating the consciousness of environmental considerations in industry through media and other means. The Indonesian example of color grading of the companies on the basis of the environmental responsibility is a case in point[8]. The increased environmental consciousness generated through the media of this scheme has led to significant decline in market valuation of the companies that were labeled as relatively poor (black) in terms of environmental standards. It suggest that such schemes could build considerable pressure on companies to become environmentally more conscious.

10.2.6 Databases of Experiences

The field-work conducted as a part of the country studies brings out a variety of experiences of imposition of environmental standards by importers on exporters of the countries studied, sometimes in an informal manner and often under the cover of good manufacturing practices. It is important to compile a database of such experiences so that as to verify if certain regulations imposed are not consistent with SPS and TBT norms and hence necessary redressal could be sought through WTO Dispute Settlement.

10.2.7 Exploiting Opportunities for Environmentally-Friendly Goods and Services

The South Asian countries should take advantage of the growing environmental consciousness in the developed world by pushing exports of the environmentally friendly goods and services. The South Asian countries have a natural advantage in organic farming which should be exploited fully. The region has used vegetable dyes such as indigo for centuries in the textile industry. It may be fruitful to create a brand in the Western world on the basis of use of vegetable dyes. Similarly exports of herbal medicines, cosmetics, eco-tourism among other environmentally friendly goods and services could be pushed. Bangladesh has rapidly got an eco-label for its jute-packaging bag which has enhance the sales of these bags significantly[9].

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[8] See the Pakistan Case Study.

[9] See UNCTAD 1998.

10.2.8 Diversification of Export Commodities/Markets

It is clear from the country studies that South Asian countries are heavily dependent on exports of few commodities and on few markets. For instance, Nepal's dependence on carpet exports, Bangladesh's dependence on garments, marine products and leather goods. Even though, India's exports structure is more diversified, the share of textiles and garments in India's exports is quite substantial at 33 percent. Similarly, there is a high dependence on specific markets. For instance, Germany accounts for 80 to 90 percent of Nepal's exports of carpets. The dependence on few products and markets for exports make these economies highly vulnerable. Therefore, in medium to long term, the objective of the government policy should be to diversify the composition of exports as well as the coverage of markets.

10.3 Issues for International Action

These include a number of issues which have to be taken up at the WTO and other international for a, as follows:

10.3.1 Effective Technical Assistance

Both SPS and TBT Agreements in WTO contain provisions for technical assistance to be provided by the importing countries to assist the exporters in their compliance with the new standards imposed by them. The SPS Agreement under Article 9 includes 'provision of technical assistance to other Members specially developing country Members.....in the areas of processing technology, research and infrastructure, including in the establishment of national regulatory bodies and may take the form of advice, credits, donations and grants including for the purpose of seeking technical expertise, training and equipment to allow such countries to adjust to and comply with sanitary and phyto-sanitary measures necessary to achieve the appropriate level of sanitary and phyto-sanitary protection in their export markets'. Furthermore, the SPS Agreement provides 'where substantial investments are required in order for an exporting developing country Member to fulfill the sanitary and phyto-sanitary requirements of an importing Member, the latter shall consider providing such technical assistance as will permit the developing country Members to maintain and expand its market access opportunities for the product involved' (Art. 9.2). Similarly, the TBT Agreement under Article 11 provides for advice and technical assistance, if requested, on mutual agreed terms and conditions. However, there is little evidence of

the promised technical assistance forthcoming. Following the ban imposed by European Commission on exports of fisheries products originating in Bangladesh in 1997 in the light of deficiencies in the infrastructure and hygiene fisheries establishments in the country, Bangladesh Frozen Foods Exports Association had sought technical assistance from European Union experts. That assistance was provided but the Association had to pay for it from its own resources[10]. It is clear, therefore, that the obligation for technical assistance has not been fulfilled by developed countries in an adequate manner.

10.3.2 Reviews of SPS and TBT Agreements

Developing countries may consider seeking reviews of the Agreements on SPS and TBT at the WTO Committee on Sanitary and Phyto-sanitary Measures and the Committee on Technical Barriers to Trade to reduce the discretion and flexibility available under these Agreements that is being misused, universal application of international standards, and to bring about greater transparency in the imposition of standards, good manufacturing practices and all other regulations.

10.3.3 Special and Differential Treatment (SDT)

Like other WTO Agreements, SDT in the case of SPS and TBT Agreements has also been reduced to a longer transition period for developing especially the least developed country Members. However, the longer transition period provided under these Agreements is of hardly any use because the importing enterprises start insisting on the new product standards due to high consumer consciousness for these standards. Therefore, the SDT has to be of a more substantive type. It could be, for instance, in the form of additional financing (along with technical assistance) to cover the costs of compliance by the developing country exports of the new standards.

10.3.4 Compulsory Licensing of Technology

Sometimes the compliance of new standards is constrained by non-availability of technology due to strengthening regime of IPR protection. The TRIPs Agreement should provide for compulsory licensing on environmental grounds.

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[10] See UNCTAD 1998.

10.3.5 Assistance for Effective Participation of Developing Countries in Setting of International Standards

As observed earlier, the international standards are evolved without much participation of developing countries. The international community should subsidize the participation of developing countries in the meetings of international standards setting bodies besides assisting them in their technical preparations for their effective participation in these fora.

10.4 Issues for Regional Cooperation

There are a number of areas where a regional approach could be fruitful as we see below.

10.4.1 Coordination in International Negotiations

The countries of South Asian region export many products that are common to all. Hence their concerns are quite similar. Hence, a region-wide coordination in international standards setting events and in the WTO Committees on SPS and TBT and other negotiations would be serving their interest better.

10.4.2 Cooperation in Compliance with the Emerging Environmental Standards

The regional cooperation could be effective in sharing costs of compliance with the emerging environmental standards. The regional cooperation could cover joint development of products which meet the new regulations and hence sharing the costs. In this context, a case in point is a highly successful project for development of Aflatoxin risk free groundnut jointly conducted by the Indian Council of Agricultural Research and the UNDP. This Project successfully brought down the Aflatoxin levels to 0-5 PPB in 80 percent of the samples at the end of three years term of the project in a high risk area of Andhra Pradesh, India against the permissible limit of 15 to 20 PPB in developed countries such as Australia, Canada, USA[11]. Such projects could be fruitfully undertaken at the regional level. The regional cooperation could also cover creation of regional institutional infrastructure such as test laboratories where the costs are high. The geographical contiguity in the region would facilitate the optimal utilization of such infrastructure. Joint training programmes and other measures to build local capacity would also be fruitful.

10.4.3 Regional Eco-label

A number of South Asian countries including India have tried to launch their own eco-label programmes. However, these programmes have had limited success. Another area of regional cooperation could be promotion of regional eco-labels which might be more acceptable and popular than national eco-labels.

10.4.4 Evolving Regional Standards for Products of our Export Interest

Another area of fruitful regional cooperation could be to evolve regional standards especially for products of our export interest and have them accepted them globally. Similarly, it would be fruitful to define environmentally sensitive goods from a regional perspective.

10.5 Concluding Remarks

In this chapter we have put together an inventory of policy lessons emerging from the research project. These policy lessons cover some issues for action at the level of national governments that are likely to prepare the exporters in these countries face the emerging challenge more effectively. Then there are issues to be addressed at the international or WTO level. These will help moderate the incidence of these new standards on the South Asian countries. Finally we have identified some areas in which regional cooperation would be fruitful.

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[1] Basu and Radhakrishnan (2001).

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