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**The Impact of Environmental
Standards on the International Trade
of South Asian Countries**

**Shaheen Rafi Khan and Toqeer
Ahmad**

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Acronyms

APTMA	All Pakistan Textile Processing Mills Association
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
ETPI	Environment Technology Program for Industries
EU	European Union
FPCCI	Federation of Pakistan Chambers of Commerce and Industries
GPP	Greener Public Purchasing
GSP	General System of Preferences
IISD	International Institute for Sustainable Development
MEAs	Multilateral Environmental Agreements
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
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
PVC	Polyvinyl chloride
SIDA	Swedish International Development Agency
TCP	Tetrachlorophenol
UNEP	United Nations Environment Program
UNCTAD	United Nation Conference on Trade and Development

The Impact of Environmental Standards on the International Trade of South Asian Countries

Shaheen Rafi Khan and Toqeer Ahmad

Abstract

The relationship between trade and environment has always generated debate. Proponents of free trade/globalization assert the compatibility of trade and environmental objectives. The opposing view holds trade/globalization responsible for degrading the environment and rules out the possibility of synchronizing trade and environment objectives. The premise of this paper is that 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. 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.

This paper reviews the international environmental standards likely to affect Pakistan's exports, and the institutional initiatives in place to address national environmental.

The scope for convergence is examined with a view to concerns potential win-wins, where cleaning industry means improved export, health and environmental benefits.

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.

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

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

1.1 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.

1.2 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.

1.3 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 measures³. 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 Ltd⁴. 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, expert tanners

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: http://www.inem.org/htdocs/case_studies/perion.html

4 Source: http://www.inem.org/htdocs/case_studies/curtigran.html

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 automotive. 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.

1.4 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:

1.4.1 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

1.4.2 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 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

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.

symptoms. (Shahid 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. (Masood, 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.

1.4.3 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).

1.4.4 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 are⁵:

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

5 Source: IISD' handbook on Trade and Environment

1.5 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.

1.5.1 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).

1.5.2 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 Versand⁶ demands an environmental management system, requiring the specification of an environmental strategy; detailed programs and monitoring reports. IKEA, another large buyer of textile products, has clearly stipulated EMS as a preferred option of doing business with its suppliers. (AFTPMA, 1998)

1.5.3 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

6 A German buyer of textile products from Pakistan

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 textiles⁷. 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

1.5.4 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.

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
<i>Sears and Roebuck</i>	Strict adherence to local laws governing working conditions and production methods
<i>Levi Strauss</i>	Sharing commitment to the environment and conducting business in a way that is consistent with Levi Strauss & Co.'s Environmental Philosophy and Guiding Principles.
<i>IKEA</i>	Due compliance to environmental conditions such as use of azo-free dyes, formaldehyde, PCP (pentachlorophehenol,)
<i>C & A</i>	C & A will assist its suppliers in their efforts to meet their obligation to preserve the environment
<i>Hennes & Mauritz</i>	Suppliers must comply with all environmental laws and regulations in the country of operation

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. 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.

1.5.5 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,

7 Source: <http://europa.eu.int/comm/environment/ecolabel/envir.htm>

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.

1.5.6 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.

1.6 Trade-Environment Linkages in Pakistan

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 are of 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 thermosole⁸ 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

8 Thermosole dyeing machines are considered better than traditionally used Jiggers and Jets

atmospheric beck for the same fibre reactive dyed shade. This reduces associated BOD and COD loading for waste streams by up to 80% (Hagler Bailly, 1998).

1.7 *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.

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, (Mahmood, 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 Export⁹

	US\$ Millions		
	1993	1994	1995
Total Trade	3,257,589 6,842	3,617,591	4,490,031
World Total	0.21	7,328	8,125
Pakistan (% Share)		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

9 Source: Mahmood Ahmed , 1998

World Total	202	143	150
Pakistan % Share	0.61	0.39	0.36

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 ecology¹⁰. 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 chemicals¹¹ 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 100¹³ 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 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.

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, 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.

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 barriers 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.

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 m³/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. (Azher, Sep.2000).

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 dyeing 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

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

depressions. Some industries use soakage pits to dispose off their effluents. This leads to groundwater contamination.

3.1 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, 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. Despite scanty evidence, Jabbar and Mallick (1994) reported the existence of residues in water, soil, food and humans.

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 2 provides details of the links between the various stages of production and their environmental and health impacts.

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.

3.2 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, 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 Peshawar) 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 4: Environmental Hazards Associated with Leather Sector

Waste	Source	Major Impacts
Liquid	Organic & inorganic solid, hydrogensulphide, ammonia, volatile 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, meat remains, the tanned skin remains, chromium remains during trimming	Contamination of soil and underground water, contamination of food, occupational health hazard such as perforation and bronchiogenic carcinoma, contamination of poultry feed, reduce genetic biodiversity
Air emissions	Hydrogen sulphide & sulphur-containing compound, ammonia & nitrogen containing compounds, organic solvents	Lower than NEQS

Source: Based on information from different sources.

The Case of Kasur City¹

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)

4. Environmental Sensitivity of Industries/Products

4.1 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.

4.1.1 Environmental Impacts

The Environmental Standard Committee (ESC) of Pakistan has classified industries into three main categories 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 emissions¹⁶.

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 industries¹⁷.

4.1.2 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 units¹⁸. 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 rate
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

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

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

Continued.....

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

4.1.3 Export Potential

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

4.1.4 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

4.2 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

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

Continued.....

Components	Sector					
	Textile	Leather	Carpets	Sports goods	Surgical Instruments	Fish
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. Mitigation Initiatives

5.1 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 .

5.2 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 parameters²⁰, 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.

5.2.1 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 (Haroon, 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.

20 See ETPI, "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.

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.

5.3 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

5.4 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.

5.5 Private Initiatives

5.5.1 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 Governments 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.

5.5.2 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.

5.5.3 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.

5.5.4 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 Income²³

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 Industry²⁴

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 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.

5.6 Publicity and Communications

5.6.1 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.

5.7 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

²³ Source: Environmental News, September, 1999

²⁴ Source: Environmental News, September, 1999

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.

5.8 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.

5.9 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 the current environmental state of different industrial zones will play an important role in determining the fate of this case.

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.

6.1 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.

6.1.1 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.

6.1.2 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.

6.2 *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.

6.2.1 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.

6.2.2 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 countries²⁵. 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

6.2.3 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 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

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

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.

6.2.4 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 addition, 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.

6.2.5 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.

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Annex-1

Table 1-A: Pakistan's Principal Textile Export²⁶ (%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
Total export	294,741,162	325,313,469	373,159,934	331,071,522
% 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
Total export	294,741,162	325,313,469	373,159,934	331,071,522
% Share of total export	3.0	2.95	2.51	2.83
Carpets	95-96	96-97	97-98	Average
Hand Knotted Wool Carptets	6964.382	7577.231	8475.895	7672.502

Continued.....

Textile(excl. carpets)	95-96	96-97	97-98	Average
Hand Woven Rugs	30.490	119.684	116.880	89.018
Other Capets	136.298	120.462	108.674	121.811
Miscellaneous	0.042	3.469	7.779	3.763

26 Source: EPB, 1997

Total carpet export	7131.212	7820.846	8709.228	7887.095
Total export	294,741,162	325,313,469	373,159,934	331,071,522
<i>% Share of total export</i>	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
Total export	294,741,162	325,313,469	373,159,934	331,071,522
<i>% Share of total export</i>	1.5	1.5	1.5	1.5
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
Total export	294,741,162	325,313,469	373,159,934	331,071,522
<i>% Share of total export</i>	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
Total fish export	294,741,162	325,313,469	373,159,934	331,071,522
<i>% Share of total export</i>	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
Total export	294,741,162	325,313,469	373,159,934	331,071,522
<i>% Share of total export</i>	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/cm ² /week	Nickel & nickel compounds
The Netherlands	Textile products intended for skin contact	Not Available	Future legislation	Probably compulsory labeling when exceeding 0.5 ug/cm ² /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/cm ² /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	German Commodity Goods Act, 1992	Legislation	Prohibition	Flame retardants

Country	Products	Law	Status	Standard	Parameter
	contact				
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
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 Test method: US EPA recommended Test report 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: direct determination by atomic absorption spectrometry
3. Polyester Fiber	Antimony < 300 ppm VOCs emissions < 1.2 g/kg of produced polyester 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) Alkylphenoethoxylates (APEOs), bis (hydrogenated tallow alkyl) dimethylammonium chloride (DTDMAC), distearyl dimethylammonium chloride (DSDMAC), di (hardened tallow) dimethyl ammonium chloride (DHTDMAC) and and ethylenediaminetetraacetate (EDTA) are prohibited (b) At each wet-processing site	Test method: ISO & OECD recommended Test report required on application
8. Bleaching agents	AOX emission < 40 mg C1/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 < 250 ppm; Hg < 4 ppm; Ni < 200 ppm; Pb < 100 ppm; Sb < 50 ppm; Sn < 250 ppm; Zn < 1500 ppm	
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.	

Continued.....

Ecological Criteria	Requirement	Compliance verification
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. Polyester Fiber	Antimony < 300 ppm VOCs emissions < 1.2 g/kg of produced polyester 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 < ???; Sn < 250 ppm; Zn < 60.0 mg/kg	Laboratory Report
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

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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