ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

STUDIES IN TRADE AND INVESTMENT 44

ENHANCING EXPORT OPPORTUNITIES THROUGH ENVIRONMENTALLY SOUND BUSINESS DEVELOPMENT

UNITED NATIONS

STUDIES IN TRADE AND INVESTMENT

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(Continued on inside back cover)

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Studies in Trade and Investment 44

ENHANCING EXPORT OPPORTUNITIES THROUGH ENVIRONMENTALLY SOUND BUSINESS DEVELOPMENT

Selected papers and issues discussed at the
ESCAP National Workshops on
Enhancing Export Opportunities
through Environmentally Sound Business Development,
Nepal, Sri Lanka, Lao PDR and Viet Nam, 18-26 September 2000

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AFTA	ASEAN Free Trade Agreement
ASA	Advertising Standards Authority
ASEAN	Association of South East Asian Nations
BADEPAL	Badan Pengendalian Dampak Lingkungan
BOD	biological oxygen demand
COD	chemical oxygen demand
COMPARE	cleaning operations and manufacturing for productivity and resource efficiency
CSC	Commonwealth Science Council (UK)
CTs	cleaner technologies
DENR	Department of Environment and Natural Resources
DEQP	Department of Environmental Quality Promotion
DOE	Department of Environment
DSB	Dispute Settlement Body
EC	European Community
ECC	Environmental Compliance Certificate
EIAs	environmental impact assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
ENV	Ministry of Environment
EOP	"end-of-pipe"
EPZs	export promotion zones
EQA	Environmental Quality Act
ESTs	environmentally sound technologies
EU	European Union
FAO	Food and Agriculture Organization
GBHN	Garis-garis Besar Haluan Negara
GDP	Gross Domestic Product
GFDC	Green Food Development Centre (China)
GMOs	genetically modified organisms
GNP	gross national product
GP	green purchasing
GSP	General System of Preferences
IAF	International Accreditation Forum
IEC	International Electrotechnical Commission
IFOAMS	International Federation of Agricultural Movements
ILO	International Labour Organization
IOAS	International Organic Accreditation Service
ISAAA	International Service for the Acquisition of Agri-biotech Applications
ISO	International Organization for Standardization
IUCN	World Conservation Union
LDCs	less developed countries

LGUs	local government units
LOAM	Lanka Organic Agricultural Movement
MEAs	Multilateral Environmental Agreements
MFA	Multi-Fibre Arrangement
MNCs	multinational corporations
MOSTE	Ministry of Science, Technology and Environment
NAFTA	North American Free Trade Agreement
NASAA	National Association for Sustainable Agriculture Australia
NGOs	non-government organizations
NIEs	newly industrializing economies
NOP	National Organic Programme
NSS	Nature Society, Singapore (NSS)
NTBs	non-tariff barriers
OAPs	organic agricultural products
OECD	Organization of Economic Cooperation and Development
OEPP	Office of Environmental Policy and Planning
OFPA	Organic Foods Production Act
OTA	Organic Trade Association
PCD	Pollution Control Department
PSI	Pollution Standards Index
RCPM	regional cooperative policy mechanism
RO	Reverse Osmosis
SA	social accountability
SAFECO	Singapore Association of Environmental Companies
SAFTA	SAARC Free Trade Agreemnet
SAI	Social Accountability International
SCIC	Singapore Chemical Industry Council
SMEs	small and medium scale enterprises
SPIES	Sustainable Productivity Improvements for Export Success
TBT	Technical Barriers to Trade
UNCED	United Nations Conference on Environment and Development
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WHO	World Health Organization
WTO	World Trade Organization

Part One

Workshop Summary and Recommendations

I. SUMMARY OF MAIN ISSUES AND RECOMMENDATIONS

National Workshops on Enhancing Export Opportunities through Environmentally Sound Business Development

Kathmandu, Nepal, 13-14 September 2000
Colombo, Sri Lanka, 18-19 September 2000
Vientiane, Lao PDR, 22 September 2000
Hanoi, Viet Nam, 25 September 2000

A. Organic agriculture

There is an increasing tendency to source organic agricultural products (OAPs) more globally and to develop partnerships with developing countries. The rapid increase in consumption and the favorable growth projections (between 5 and 40 per cent annually in the European Union and the United States) suggest significant opportunities over the medium term for exports of developing countries. In particular, developing countries should focus on tropical foods and products that do not compete with off-season fruits and vegetables, or temperate products produced in the developed countries.

However, while it is true that organic agriculture forms part of a heritage of ancient wisdoms that were transmitted through the generations before the advent of chemical intensive commercial farming, exporting organic products in today's world requires a modern approach to production and export. A key element of such an approach is the need to produce according to a strict definition of what is organic (for which *inter alia*, the International Federation of Organic Agricultural Movements [IFOAM] has developed a set of standards), and to acquire certification from an internationally accredited body.

Developing countries need to develop a strategy for long-term development of organic agriculture for the export market. Some of the elements of such a strategy could include the following:

- Financial assistance under various international and government environmental programmes to assist farmers in the conversion from chemi-

cal to organic farming. (Conversion periods can last between three to five years, during which productivity levels are low and significant financial support is needed to keep farms commercially viable.)

- The development of country-specific regulations and standards that are harmonized to the extent possible, with international guidelines of the FAO/WHO *Codex Alimentarius* Commission and regulations as contained in EEC Council Regulation 2092/91 and its subsequent amendments.

- Local certification programmes and certification bodies should be assisted to obtain international accreditation. As no domestic certification body from the ESCAP developing countries has obtained international accreditation (Thailand's ACT is in the process of obtaining accreditation to IFOAM), the only short-term solution is to rely on international certification bodies. However, as international certification is much more expensive, domestic internationally accredited programmes need to be given priority attention for long-term market access to developed countries.

- Devising national level policies on the import of and cultivation of genetically modified organisms (GMOs) which are banned from organic agriculture.

- Growth in food sales in developed countries is declining. In contrast, the ESCAP region with its high population growth rates and increasing per capita incomes is expected to experience positive growth rates. Developing countries of the region should therefore seek to diversify their organic exports to the ESCAP region itself. Trade liberalization and facilitation measures to expand trade in organic agricultural exports under various preferential trading arrangements such as the Bangkok Agreement, AFTA and SAFTA should be further explored, particular as tariffs on raw and processed agricultural products remain disproportionately high.

- Similarly, as per capita incomes rise and awareness of health and environmental consciousness increases in the ESCAP region, attention should be paid to the domestic market. Export promotion strategies should be developed in parallel with health awareness campaigns targeted at domestic consumers.

B. Textiles and clothing sector

Globalization has brought accelerated and deeper sourcing of products in the textiles and clothing sector from a wide range of developing countries. On the one hand it has opened up significant opportunities for exporters from Asian developing countries; on the other hand it has increased competitive pressures because international sourcing is focusing on a smaller number of larger suppliers that can meet high quality requirements. These pressures will intensify with the cessation of the MFA, with the result that the textiles and clothing sector now has to deal with a much wider range of competitiveness issues than five years ago when the interim WTO Agreement on Textiles and Clothing was concluded.

Powerful forces in ESCAP's main destination markets are transforming the garment retail sector. Government regulations in those markets aimed at controlling toxic chemicals and reducing packaging waste are important determinants of the ESCAP region's export competitiveness and international market access. At the same time, labour issues are now firmly on the corporate agenda. Public pressure and campaigns by NGOs to tackle "sweatshop" conditions in garment production have forced large multinational companies to demonstrate social responsibility along their supply chains. Developing country suppliers are therefore increasingly being requested to comply with "ethical trading" initiatives and corporate codes of conduct that are linked to brand value and the reputation of leading clothing retailers in developed countries. More recently, the NGO-initiated Social Accountability (SA) 8000 standards were launched in 1998. These are based on ILO Conventions and ISO management systems, and comprise an attempt to harmonize the varying labour market access requirements in place. To date however, most of these are market-driven initiatives, rather than initiatives of international organizations. As developing countries prepare for the cessation of the MFA on 1 January 2005, export competitiveness will increasingly be determined by their ability to meet improved company performance through environmental and social improvements.

As part of a sustainable development agenda for developing countries' textiles and clothing sector, the following priorities need attention:

- Eliminating environmental hazards such as pesticide use in cotton cultivation and toxic chemicals in textile manufacture, through a policy mix of regulations and market based incentives, as well as through worker training and education.
- Improving water and energy efficiencies for improved company performance, particularly during textile processing and clothes' washing. This requires a mix of regulations, policy incentives to promote eco-

efficiency and cleaner technology, and penalties for excessive use of resources. Most developing countries would have to phase out subsidies on water and energy resources, which keep prices artificially low.

- Reducing pollution and waste, especially in dyeing.
- Devising national level policies on the import of and cultivation of genetically modified cotton.
- Improving working conditions, especially for women, including occupational health and safety, as well as increasing worker training and education because improvements in environmental protection can be achieved faster besides being more sustainable when accompanied by improved skills and worker education.
- Developing information sources, for example further developing and updating by industry associations or Chambers of Commerce, of the COMPARE (Cleaner Operations and Manufacturing for Productivity and Resource Efficiency) database which provides developing countries with access to information on various national, corporate and international norms and standards, and enables individual companies to assess their performance against these norms.
- Building supply chain partnerships with developed countries in a manner that would ensure the equitable distribution of the burden of change and in a manner that enhances the export competitiveness of the sector for developing countries.
- Conduct of follow-up workshops and seminars on all of the above aspects to assist developing countries in their export promotion strategies.

C. Leather sector

Although exports of leather products have increased significantly over the last decade, a slight decrease in growth was experienced recently. While this is due to factors such as exchange rate fluctuations and depressed market conditions, widespread closure of tanneries - where most of the problems with pollution arise - is a contributing factor.

Tanneries are for the most part small-scale and cottage type industries; large tanneries account for less than five per cent of the sector, while a fair number, possibly about 10 per cent of the small tanneries, are not registered with any government agency. They are among the most pollution-intensive of all types of economic activity.

Sustainable development and export competitiveness of the sector is therefore particularly affected by a company's ability to minimize its negative impact on the environment. The following actions should receive priority attention by companies:

- Rather than focus on end-of-pipe solutions for waste generated - which bring little direct benefit to a company while significantly increasing its costs-, the introduction of cleaner production methods and preventive (clean) and recycling technologies is important. It yields not only environmental benefits, but also economic returns in the form of higher profits. More efficient utilization of raw materials, water and energy improves production efficiency. Furthermore the recovery of valuable by-products brings about less pollution as well as lower costs for waste disposal and wastewater treatment.

- Cleaner production options should encompass technology change. For example, tanners can reduce their costs for the use of expensive chromium by installing chromium recovery plants, which at the same time solves the delicate problem of disposing of chromium-loaded sludge. However, cleaner production also encompasses easy-to-implement, cost-effective improvements in housekeeping practices; for example, it is estimated that over half of the water wastage in tanneries could be avoided by simple practices of good housekeeping and worker awareness.

- The uptake of cleaner production by industries is slow. More than two-thirds of barriers to implementation of cleaner production involve human motivation, and rigid managerial attitudes that refuse change. The commitment of management to cleaner production as a culture is the key to change, and to a process of continuous environmental improvement.

- The introduction of an environmental management system is important for environmental integrity because it is a tool used by managers in surveying, monitoring and controlling and reducing the environmental impact of enterprises, on a continuous basis.

- At the same time commitment to cleaner production requires a high level of commitment from government through effective implementation of environmental legislation.

- Cleaner production processes need to be further encouraged through preferential tariffs for ecologically sound products under various GSP schemes. An example is the "encouragement regime" of the EU where

about 20 to 30 per cent additional tariff preferences are given to ecologically friendly products, or products that follow ILO labour conventions.

More specifically the following issues need follow up.

1. *Policy level*

- What instances are there for the integration of CP principles as a priority element in national environmental strategies, and what has it accomplished in promoting CP?
- What instances are there for the integration of environmental objectives and the promotion of CP as a significant element in national industrial development policies, as well as export development and what has it accomplished in promoting CP?
- How would significantly greater integration of CP concepts in national environmental strategy, industrial development policy and export promotion strategy be received?
- Has the adoption of CP and related management techniques become an issue in financial transactions, such as lending or insurance? Would financial sector institutions be receptive to incorporating CP as a decision criterion?
- Are there examples of the adoption of CP and related management techniques in the services sector such as tourism, transportation, health, energy and others? Have they been adopted by local Government units? Elsewhere?
- In what new channels can national programmes work to introduce CP concepts (e.g. engineering and business schools, national productivity programmes, technical training programmes, local government institutes, the media, etc.)?
- How can community level efforts be utilized in a national programme to promote CP as well as exports?
- Through which mechanism should CP efforts be coordinated within a national plan or framework? What has such coordination accomplished in more efficient use of resources for the promotion of export? What were the obstacles to its greater success?
- Within an individual country is a national framework and plan for the promotion of CP a critical condition to achieving substantial success in

CP? Will national and local Governments support such coordination if it incorporates international donors?

- How would a national plan or framework best be structured and managed (e.g. which is the lead agency, how much authority should it have, etc.)?
- What are other critical conditions for national level coordination?

2. *Financing and market-based options*

- What financing mechanisms (e.g., concessional lending facilities) best promote the adoption of CP? If they have not been fully utilized; why not?
- What market-based instruments (e.g., emission charges, tradable permits, tax or tariff waivers, etc.) now exist which directly or indirectly promote CP? How successful have they been and what obstacles have been encountered?
- Should a regional financing mechanism be considered, and what would be the advantages and the disadvantages?
- What imaginative financing mechanisms or market-based instruments have worked elsewhere which should be explored in the ESCAP region? What are the critical conditions for success?

D. Regional cooperative mechanism for the transfer, financing and management of environmentally sound technologies (ESTs)

Despite differences between countries in the region, opportunities exist at many levels for regional cooperation and exchange for implementing the objectives set out in chapter 34 of Agenda 21. Presentations were made at the workshops in Lao PDR and Viet Nam on the implementation status of chapter 34 of Agenda 21 in the Asia-Pacific region, and on how member countries could benefit from a regional cooperative policy mechanism (RCPM) for the transfer, financing and management of ESTs.

A review of the situation in the region makes it apparent that traditional ways of addressing environmental issues - in a reactive *ad hoc* and end-of-pipe manner - are proving to be highly inefficient. As competition increases within the expanding global market, good environmental performance is not just a legal or moral obligation; it also makes good business sense. Reducing pollution means increased efficiency and wasting fewer resources through the encouragement of

industrial and trade policies, technologies and management practices that contribute to sustainable development. In some countries, business leaders recognize the need for change, and have initiated the first steps toward a more sustainable approach through the adoption of cleaner production technologies, environmental management systems and more efficient operating procedures. Sustainable industrialization is especially a challenge for countries such as Lao PDR and Viet Nam, because their comparatively low level of development provides them with an opportunity to follow a technological trajectory which can be cleaner and more efficient than the path taken by developed countries.

Although the spread of proven ESTs through commercial means may be limited due to various barriers, including those related to cost, lack of financing and expertise, as well as complications resulting from proprietary considerations and intellectual property rights, regional capacity-building programmes and assistance on the basis of South-South cooperation could alleviate some of these problems and increase the flow of ESTs to developing countries.

Developing countries, such as Lao PDR and Viet Nam, could benefit therefore from participating in an RCPM. The RCPM envisages providing comprehensive EST support packages for users to choose from in order to meet the broad objectives of chapter 34 of Agenda 21, and with the emphasis being on popularizing technologies developed within the region. Since technology-transfer could not stand alone, capacity-building efforts need to be intensified by organizing workshops and training programmes, and by providing guidelines and case studies. To this end, the participants from Lao PDR and Viet Nam were interested in strengthening their countries' cooperation with APCTT, since the Centre had been identified as the interim coordinating body for the RCPM and was already extensively involved in EST transfer to SMEs and related environmental management issues.

Part Two

Workshop Papers

II. ENVIRONMENT CHALLENGE AND BUSINESS COMPETITIVENESS*

A. Industrialization, environmental degradation and their effect on export competitiveness in the ASEAN countries*

1. Economic development in the ASEAN countries

The Asian region has experienced one of the fastest rates industrial and economic development compared to others. Within 30 to 40 years, several countries in the region have made the transition to developed status that took most western countries a century or longer. Other Asian nations now look set to follow.

Table II.1. Regional economic spectrum of development

Growing level of development ←

Asian "tigers"	"Tiger cubs"	Emerging giants	In waiting
Hong Kong, China	Indonesia	China	Bangladesh
Republic of Korea (The)	Malaysia	India	Cambodia
Singapore	Philippines		Lao PDR
Taiwan Province of China	Thailand		Myanmar
			Nepal
			Pakistan
			Sri Lanka
			Vietnam

The region is a geographically fragmented area comprised of hundreds of individual cultural, economic and political zones. It is home to over three billion people (half of the world's population). The region's largest differences lie in the levels of economic development, with South East Asia including some of the world's richest countries, such as Japan with a per capita GNP of US$35,000, as well as some of its poorest, e.g. Nepal with a GNP of only US$200 per capita (see table II.1)

* Regional Institute of Environmental Technology (Dr Uwe Weber, Editor, with contributions from Dr Wang Hong and Anja Kaiser)

Table II.2. Key economic and social indicators 1998

Countries	Population million	Per capita GDP US$	GDP billion US$	GDP growth rate (1990 - 98)	Literacy per cent pop.
ASEAN					
Indonesia	203.7	462	94	7.3	(86)
Malaysia	22.2	3,265	72	8.7	(87)
Philippines (The)	75.2	866	65	5.2	(95)
Singapore	3.2	26,368	84	8.0	(92)
Thailand	61.2	1,819	111	8.6	(95)
NEAR EAST ASIA					
China	1,217	(575)	(700)	8.7	(83)
Hong Kong, China	6.7	24,842	166	4.4	(94)
Republic of Korea (The)	46.4	6,913	320	6.1	(97)
Taiwan Province of China	22	(12,000)[2]	(264)	5.7	
SOUTH ASIA					
India	980	439	430	6.1	(55)

Source: World Bank: *2000 World Development Indicators*

[a] estimated values

2. Export-oriented industrialization

The ASEAN countries, with the exception of the Philippines, have undergone a rapid industrialization and transformation during the past three decades. Economic growth was the highest among the developing countries, until the "Financial Crisis" affected South East Asia in mid 1997. All the five ASEAN countries, starting with the Philippines in the early 1950s, initially embarked on an import-substituting pattern of industrialization. The levels of protection however varied widely, with Singapore having the lowest level of protection, with nominal rates of protection averaging only 7 per cent in 1967, and the Philippines the highest and Indonesia a close second.

Singapore was the first ASEAN country which shifted to export-oriented industrialization following its separation from the Malaysian federation in 1965 and the subsequent loss of its expected domestic market. To support the shift to export promotion, the Singapore government successively eliminated tariffs and quotas.

Following the example of Singapore, the other four more resource-rich ASEAN countries began to pursue export-promoting industrial policies - Malaysia, the Philippines, and Thailand in the early 1970s, and Indonesia since the mid 1980s.

Malaysia's major device for promoting manufactured exports was the establishment of export-processing zones (EPZs) in the early 1970s. Thailand also pursued a relatively mild import substitution policy, although its tariffs were, on average, higher than those of Malaysia. By 1981, some two decades after Malaysia, the Philippines and Thailand had started developing their manufacturing sector. The bulk of their merchandise exports consisted of primary commodities, with manufactured exports accounting for 20 per cent of total exports in Malaysia, 23 per cent in the Philippines, and 25 per cent in Thailand.

In Indonesia and the Philippines, the policy reorientation to export promotion was more difficult. As manufacturing firms were unable to import intermediate goods and capital equipment, the manufacturing sector was saddled with substantial excess capacity, leading to negative growth. It was only under pressure from the World Bank and the International Monetary Fund (IMF) that the Philippines started reducing its tariff and non-tariff protection gradually in the early 1980s. Under the Aquino administration (1986-1992) significant progress was made with trade liberalization.

In Indonesia the shift to export promotion proved difficult compared to that of its neighbours, as it had followed a more inward-looking economic policy among the ASEAN countries. Import-substitution and industrialization in Indonesia in the 1970s was buttressed by a wide array of protectionist barriers, including the highest nominal and effective rates of protection for consumer goods among the ASEAN countries and a wide array of non-tariff barriers (NTBs).

3. Summary of industrial and economic growth

During the period 1980-1998 the ASEAN countries, with the exception of the Philippines, generally sustained their rapid industrial growth (see table II.3). Indonesia's manufacturing sector had the fastest growth rate within ASEAN during the period 1980-1998. Its growth was at double digit rates on the average both during the 1980s and the first half of the 1990s.

Within the same period, the manufacturing sectors of both Malaysia and Thailand also expanded rapidly. Until the early 1980s, these three ASEAN countries were still largely dependent on the exports of primary commodities; but beginning the early 1980s, increases in manufactured exports were experienced. The share of the three ASEAN countries in total world manufactured exports rose from 0.1 per cent in 1965 to 0.4 per cent in 1980 and 1.5 per cent in 1990. The increase of their share in total developing-economy manufactured exports was noted at 1.1 per cent in 1965; 3.8 per cent in 1980; and 12.0 per cent in 1990.

Table II.3. Industrial development in the ASEAN countries, 1980-1998

Country	Manufacturing value added (MVA) (million US$)		Manufacturing average annual growth rate (per cent)		MVA as per cent of GDP	
	1980	1998	1980-90	1990-98	1980	1998
Indonesia	10,142	23,539	12.6	8.8	13	24
Malaysia	5,142	21,022	8.9	20.8	21	33
Philippines	8,450	14,323	0.2	3.1	26	23
Singapore	3,398	19,407	6.6	6.7	29	27
Thailand	7,118	36,625	9.5	7.7	22	32

Source: World Bank: *2000 World Development Indicators*

Indonesia's manufactured exports started to increase beginning 1987. By 1993, the bulk of the total exports of Indonesia, Malaysia and Thailand comprised manufactured exports. For the above reasons, these three Southeast Asian countries were referred to as the "second tier" East Asian NIEs, following in the footpath of the "first tier" East Asian NIEs (Republic of Korea, Taiwan Province of China, Hong Kong, China, and Singapore).

Industrialization transformed the economic structures in Malaysia, Thailand and Indonesia, increasing the contribution of the manufacturing sector to the Gross Domestic Product (GDP) of these countries. With the manufacturing sector contributing more than 20 per cent to GDP, by UNIDO standards Indonesia and the Philippines could by 1998 fall under the category "semi-industrial economies," and Malaysia and Thailand, with their manufacturing sector contributing more than 30 per cent to GDP, under the category "industrialized economies." Compared to the first three ASEAN countries, the industrial growth in Singapore has been less significant as it has become a "service economy."

4. Environmental degradation attributed to industrialization

ASEAN countries have achieved rapid industrialization and impressive economic growth. Industrialization has, however, impacted on the environment and ecological systems in the region. Levels of air and water pollution have risen, and the ASEAN countries have to deal with hazardous waste generated by agriculture and industry as well as with municipal urban waste. While the direct benefits of industrialization are largely private and enjoyed by a privileged minority of the region's population, the environmental costs, or externalities, are mostly social (i.e. shared by the whole community) and thus borne by the society as a whole. Those who enjoy the full benefits of industrialization, and who are also responsible for making "decision against nature" are rarely the same people who suffer from the

direct negative impacts of economic development, i.e. urban residents, downstream riparian communities, reservoir evacuees.

The effects of industrialization on the environment result from the following:

- Exploitation of locally available raw materials;
- Increased energy intensity;
- Utilization of technology and capital;
- Waste generation and the means of its disposal; and
- Environmental awareness, sensitivity and concern of economic actors.

(a) Growing environmental pressures in the region

Asia is the world's largest and rapid growing region with (1) more than half of the world's population; (2) mushrooming urbanization and (3) rapid and massive industrialization. Consequently severe environmental problems affect the economic growth. These include the following:

- Water resources depletion and pollution;
- Uncontrolled urban and industrial and hazardous wastes;
- Smog and atmospheric pollution;
- Alienation of natural resources;
- Relevant greenhouse gas emission emissions;
- Fading ozone layer; and
- Receding bio-diversity.

(b) Degradation of land and associated resources

Approximately 214 million hectares of cropland -37 per cent of today's regional cultivated area -- have been damaged by agricultural mismanagement since World War II. In addition 281 million hectares of permanent pastures, one-fifth of the total forested land, have also been degraded, with damaged areas of about a fourth (365 million hectares) for forests. Deforestation is another critical process in the region. Findings of the Food and Agriculture Organization of the United Nations (FAO) indicate that the annual deforestation rate in the ASEAN region increased from 2 million hectares during the period 1976-1983 to 3.9 million hectares in 1981-1990, but declined slightly to 3.6 million from 1990 to 1995.

(c) Degradation of biodiversity

The Asian region is rich in biodiversity and is noted for its high rates of species endemism. Seven out of 17 mega-diversity countries of the world are located

in the region. However, the diversity in the region is under serious threat because of (1) habitat modification; (2) fragmentation and loss, (3) over-exploitation of resources, and (4) introduction of exotic species.

The protected areas in the region are limited in extent and constitute only five per cent of the total area against the World Conservation Union (IUCN) guideline of 10 per cent. The resources allocated for the management of protected areas are estimated to be two to three times lower than the requirement for effective management.

(d) Degradation of water resources

Asia already abstracts 10 per cent more from the natural water cycle than sustainable in the long run. These massive withdrawals from rivers, lakes and underground reservoirs deplete the volume of water in rivers, lakes and underground aquifers, consequently leading to land subsidence as in and around Bangkok and saltwater intrusion into aquifers.

Sectional competition and conflicts. Irrigation which accounts for 80 per cent of all water use in Asia, has significantly increased food production but has also substantially diminished the supply of water for other end users. From the water abstracted for irrigation use, only around 20 per cent in average reaches the crop In addition the contribution of agriculture to the overall GDP is declining.

Water quality deterioration. The growing scarcity of water is accompanied by deteriorating water quality due to the increasing discharges of waste, sewage and effluents from domestic, industrial and agricultural sources and saline intrusion. Around 70 per cent of the Asian population have no access to sanitation facilities.

(e) Degradation of marine and coastal resources

The more pressing threats to the regional marine and coastal environment, as a result of poorly planned commercial activities and high rate of coastal population growth, are the following:

- Over-exploitation of fish and seafood resources;
- Pollution resulting in damage to ecosystem and economy, especially tourism;
- Habitat degradation, loss of biodiversity, for example when Mangrove forest is converted into shrimp farms; and
- Climate change - coral bleaching, intensified storms and sea level rise.

(f) Degradation of atmosphere and related ecosystems

The haze from forest fires and acid rain are the regional threats posed by transboundary atmosphere pollution. The quality of air in metropolitan areas has deteriorated seriously. Of the 15 cities in the world with highest levels of totally suspended particulate in the air, 12 are located in Asia. Six of the 15 cities with the highest level of sulphur dioxide are also located in the region. Increasing number of vehicles, congestion and traffic jams as well as emissions from industry, power generation open burning of waste and heating are the principal contributors to deteriorating air quality.

Incidents of haze have occurred from time to time but the most serious episode occurred during the 1977 forest fires, which affected 12.4 million people in Indonesia alone. The effects of haze extended to neighbouring countries such as the Philippines, Brunei, Singapore, Malaysia and Thailand. It severely affected tourism, one of the region's main foreign currency sources. Acid rain became a major concern in several parts of the region caused by coal-fired power plants, industrial sources, transport, residential heating and cooking.

(g) Degradation of urban environment

The regional urban population of 1.4 billion is expected to swell to 2.2 billion by 2020. This will exert additional pressure on natural resources such as land, forest, and water.

(h) Increase of solid waste

The amount of municipal solid waste generated annually in the region is about 700 million tons. Industrial activities on the other hand generate 1,900 million tons of waste per year. The generation of hazardous waste from manufacturing, hospital and health-care facilities, nuclear power generation and fuel processing plants is rising; it is estimated to more than double within the next 10 to 15 years. Only around 50 per cent of municipal solid waste is collected. Most of the refuse is untreated and disposed of in unsanitary landfills. Open dumping and burning remain the major disposal methods for the regional solid waste, thus contaminating ground water and contributing to various health risks. Sanitary landfilling, incineration and composting are being increasingly used but still account for only one-fourth of the waste disposal methods used and little more than 10 per cent of the overall waste generation.

C. Impact of industrialization on environment

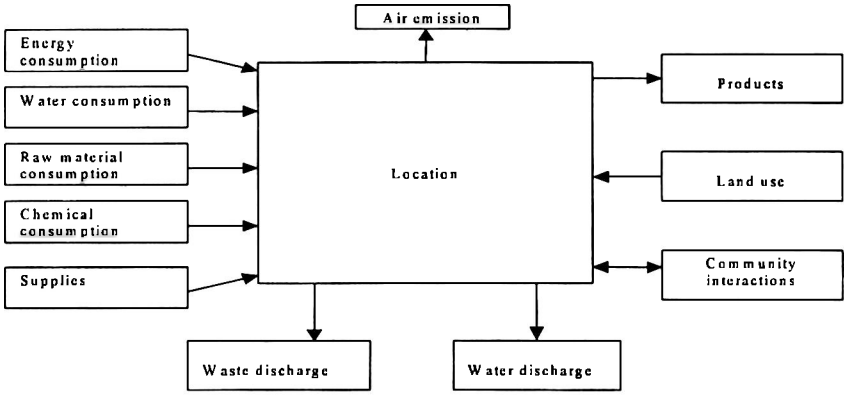

Figure II.1. Environmental aspects related to production

Product Packaging
- quality (weight/volume)
- recyclability
- recycled content
- toxic material content
- material diversity

Transport
- mode/distance
- energy use
- emission

Product Maintenance
- chemicals for cleaning/repair
- consumables

Product
- energy use
- toxic material content
- reusability
- upgradability
- emissions during use

End of Life Management
- recyclability
- hazardous material content
- material diversity
- upgradability
- waste classification
- assemble techniques
- disposal/emissions

Figure II.2. Aspects considered for an environmental Life Cycle Assessment (LCA) of products and services

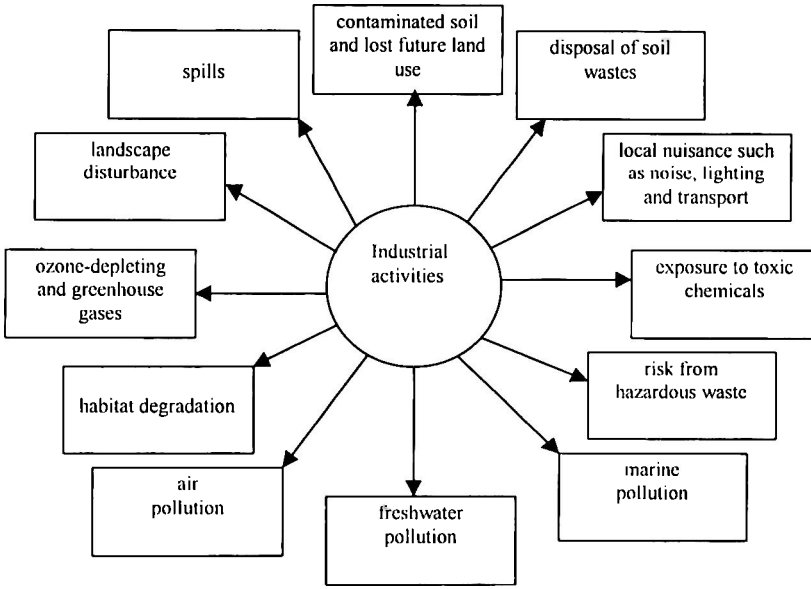

Figure II.3. Possible environmental impact of industrial activities

6. Environment and environmental clean-up costs

(a) Cost categories for environmental costs of industrial production

Environmental costs in company operations need to be identified and accounted for. The following, though not exhaustive, could be used as a guide:

- **Direct costs:** waste and wastewater collection, treatment and disposal costs;
- **Indirect environmental cost:** taxes, fees and voluntary environmental management costs;
- **Legal liability costs:** fines and penalties for non-compliance under criminal law and compensation under civil law;
- **External costs**: public assets damages, mitigation measures, planning control and remediation costs;
- **Intangible costs** of overlooked environmental related damage: forgone production, staff health and safety, personnel motivation and recruitment, reputation damage or less trust by enforcement agencies; and
- **Costs of non-employed resource saving measures**: water material or energy conservation, saving or reuse.

(b) Industrial management decisions that benefit from environmental costing

Evaluating and taking into account the environment related cost of an industrial operation would enable the company to identify optimization and rationalization potentials in the sectors listed below. This would benefit the company in its overall performance and competitiveness.

- Product design;
- Production or service process design;
- Facility siting;
- Purchasing activities and subcontracting;
- General operational performance;
- Risk management with regard to accidents and eventual contamination of environmental media;
- Environmental compliance strategies;
- Capital investment;
- Cost control;
- Waste management;
- Product retention and mix; and
- Product pricing.

Some of the costs associated with environmental aspects or impacts are "hidden" and do not show up in the current accounts of an organization. These include the following:

- Upfront environmental cost (i.e. permitting);
- Regulatory and voluntary environmental costs (i.e. monitoring);
- Future back-end environmental costs (i.e. decontamination);
- Contingent cost (i.e. penalty); and
- Image and relationship costs (i.e. corporate image costs)

Table II.4. Example -Estimated cost from air pollution in some Asian cities[1]

City	Cost resulting from air pollution (1999) million US$	Percent of GDP (1998)
Bangkok	1,300-3,100	1.2-2.8
Jakarta	400-800	0.4-0.8
Manila	1,800	2.8
Seoul	6,200	1.9

Source: World Bank, *Air Quality in Asia, Challenges and Accomplishment, 1999*

The World Bank estimated the 1995 cost for air and water pollution, based on the willingness to pay for an improved environment. The estimate was between seven and eight per cent of GDP. The figures indicate that environmental neglect in Asia incurs substantial cost for the ASEAN countries, at the same time reducing the productive investment capacity of the governments and the private sector.

7. Environment and export competitiveness

(a) Corporate environmental performance and business competitiveness

(i) Increasing pressure for environmental protection

The environment was viewed not too long ago as a matter of low concern, with the responsibility for it delegated to street sweepers, garbage collectors or the junior blue-collar workers at the factory shop floor. Today, taking care of the environment has become a serious business with responsibility reaching the highest level of the corporate and political hierarchy.

Faced with economic globalization, companies cannot expect to stay competitive by focusing only on traditional areas of competitive advantage such as capital, labour, energy and raw materials. Today's globalization trend (for competition without borders and information on products, processes and prices available everywhere) makes the notion of competitive advantage obsolete. Either a company strives for improvement of the corporate performance, or it will fail.

(ii) Role of environmental performance in business competitiveness

Good environmental performance is more than a matter of compliance and cost. To survive and thrive, corporate managers must develop mechanisms, which enable them to successfully answer the environmental demand of regulators, stakeholders, employees, suppliers, and customers. Experience from companies suggests that embarking on proactive environmental management strategies en-

ables companies to address environmental challenges and at the same time enhance their business competitiveness.

(iii) Win-win solution

The application of environmentally sound technology has a favourable impact on sustainability and the environment as well as on the corporate bottom line. When a company produces more with less, and waste generation declines, it saves twice on input costs and on end-of-pipe waste management costs. This is a *win-win* solution: good for the environment (less waste and less energy consumption), good for business (less cost); and for the consumers (product prices remain stable).

A "green" product may have other benefits for the consumer, such as less energy consumption, no emission of harmful substances, recyclability etc. These are increasingly sought after in the market place and can command premium prices over competitors. Companies are thus able to develop improved products, save additional cost and protect the environment.

(b) Green purchasing: promoting trade and environmental sustainability

Green purchasing (GP) is the practice of applying environmental criteria to the selection of products or services by institutional and corporate customers. Common among larger companies, it is increasingly becoming a corporate practice. The European and American public sectors use GP to develop environmental conscious suppliers. This model has still to be followed by the Asian public sector, which lacks competence on the one hand and qualified suppliers on the other. For example, a 1995 survey of 1,000 buyers of office equipment and supplies showed that 80 per cent of respondents were taking part in environmental initiatives within their organizations. This was a hundred percent improvement over the results of a similar survey done in 1993, when only 40 per cent responded in the same way.

The use of GP is documented in relevant literature, numerous case studies and books on environmental management. Some examples are the following.

- The GB organization, *Business in the Environment*, has published a training kit for promoting environmental management to suppliers.
- The *U.S. National Association of Purchasing Managers* has a committee on environmental purchasing; this subject is a regular feature of their conferences. In a survey of 256 U.S. manufacturing firms, nearly half identified suppliers as the key players in their pollution prevention strategies.
- Leading *Multi-National Corporations* (MNCs) with international-supplier environmental management efforts include Motorola, IBM, S.C. Johnson, TRW, Nokia, Sony, Ford, Ray-O-Vac, Northern Telecom, Apple Computer, Sun

Microsystems, and the Body Shop. The literature also describes many other companies with domestic supplier environmental programs. (*The impact on international suppliers, especially in developing countries, is not well documented yet but there is increasing evidence that the impact on suppliers is or will be significant.)*

- Denim producer *Arvind Mills Ltd.*, based in Ahmedabad, is investing $16 million on new pollution control devices, in part to comply with the requirements set by Marks and Spencer.
- New Delhi-based *Ranbaxy Laboratories* was queried on environmental standards by Hoechst, upon which it upgraded its manufacturing sites to make them "zero discharge" sites.
- *Nike Inc.* and *Gap, Inc.*, require their Asian suppliers to attend workshops on pollution prevention and cleaner production as a condition of continuing relationships. Although the suppliers who attended had strong concerns about the costs in meeting environmental standards imposed by their buyers, all indicated that they would comply.
- The first company in the Philippines that became certified to the ISO 14001 Environmental Management Systems standard was the *Texas Instruments Inc.*, in Baguio City. The major motivating factor was information received from one of its Japanese customers that ISO 14001 certification would be required eventually from all its suppliers. The customer also conducted an environmental audit of the facility.
- Another Asian manufacturer, *Lucent Technologies* (formerly part of AT&T) has made a commitment to ISO 14001 certification partly in order to satisfy its major Japanese electronics client-companies.

(c) Market access and environmental requirements

Access to export markets in developed countries is a key issue for Asian and other developing countries. Corporate customers in developed countries are concerned that inefficient environmental policies and insufficient environmental performance in developing countries may adversely affect the acceptance of their consumer products, which are wholly or partly manufactured in such countries. Producers may not be able to comply with the environmental regulations of industrialized nations and may be sidelined in the globalization process.

A key concern is the extent to which environmental standards and regulations, as well as sanitary and phytosanitary (SPS) measures in developed markets, have the potential to create barriers to trade, particularly for products exported by developing countries.

Environmental and health standards and regulations, as well as related consumer and business preferences, may take several forms, such as: technical standards and regulations, product-content requirements; sanitary and phytosanitary measures; mandatory labelling and packaging requirements. Large producers are generally able to cope with these requirements, but SMEs and producers in the LDCs experience difficulties in maintaining their existing export markets or embarking on new export opportunities. Challenges reported by exporters refer to issues such as the following.

- Lack of timely and accurate information about (new) requirements in their export markets;
- Uncertainty due to rapidly changing environmental and sanitary requirements in overseas markets;
- Access to scientific data and analytic procedures for specific thresholds or limit values;
- Varying standards and regulations in different markets; and
- Costs and difficulties of testing and verification procedures.

(d) Multilateral Environmental Agreements

Multilateral Environmental Agreements (MEAs) are a serious challenge faced by international traders. MEAs are important tools in dealing with environmental problems that transcend national borders. Consideration must be given to the competitiveness and development effects of policy harmonization in the context of MEAs. An example is the implementation of the Montreal Protocol to phase out ozone-deleting substances, which affect the export capacity and competitiveness of products in developing countries.

Some MEAs that are particularly relevant to trade regimes are the following:

- The Convention on International Trade in Endangered Species.
- The Vienna Convention on Substances that deplete the Stratospheric Ozone Layer, with the Montreal Protocol.
- The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal.
- Framework Convention on Climate Change.
- Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.
- Cartagena Protocol on Biosafety.

(e) Environment and trade liberalization

Environmental issues have been raised in the context of regional deliberations aimed at strengthening regional economic integration and free trade, in particular those involving developed and developing countries. An example is the North American Free Trade Agreement (NAFTA) between Canada, Mexico and the United States. Considerable research and several studies which address the linkages between trade and the environment in the context of NAFTA have been done.

It has been emphasized, particularly by NGOs, that further trade liberalization should take account of environmental and social effects. The need to anticipate these effects and, where necessary, take complementary measures in other policy areas, in particular environmental policy, has been recognized. It is believed that impact assessments of trade policies should be the responsibility of national governments. There is some pressure to attach environmental impact assessment (EIAs) to new trade agreements.

Some developed countries have proposed the inclusion of the environment in future negotiations of specific World Trade Organization (WTO) agreements. The European Community (EC), for example, has proposed to examine "the scope for and need to factor environmental concerns" into the WTO across the board (mainstreaming). Other countries, such as Canada, Iceland and Norway) have also made suggestions concerning "mainstreaming." This may take place either in the context of already planned revisions of specific agreements (for example the TRIPs, TBT and SPS agreements) or in the context of a possible round of new trade negotiations (a "Millennium" Round). Several developing countries have opposed the inclusion of environmental and social issues in the agenda of a possible new round as "externalities."

In this context it should be noted that the private sector in developed countries imposes conditions on its suppliers from developing countries - for example, GP - that it deems appropriate to support its business development. Addressing this imbalance by including environmental and social issues in WTO agreements would provide a baseline and eventually formulate a framework for technical assistance and economic co-operation compared to the current arbitrary practices.

(f) Environmental sectors as trade opportunities

A large and growing market is emerging for environmental goods and services due to more stringent environmental policies, standards and regulations and the first effort for their enforcement in Asia. A US-EPA study shows that the global market for environmental goods and services increased from about US$410 billion

in 1998 to US$540 billion in 2000. Asia had the highest market growth rate with 16 per cent. This market includes services, pollution abatement equipment and other environmental protection related goods. Asian and other developing countries should be able to compete since this development emerges in their own markets.

(g) Strengthening capacities to respond to environmental challenges and manage trade and environment issues

Developing countries are primarily responsible for identifying and responding to environmental issues, and for integrating environmental considerations into their policies. In the area of trade promotion, governments and the business sector may adopt several policies and measures aimed at promoting standards and quality with a view to enhancing competitiveness, e.g.:

- Improvement of environmental infrastructure.
- Dissemination of information and education on environmental issues.
- Promoting co-operation between the government and the business sector, and between producers/exporters/importers.
- Adopting testing, certification and environmental management systems such as ISO 14001, Responsible care, product labelling etc.
- Encouraging environmentally sound technology transfer.

The trade and environment scenario above points towards the need to strengthen the countries' institutional, administrative and private sector capacity to respond to emerging environmental requirements.

B. Role of environmental management and regulations in business competitiveness

1. Introduction

Environmental issues have evolved into a serious business with responsibility reaching the highest level of the corporate and political hierarchy. The developing countries themselves should be mainly responsible for identifying and responding to environmental challenges, in particular to do the following:

- Reduce natural resources requirements of goods and services;
- Decrease the energy intensity of goods and services;
- Reduce material consumption and promote reuse;

- Manage environmental risks which may lead to loss of revenue or unexpected costs; and
- Improve public image.

Different environmental management strategies are possible. The first approach is to address pollution as an independent issue and consequently look at options that can minimize the cost of pollution control. The second approach views pollution as an integral part of production and searches for solutions which minimize or eliminate the causes of pollution.

Through innovation and dynamism, countries and companies can create opportunities out of threats, and translate environmental improvement into a competitive edge. To aid these efforts, environmental regulations and standards should be structured to trigger, not to stifle, innovation. There should be appropriate environmental management policy to free internal innovative forces, enabling companies to effectively allocate resources for environmental objectives and to use inputs such as raw materials and energy more productively. Enabling an economic answer to environmental problems requires that the different environmental options and associated costs to the society are transparent to the stakeholders.

In this context environmental legislation can foster improvement by internalizing the costs related to environmental neglect into corporate accounts. These costs focus the attention of economic decision-makers towards environmental issues, alert company managers on resource efficiency and provides motivation to link environmental improvement to innovative solutions. Costing of the environment ensures that companies do not derive economic advantages from avoiding environmental investment.

3. Legislation and legislation enforcement

(a) Environmental awareness and consciousness

More awareness on environmental issues has resulted from increasing health risks of people, slowdown in economic growth and rising environmental costs. However, the growing awareness of the population has not meant a parallel rise in the awareness of governments in the ASEAN region to enforce environmental laws, standards and regulations.

Table II.5. Environmental consciousness, selected countries

Countries	Per cent	Rank
Germany	63	17
India	77	12
Japan	66	16
Philippines (The)	94	1
USA	85	5

Source: Dunlop, Gallup & Gallup (1993) cited in *Hauff, Wilderer, 1997*

Table II.5 does not reflect the pro-active stance of the selected country towards the environment. However, the incidence of "a great deal" or "a fair amount" responses to the question on whether people feel concerned about the environment indicates the direness of the environmental situation as viewed by the respective country's populations.

(b) Environmental legislation and its enforcement

A comparison of environmental laws in the region fosters an understanding of the laws themselves, the natural resources sensitivities of respective countries and approaches applied to solve the environmental issues. This section draws on a report from Alan K.J. Tan of the Asia Pacific Centre for Environmental Law.

In developing countries the central problem relating to the upholding of environmental legislation is the conflict between development and protection of the environment. The concept of "sustainable development" has not been adequately manifested beyond its value as a theoretical ideal. The economic costs of environmental neglect are generally ignored. A concrete and practical application of the concept has yet to be formulated to effectively reconcile the interests of development and the environment. As a practical reality, the developmental interests of industrialists, corporations and local authorities influence decision-making in developing countries to a considerable extent. The result is that effective protection of the environment remains a formidable challenge.

Conflicts of jurisdiction occur at the central government level and other national, federal or local agencies. Unclear level of competence and responsibility distribution between those players makes it even more difficult to efficiently embark on sustainable development. Given the importance of environmental legislation and its adequate enforcement for an environmentally sound development and as driving force for environmental market development, much remains to be achieved in relation to good governance within the ASEAN 6 countries.

A description of the country environmental legislation is shown below, addressing environmental institutions; non-governmental organizations; environ; mental legislation; legislation implementation; and enforcement in the judicial system.

(i) Indonesia

a. Environmental institutions

The institution responsible for environmental management and co-ordination is the Office of the State Minister for the Environment. As it is less powerful than a full-fledged Ministry, it plays more of a co-ordinating role and has no actual enforcement competence. In 1990, the Indonesian government established Badan Pengendalian Dampak Lingkungan (BAPEDAL) - the Environmental Impact Management Agency. BAPEDAL possesses provincial jurisdiction and has branches in all the provinces.

Complementing the role of BAPEDAL branches at the local level is the provincial government apparatus. The main enforcement mechanisms in the provinces are the police and army, acting with the local governments, prosecutors and BAPEDAL branches, where applicable.

b. Non-governmental organizations (NGOs)

The environmental NGO movement in Indonesia is significant. In 1980, the State Minister for the Environment promoted the creation of WALHI, a forum for environmental NGOs in Indonesia with over 330 environmental groups (about 600 NGOs work on environmental issues throughout the country).

NGOs face difficulties, mainly the lack of access to information and participation. Even though laws provide for such access, it is difficult in reality to obtain public information. Environmental activists in Indonesia are usually branded as "anti-development," or even "communists."

c. Environmental legislation

Until 1997, the framework environmental legislation in Indonesia was the Environmental Management Act No. 4 of 1982. On 19 September 1997, Act No. 23 of 1997, otherwise known as the 1997 Environmental Management Act, was passed. This Act must be read in conjunction with numerous implementing regulations. Indonesian environmental legislation must also be understood in the context of broad state policies, chief of which is the Garis-garis Besar Haluan Negara (GBHN) (Policies of the State). The principle of sustainable development had been entrenched primarily in GBHN 1973-1978.

d. Problems in implementing environmental legislation

One major problem in implementing environmental legislation lies in the division of competencies amongst the environmental institutions described above. At the central level, there is uncertainty in the respective jurisdiction of the Office of the State Minister and BAPEDAL. There are also significant jurisdictional issues vis-à-vis other sectoral ministries which had traditionally regulated the areas now governed by the Office of the State Minister and BAPEDAL. There is a proliferation of legislation enacted on the behest of several national and provincial agencies which have conflicting competencies in different spheres of environmental protection. There is therefore a need to ascertain which agency has particular competence in a given issue.

Other problems relate to the enforcement of penalties - several sectoral laws like Government Regulation No. 20 on Water Pollution Control, administered by provincial governments, have provisions which are cross-referenced to criminal and administrative sanctions under the 1982 EMA. There are also provisions in the Industry and Agriculture Acts, which are similarly cross-referenced. Uncertainty exists as to which ministry/agency/provincial authority is to administer these penalties, and in what manner.

One major area in which action has been taken to resolve jurisdictional overlaps relates to the AMDAL, or environmental impact assessment (EIA) process. In this respect, some progress has been made towards co-ordinating an integrated, multisectoral approach to the conduct of EIAs. While BAPEDAL is recognized as the agency responsible for EIAs, there are some problems in the implementation of the EIA provisions. Reports of EIA procedures being circumvented, such being viewed as obstructive to development, are not uncommon.

These issues, in combination with private vested interests, civil servants' inaction and a general lack of transparency, lead to a less than satisfactory level of implementation or enforcement of laws. By definition, the fight against pollution must take place at regional and local levels. Involving the governments of the provincial, district/mayoral, sub-district and village levels in environmental management requires decentralization of tasks, competencies, resources and decision-making.

e. Enforcement in the judicial system

Indonesians also rely on the judicial mechanism to vindicate environmental rights. Two problems usually come up in this respect: the vested interests of industrialists, and the difficulties faced by judges in exploring unfamiliar and abstract jurisprudential concepts introduced by environmental law such as "the right to the environment" and "strict liability." Even before the cases reach the courts,

there are procedural difficulties. For instance, it is generally difficult to persuade the police and the prosecutors to investigate environmental violations, especially in relation to smaller-scale violations in the remote regions. What is required is the political will to resist efforts by vested interests to compromise environmental laws and procedures.

(ii) Malaysia

a. Environmental institutions

The Department of Environment (DOE) of the Ministry of Science, Technology and Environment conducts environmental management at the federal level. The state governments have corresponding authorities and officials in charge of environmental matters. The DOE principally deals with matters involving air and water quality, industrial wastes, noise levels and environmental impact assessments. Thus, it is concerned with industrial pollution and environmental quality. Jurisdiction over land use and natural resource management rests primarily with the respective state authorities, such that issues like forestry, wetlands, mining and marine conservation do not fall within the DOE's mandate. It is only through the EIA process that the DOE exercises some central supervision.

b. Non-governmental organizations

The environmental NGO movement in Malaysia has had increasing involvement in recent years. Several well-publicized environmental incidents have thrust NGOs to the forefront of public attention. Several NGOs have strongly resisted developmental projects which threaten environmental quality. The environmental NGOs in Malaysia face many challenges, chief of which is the difficulty in having their right to sue recognized by courts. In addition, NGOs are generally viewed with suspicion over their perceived "anti-development" positions.

c. Environmental legislation

The main framework environmental legislation in Malaysia is the 1974 Environmental Quality Act, or EQA, and the regulations enacted thereunder. The 1974 EQA has been amended in recent years, principally by the Environmental Quality (Amendment) Act of 1996 (Act A953).

d. Problems in implementing environmental legislation

Apart from the development-environment conflicts and the common budgetary and manpower problems found in most developing countries, Malaysia faces a significant challenge in relation to federal and state government competence. The problem is further compounded in relation to the implementation of international

treaty obligations. As a result, considerable differences have arisen over environmental protection issues, particularly in relation to forestry, land use, wildlife protection and hydroelectricity generation, issues, which reside within exclusive state competence.

Further challenges arise in relation to the competence of the various national agencies in the natural resource sectors (forestry, fisheries, mining and agriculture) which are under the jurisdiction of other national ministries with separate sets of regulatory laws. This leads to overlapping in prescriptive and enforcement jurisdiction, since environmental concerns often cut across numerous natural resource sectors.

(iii) Philippines

a. Environmental institutions

Environmental management, conservation and development in the Philippines is administered at the national level by the Department of Environment and Natural Resources (DENR), which was created in 1987. The Philippines is the only ASEAN country which reposes the functions of environmental protection and natural resource management in one body. However, the management, conservation, development, protection, utilization and disposition of all fishery and aquatic resources of the country are within the jurisdiction of the Bureau of Fisheries and Aquatic Resources (BFAR), a line bureau under the Department of Agriculture.

The DENR regional offices which are found in the 13 administrative regions and the DENR- Provincial Environment and Natural Resources Offices (PENROs) within each province implement policies. The provincial governments also run their PENROs as well as Community Environment and Natural Resources Offices (CENRO) in certain municipalities. Under the mandate of the Local Government Code of 1991, certain functions of the DENR have been devolved to the local government units (LGUs), such as the testing and apprehension of smoke-belching vehicles.

b. Non-governmental organizations

The NGO movement in the Philippines is extremely vibrant, particularly in relation to environmental protection. Most NGO activities focus on community-based resource management and environmental rights. In recent years, many NGOs have allied themselves into coalitions for increased exposure and efficacy. The social and political culture in the Philippines is extremely tolerant of and receptive to the work of NGOs, as a result of which they wield significant influence over the shaping of public opinion and even governmental policy.

c. Environmental legislation

The major laws are the Republic Acts passed by Congress, but these typically envisage specific implementing regulations such as department administrative orders. The provincial government apparatus comprises the major enforcement machinery. As with most developing countries, enforcement capacities in the provinces are weak, due to a combination of factors including financial and manpower constraints and the lack of political will.

Under the Philippine Constitution, it is the duty of the State to protect and advance the right of the people to a balanced and healthful ecology. This duty was earlier codified in the Philippine Environmental Policy, which is the national blueprint for environmental protection. The Philippine Environment Code, in turn, contains general principles dealing with the major environmental and natural resource concerns of the Philippines. These two documents are very broad and general, and contain few substantive provisions. There is no singular framework or "umbrella" legislation which comprehensively binds together the numerous environmental concerns.

It must be noted that the Philippines among the countries in Southeast Asia has the most progressive, albeit piecemeal, environmental legislation in place. It has the only specific legislation relating to the prospecting of biological and genetic resources, as well as the most advanced EIA, mining, fisheries, protection of ancestral domain and protected areas legislation in the region. However, the challenge remains to effectively implement the legislation.

d. The Environmental Impact Statement (EIS)

The Philippine Environmental Impact Statement (EIS) System requires all government agencies, government-owned or controlled corporations, and private companies to prepare an Environmental Impact Assessment (EIA) for any project or activity that significantly affects the quality of the environment. Unlike in several other countries, the EIS system does not merely emphasize the regulation of industrial pollution, but also aims at the protection of natural resources, fragile ecosystems and the rights of local communities.

Most banks in the Philippines make loans contingent upon the proponent securing an Environmental Compliance Certificate (ECC) as a result of an EIA. A number of government agencies also require an ECC before issuing project-related permits and approvals.

e. Problems in implementing environmental legislation

As in many developing countries, conflicts of jurisdiction occur at the central level between the DENR and other national agencies, and at the provincial levels, between the DENR and provincial governments. Several reasons exist for inadequate enforcement:

- Lack of political will amongst LGUs to enforce environmental laws, at times leading to differences in views between the LGUs and the central DENR over the feasibility of proposed projects. LGUs are often more concerned with the attraction of investments and the establishment of industrial zones rather than environmental protection.
- Certain matters belong to the exclusive jurisdiction of LGUs, and these impinge on matters coming under the authority of the central DENR (and vice versa), e.g. concerns over pollution from mines (which is under the jurisdiction of DENR) contaminating fisheries in municipal waters (under LGUs);
- Insufficient understanding of legislation due to LGUs' lack of trained manpower;
- Lack of financial resources in LGUs.

Provincial governments are under heavy pressure to showcase developmental projects at the cost of long-term plans for environmental and natural resource management. This is often exacerbated by vested interests that favour projects which are not always consonant with sound environmental practices.

(iv) Singapore

a. Environmental institutions

The management of the environment lies with the Ministry of Environment (ENV), which was established in the 1970s, first as a department within the Prime Minister's Office. It provides the infrastructure for waste management, as well as enforces legislation relating to pollution control and public health. The Pollution Control Department (PCD) within the ENV is in charge of environmental planning and building development control, air and water pollution control and the regulation of hazardous substances and wastes. Due to the government's strong commitment to pollution control, in combination with the small area of Singapore, the ENV has successfully implemented its pollution control programmes.

b. Non-governmental organization

The environmental NGO movement in Singapore is fairly active, and liaises closely with the government, media and industry. The NGOs consist primarily of nature groups such as the Nature Society, Singapore (NSS) and groupings of companies like the Singapore Association of Environmental Companies (SAFECO) and the Singapore Chemical Industry Council (SCIC). The umbrella organization which co-ordinates the activities of environmental groups is the Singapore Environment Council (SEC), formerly known as the National Council for the Environment.

c. Environmental legislation

The Singapore Constitution does not have provisions on the environment. Neither does Singapore have a framework law on environmental protection and management. There is no mandatory EIA system laid out in legislation. However, as and when the ENV deems a particular project to have sufficient potential for pollution that may affect public health, an EIA may be required. The present scheme of environmental management in Singapore is scattered throughout numerous Acts and Regulations. EIAs are required on an *ad hoc* basis at the discretion of the ENV. There are no laws to govern soil contamination, or to require that this be cleaned up.

The environmental protection effort is almost exclusively administrative in nature - the relative success of environmental management in Singapore is primarily due to the administrative efficiency of the ENV and other government agencies operating within a relatively tiny country. Also, stringent planning and zoning laws ensure optimal usage of land and proper siting of polluting industries.

Two general categories of environmental legislation exist - those that deal primarily with the regulation of wastes and emissions from industries, hospitals, households and vehicles (pollution control laws), and that deal with the protection of natural areas and wildlife or nature conservation laws. There have been calls for a single framework law; this is now under development.

d. Problems and issues in legislation and implementation

Legislation related to the environment is found in at least two dozen Acts. Not all of these Acts come under the administration of the ENV - for instance, marine pollution matters under the Prevention of Pollution of the Sea Act fall within the responsibility of the Maritime and Port Authority of the Ministry of Communications, while nature conservation issues are under the departments of the Ministry of National Development. The Urban Redevelopment Authority usually handles planning issues. Fortunately for Singapore, the dispersed authority over matters

related to the environment does not pose too severe a problem as planning and implementation are highly centralized activities.

e. Land scarcity and the protection of natural areas

The Singapore Green Plan establishes broad policies for nature conservation. Under the Green Plan, five per cent of the land area is to be set aside for nature conservation. To date only three per cent of the nature sites have legal protection under the National Parks Act (two National Parks and two Nature Reserves), and there exists no protection of marine areas as entire ecosystems.

Another issue is the protection of wildlife. Violations of wildlife conservation are largely unreported, and the general public is quite unaware of the laws which protect fauna and flora. There is significant public ignorance on matters related to the environment; and more public education is needed to redress this.

(v) Thailand

a. Environmental institutions

The Ministry of Science, Technology and Environment (MOSTE) conducts environmental management on a national basis. The main departments under MOSTE are the Office of Environmental Policy and Planning (OEPP), the Pollution Control Department (PCD) and the Department of Environmental Quality Promotion (DEQP). These are divided into several divisions and regional offices, which take charge of environmental concerns at the national and provincial levels.

The OEPP is tasked with policy formulation and the development of environmental management plans, in coordination with national and provincial agencies. The OEPP co-ordinates the implementation of the EIA system in Thailand. The PCD takes charge of pollution issues, and is charged specifically with implementing pollution control laws and emission standards. The DEQP promotes public education on the environment, and takes charge of environmental information, public and media relations, research and training as well as NGO liaison. Apart from these three agencies, several other bodies operate under the aegis of MOSTE, which take charge of specific environmental issues.

The responsibility over natural resource management resides primarily with the sectoral ministries. In particular, the Ministry of Agriculture and Co-operatives and the Ministry of Interior, together with their constituent departments, enjoy broad jurisdiction over numerous natural resource sectors.

b. Non-governmental organization

The environmental NGO movement in Thailand is significant, with over 70 NGOs registered with the DEQP. Thai law grants juristic status to NGOs, and only registered ones may request governmental assistance and support. However, the requirement for registration prior to financial support is a deterrent to the activities of many NGOs because of high costs and increased regulation by the authorities.

c. Environmental legislation

The main framework environmental legislation is the Enhancement and Conservation of the Natural Environmental Quality Act of 1992. It is a substantive piece of legislation containing several progressive provisions which are designed to enhance the protection of the environment.

d. Problems in implementing environmental legislation

Overlaps in administrative jurisdiction occur at the central level amongst government agencies, as well as between central and provincial authorities. One major problem lies in the division of competencies and the lack of co-ordination amongst the following bodies and the separate laws which they administer:

- The MOSTE and its constituent departments;
- Other sectoral ministries and their constituent departments, in particular the powerful Ministry of Agriculture and Co-operatives which manages several key natural resources like forestry, wildlife and fisheries, and the Ministry of Industry whose jurisdiction over industries impinges on the EIA process, especially in auditing and enforcing EIA guarantees;
- The provincial governments.

Channels of communication with provincial governments, especially those in the more remote regions, are difficult to maintain. From a broader perspective, the provisions for multi-agency co-operation are hampered by the realities of political administration in Thailand, where governments are regularly formed by coalition. Decision-making is influenced to a considerable extent by the vested interests of industrialists, political parties, corporations and local authorities.

e. Inadequacies in public participation

The EQA Section 6(1) entrenches the people's right to be informed and to obtain information for the purpose of participation in the enhancement and conservation of national environmental quality. Sections 6(2) and 6(3) respectively

provide for the right to state compensation arising from environmental damage and the right to complain against environmental offenders. The right to information under Section 6(1), however, is subject to an exception crafted for officially classified information and secrets pertaining to privacy and property rights of individuals. As a result the established means of communicating the people's concerns through NGOs are not altogether perfect.

The above concerns find particular relevance in regard to projects requiring the preparation of EIAs. As it turns out, the right to information is often subject to the discretionary power of government officials.

3. Environmental policy instruments

(a) Direct regulation

Direct regulation comprises institutional measures that influence the environmental performance of polluters. These are the following:

- *Engineering standards:* Regulate technology;
- *Performance standards:* Regulate plants that operate in certain ways, at certain times and producing certain emission or output ratios;
- *Quantity limits:* A quota on overall emission levels/harvest levels;
- *Ambient standards:* Standards of environmental quality;
- *Bans/Prohibitions*: Preclude certain activities, the use of certain inputs or prevent access to certain areas;
- *Environmental Impact Assessment (EIA):* Environmental feasibility of new projects;
- *Land/water use restriction;*
- *Permits,* tradable; and
- *Licences,* non-tradable.

Despite criticism, direct regulation of environmental performance is the strongest and most efficient driver for environmental improvements. ASEAN countries should therefore continue to develop and improve their legislative framework, its implementation and enforcement as described in section 2.2.

(b) Economic instruments

There are measures that affect costs and benefits of alternative action open to economic agents. These are the following:

- *Emission charges:* A tax applied per unit of emitted pollution;
- *Depletion charges:* a tax applied per amount of harvest or withdrawal;
- *Product charges*: A tax applied to products used in a polluting activity or to products that resulted from pollution activity;
- *Deposit-refund systems:* A levy e.g. applied per unit of packaging;
- *Information systems:* Public disclosure of pollution, naming of polluting firms, green labelling, voluntary standards;
- *Subsidies:* Financial assistance for improved environmental performance or price support for environmental preferable products;
- *Green public procurement:* Preference given to green suppliers and products from private or governmental purchasing programs and procedures; and
- *Liability:* Liability of polluters (to compensate victims for damage or restoration).

(c) Market creation instruments

These are measures that create a market of rights for actual or potential pollution that can be bought, sold or leased after a level of pollution of emission is set:

- *Offsets:* New emission sources in an area are offset by a reduction of emission from existing sources;
- *Bubbles:* Allow shift in emission limits among existing plants as long as total emissions for a regional group of polluters with similar emissions do not increase; and
- *Marketable permits:* Emission/harvest permits that can be used, sold or leased;
- *Pollution credits*: Right to pollute up to a set level which can be traded in case of surplus allocation.

(d) Voluntary instruments

- *Assurance bonds:* A payment that is returned if environmental damages do not occur; and
- *Assign right:* Individual or community right to resources previously held publicly or open to the public.

4. ISO 14000 Series and environmental management

(a) ISO 14000 Series

The ISO 14000 series is a family of environmental management standards developed by the International Organization for Standardisation (ISO), a voluntary standards development body.

The objective of the ISO 14000 standards series is to provide an internationally recognized framework for environmental management, measurement, evaluation, and auditing. ISO 14000 standards do not prescribe environmental performance targets, but instead provide organizations with the tools to assess and control the environmental impact of their activities, products, or services. The ISO 14000 series includes the following:

• ISO Guide 64:1997	Guide for the inclusion of environmental aspects in product standards
• ISO 14001:1996	Environmental management systems Specification with guidance for use
• ISO 14004:1996	Environmental management systems General guidelines on principles, systems and supporting techniques
• ISO 14010:1996	Guidelines for environmental auditing General principles
• ISO 14011:1996	Guidelines for environmental auditing Audit procedures Auditing of environmental management systems
• ISO 14012:1996	Guidelines for environmental auditing Qualification criteria for environmental auditors
• ISO 14020:1998	Environmental labels and declarations General principles
• ISO/DIS 14021	Environmental labels and declarations Self declared environmental claims

- ISO/DIS 14031 — Environmental management
  Environmental performance evaluation - Guidelines
- ISO 14040:1997 — Environmental management
  Life cycle assessment - Principles and framework
- ISO/DIS 14041 — Environmental management
  Life cycle assessment
  Goal and scope definition and inventory analysis
- ISO 14050:1998 — Environmental management - Vocabulary
- IAF — Guidance on the application of ISO/IEC guide 62 for bodies operating assessment and certification or registration of environmental management systems (EMS) 1:1997

(b) Environmental management system (EMS)

An environmental management system allows an organization to assess and control the environmental impact of its activities, products, or services. *ISO 14001, environmental management systems – Specification with guidance for use*, outlines the requirements for an EMS.

According to ISO 14001, EMS has six key elements of an EMS:

- An environmental policy, which contains intentions and commitment to environmental performance;
- Planning, which is comprised of an analysis of an organization's environmental impact from its operations;
- Implementation and operation, which cover the development and putting into practice of processes that will bring about environmental goals and objectives;
- Checking and corrective action, which include monitoring and measurement of environmental indicators to ensure that goals and objectives are met;
- Management review, covering the review of the EMS by the organization's top management to ensure its continuing suitability, adequacy and effectiveness; and
- Continual improvement.

(c) Benefits of ISO 14001

An ISO 14001 EMS provides an organization with the tools to monitor and improve its impact on the environment. Implementing ISO 14001 may help to achieve the following:

- Improvement of cost control by increasing eco-efficiency;
- Reduced consumption of materials and energy;
- Achievement and maintenance of compliance with environmental regulations;
- Assurance of an organization's commitment to environmental management;
- Good public relations;
- Satisfaction of investor criteria and improvement of access to capital;
- Enhancement of an organization's image and market share;
- Meeting of clients' requirements concerning the environmental performance;
- Reduction of incidents that result in liability;
- Improvement of working environmental and staff morale;
- Demonstration of reasonable care;
- Obtaining insurance at reasonable cost;
- Improvement of trade and market access; and
- Improvement of industry-government relations.

Evaluation of ISO 14001 impact on business performance based on questionnaires sent to 295 certified companies in Europe and Asia (Universite Catolique de Louvain, 1999) suggests that companies implementing ISO 14001 benefit from the organizational and operational improvements as a result of the implemented PDCA cycle. Economic benefits for companies implementing ISO 14001 are most likely to arise in marketing performance, less in finance and production, least in social performance.

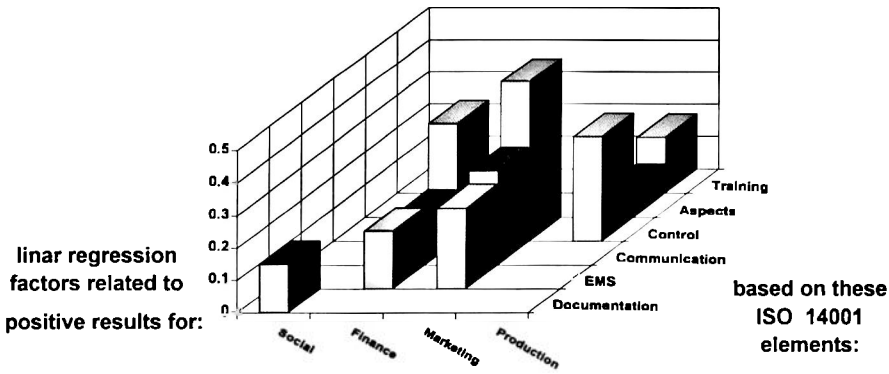

Figure II.4. Perceived impact of ISO 14001 certification on business performance

(d) ISO 14001 certification

Certification or registration is the formal recognition of an organization's EMS by an independent third party. However, certification is a private business process and is not linked to an official verification by authorities. On the North American market this is often referred to as "registration."

Organizations may simply declare that their EMS meets the requirements of ISO 14001. However, many organizations opt to have their EMS certified to provide greater assurance to clients or the public, or because regulators or clients require it. An independent third party, known as a certification body or "registrar" assesses and audits the organization's EMS to ensure that it complies with the requirements of the standard.

A further level of confidence is provided by the accreditation of registrars. Accreditation is the evaluation of a certification body's competence to carry out reliable and comprehensive assessments of an ISO standard. It provides the basis for national and international acceptance of ISO 14001 compliance certificates.

C. Case studies: application of environmentally sound technology

1. Introduction

SMEs have their share of, and often are responsible for many, environmental impacts in a region: water consumption, wastewater, and solid waste, air pollution and others. This is because SMEs frequently lack human, technical and financial resources to optimize their environmental performance. Mitigating environmental impacts are far from being a burden on companies; on the contrary they support their competitiveness and profitability.

Whether or not instituted as a formal EMS, a management approach towards environmental impacts offers a range of benefits. The following case studies illustrate the various links between environmentally sound production processes, industrial competitiveness and profits.

The examples selected provide an impression on environmental sound practices and technologies. Most technologies could easily be transferred into comparable industry sectors. Though some case studies are from large companies, their environmental achievements as well as can be replicated from smaller operations. To make those projects in different settings comparable they are described with the following structure:

- Company name and location (country);
- Type and amount of production;
- Environmentally sound activities undertaken;
- Investment effort and related cost efficiency;
- Effects on the companies environmental impacts; and
- Other benefits for the company aside from environmental improvement and cost saving.

To provide an overview on multiple industry sectors in different environmental and legislative settings, examples from the ASEAN region as well as cases from other countries are described.

2. Food and beverage industry

(a) Waste minimization in pineapple processing

(i) Company and location Del Monte (Philippines)

(ii) Production: Canned pineapple, canned juice, pineapple crush and juice concentrate; total production 1,459 tons of canned pineapple and other products daily.

(iii) Environmentally sound activity

With help of a joint program of the Philippines government and the United States Agency for International Development (USAID), Del Monte embarked on a waste minimization effort in the areas of:

- Improved recovery of pineapple mixed with pulp;
- Installation of an open-channel wastewater meter to monitor wastewater generation from different processes;
- Minimization and collection of fruit droppings and juice spillage; and
- Improved collection and recycling of cans, paper and other wastes.

(iv) Efforts and their cost-efficiency

- Installation of spill collection pans to collect fruit droppings and juice drippings: cost of US$17,800 resulted in savings of US$24,000 per year and a payback period of 9 months;
- Improvement of monitoring and supervision at the preparation and trimming tables, which saved 60 kg pineapple per hour of processing and 55 litres of juice per hour with a total worth of US$24,000 per year;
- Installation of water recycling device and an automated sprayer at the mixed fruit section; installation of automated control systems for high volume washing, use of low volume, high pressure hoses, displacement of washing by dry cleaning, producing savings of US$1,000 per year in water consumption; and
- General recycling efforts (additional savings of US$8,000 per year).

(v) Effects on the minimization of environmental impacts

- Waste minimization due to various recycling efforts, saving crucial land-fill space and resulting in reduced groundwater contamination;
- Reduction of the biological oxygen demand (BOD) concentration in wastewater to below-legal limits, which resulted in less surface water contamination;

- Reduction of waste water by 30 per cent and water conservation; and
- Improvement of health and safety conditions within the organization.

(vi) Benefits

Aside from cost-savings and environmental achievements, the company benefits from the following: (1) public recognition for its actions, and a plaque of recognition from DENR; and (2) enhanced market access and competitiveness.

(b) Reducing water consumption in rice noodle manufacturing

(i) Company and location Sun Sun Rice Vermicelli Factory, Thailand

(ii) Production: Dry rice noodles for distribution in local markets; production capacity: 44 rice sacks per day, 1,180 tons per year

(iii) Environmentally sound activity

- Installation of new rice classifier and changing of the washing system from mechanical to pneumatic.

(iv) Main objectives

- Reduction of water consumption;
- Recovery of starch;
- Reduction of electrical consumption.

(v) Efforts and their cost-efficiency

- Installation of new rice classifier unit to reduce water consumption for washing process for around US$40,000 resulting in savings of US$17,000 per year with a payback period of 2 to 3 years.
- Installation of continuous extrusion line package for US$23,000 with savings of US$5,000 per year, pay-back period: 4 to 5 years;
- Installation of container for rice noodle setting prior to drying for US$1,800 resulting in savings of US$500 per year, payback period 3.6 years.

(vi) Effects on the minimization of environment impacts

- Reduction of water consumption (7.7 per cent); and
- Reduction of steam and energy consumption (89.4 per cent)..

(vi) Benefits

Aside from cost-savings and environmental achievements, the company benefited from a reduction of starch loss (63,1 per cent). The recovered rice starch is used to produce an alcoholic beverage.

(c) Cleaner production in beer brewing

(i) Company and location: Beijing Yanjing Brewery Group Corporation (BYBGC) (China)

(ii) Production: Beer and beverage production with more than 10 kinds of products such as beer, ginseng syrup, mango juice, etc. Annual production: 2,500,000 hectolitres beer.

(iii) Environmentally sound activity

Analysis of production processes and consequent development and installation of cleaner production technologies including:

- Good housekeeping, process changes to avoid dust and reduce waste by improving the screening process for raw materials;
- Enhanced management of bottles in purchasing, storage and washing to reduce beer loss;
- Improvement of containment to save raw materials such as rice and malt in the process of raw material grinding and conveying;
- Recovery, reuse and recycling by adding a hot water storage tank to collect hot water in the cooling process;
- Closing the recycling loop of hot water to save energy;
- Reusing hot water in bottle washing, reusing the diatomite; and
- Separation of beer residue and starch waste from water and recovering hot solidifiable materials after boiling the malt.

(iv) Main objectives of activities

- Reduction in raw material consumption;
- Energy saving;
- Reduction in consumption of fresh water and of wastewater generation; and
- Reduction of chemical oxygen demand (COD) in discharged effluent.

(v) Efforts and their cost-efficiency

- Addition of a hot water storage tank to collect hot water in cooling process, costs: US$72,000 plus electricity and maintenance: US$10,500. This compares to savings of US$63,000 per year due to water saving and reduction in fees for wastewater treatment.
- Installation of recovery equipment to separate the residue and starch waste from water with costs for operation and maintenance of US$8,400 resulting in savings of US$23,400 from the sales of by-products, reduction of fees for waste water treatment, pay-back period 0 to 5 years.

(vi) Effects on the minimization of environment impacts

- Reduction in raw material and natural resource consumption;
- Energy saving and reduction in emissions from fossil fuel burning;
- Reduction in the consumption of fresh water;
- Overall reduction in wastewater generation by 184,580 m^3 per year about 11 per cent of total wastewater discharged before; and
- Reduction of the effluent's annual COD by about 14.1 per cent of that generated before.

(d) Cleaner production in palm oil mills

(i) Company and location: PT. Ekadura (Indonesia)

(ii) Production: Farming of oil palms and milling of palm oil fruit; 60 tons of fresh fruit bunches (FFB) per hour and processing of approximately 137,000 tons fruit per year including 33,025 tons of fruit kernels.

(iii) Environmentally sound activity

Participation in the CP Program initiated by BAPEDAL. Activities focused on quality control of the raw material, including harvesting standards, harvesting interval control, harvesting supervision, collecting lost fruits, transport of FFB to factory and sorting.

(iv) Main objectives

- Improvement of quality of raw material; and
- Reduction of fresh fruit wastage.

(v) Efforts and their cost-efficiency

Sorting of loads by quality. Criteria for sorting includes under-ripe fruit, over-ripe fruit, empty bunches and long stalks - decreased fruit losses from a high of >90 tons to around 4 tons or by 95.5 per cent. The benefit from the decrease of under-ripe FFB is around US$9,000, return from the increased crude palm oil extraction rate after three months is around US$16,000. An effect on the minimization of environment impacts is mainly the reduction of organic waste from fresh fruit.

(vi) Benefits

Aside from cost-savings and environmental achievements, the company benefits from the improvement of harvest and product quality.

(e) Cleaner production at a toddy distillery

(i) Company and location: Seeduwa Distillery (Sri Lanka)

(ii) Production: Coconut arrack, approximately 6,750 liters of absolute alcohol per day

(iii) Environmentally sound activity

Process modifications and implementation used a four-step approach.

- Operating practices and equipment were examined in detail, the design and implementation of the stainless steel still upgrade and optimization of its process parameters;
- Enhancement of the stainless steel still with additional equipment, e.g. a degassing column and a thermo-compressor for heat recovery;
- Construction of an effluent treatment facility; and
- Improvement in the collection and recycling of cans, paper and other waste.

(iv) Efforts and their cost-efficiency[*]

Examination of operating practices and equipment, design and implementation of the stainless steel still upgrade and optimization of its process parameters, housekeeping improvement; costs US$27,820. The improvements resulted in total savings of US$88,900 per annum requiring a payback period of three months, due to the (1) upgrading of the still with 22 per cent fuel savings worth: US$25,000 per year; (2) reduction of 95 per cent in alcohol loss to the drain worth US$34,000 per

[*] Only the first-phase results are reported.

year; and (3) reduction in breakage during handling, bottling and loading produced savings valued at US$22,600 per year.

(v) Effects on the minimization of environmental impacts

- Reduction in SO_2 and CO_2 emissions as a result of reduced fuel consumption;
- Seven per cent reduction in BOD load in the effluent stream, due to reduced amount of alcohol leaving the process in the spent wash; and
- Less resource consumption for glass bottles (volume of solid waste decreased due to reduced breakage in handling, bottling and loading).

(vi) Benefits

Aside from cost-savings and environmental achievements, the company benefits from the following:

- Quality improvements in the alcohol produced reduced the ageing period by two years (alternatively, by not reducing the ageing period, a better quality product and higher margin could be achieved); and
- Enhanced market access and competitiveness.

(f) Reducing waste in plastic injection moulding

(i) Company and location: Rees Plastics (New Zealand)

(ii) Production: Manufacturing of rigid packaging such as crates

(iii) Environmentally sound activity

- Implementation of cleaner production measures via a modification of products and processes, reuse and recycling of residual materials.

(iv) Main objectives

- More efficient use of resources; and
- Improvement in profitability and competitiveness.

(v) Efforts and their cost-efficiency

- *Development of a machine which directly moulds labels into lids of the produced containers.* This replaced the gluing of paper labels onto the lids, and led to a decrease in the number of non conforming products by over 20 per cent, an elimination of toxic glue use, decrease in the material weight of the lids by 12 grams and reduction of material and transportation costs. Total in

capital costs and labour was US$12,000, producing savings of US$35,000 in the first year due to increased production and decreased rejection rates.

- *Collection and re-refining of waste oil, collection and reuse of plastic and paper bags used to deliver materials, and recycling of cardboard.* The re-refining oil saves the business over US$800 per year, recycling bags and cardboard has reduced disposal charges by between 25–30 per cent. The latter savings may however not be realized in ASEAN countries where disposal charges do generally not reflect actual direct and indirect disposal cost.
- *Installation of two more granulators to allow re-processing non-conforming products at the injection moulding machine where they are generated.* Investment was around US$15,000 which compares to savings of US$11,000 per year due to reduction of virgin resin used.

(vi) Resulting minimization of environmental impacts

- Toxic glue no longer needed, eliminating any possible health hazards for the staff and organic solvent emissions;
- Reduction in oil consumption; and
- Waste reduction;

(vii) Benefits

Aside from cost-savings and environmental achievements, the company benefits from (1) increased productivity by 10 per cent to 15 per cent; and (2) reduction of handling and storage of material.

4. Conserving water and energy in the textile industry

(a) Company and location:	Sinsaenee Co., Ltd. (Thailand)
(b) Production:	Knitted fabric, dyed and finished fabric textiles, 312 tons per year of knitted fabric, about 1,560 tons per year of dyed and finished fabrics.

(c) Environmentally sound activity

The environmentally sound activity being undertaken refers to the Implementation of water and energy conservation options such as the following:

- Replacement of worn out pipes and insulation of new steam pipes;
- Recovery of heat from process water using a heat exchanger;
- Improvement of boiler efficiency; and

- Several housekeeping options like installing water meters, flow control nozzles etc.

(d) Efforts and their cost-efficiency

- Replacement of worn out pipes and insulation of new steam pipes, costs US$12,500 and savings realized due to reduction of fuel consumption, payback period two to seven years;
- Recovery of heat from process water using heat exchanger, costs US$20,200, savings due to reduced fuel consumption, payback period 10 months; and
- Improvement of boiler efficiency costs US$4,600 with savings due to reduction of fuel consumption, payback period 10 months.

(e) Effects on the minimization of environment impacts

- Conservation of water, due to installation of water meters, reuse of process water and other efforts;
- Minimization of BOD, due to substitution of chemicals to low BOD process chemicals and recovery of process chemicals; and
- Conservation of energy due to the usage of heat exchangers and recovery of condensate as boiler feed water.

(f) Benefits

The company benefits from the (1) improvement of worker health and safety due to the installation of warning signs in dangerous locations and placing guards in areas of exposure to hot water, steam and chemical splashing, proper disposal of old dyes and chemicals; and (2) enhanced market access and competitiveness.

5. Chrome recycling in leather manufacturing

(a) Company and location: Victorian Hide and Skin Producers Pty Ltd. (Australia)

(b) Production: Chrome tanning of cattle hides

(c) Environmentally sound activity

- Use of Sirolime technology which includes the replacement of hair from the intact hide, rather than the conventional method of dissolving hair in lime or sulphide solutions;
- Replacement of ammonia salt deliming with carbon dioxide; and
- Recycling of chrome tanning liquors.

(d) Main objectives

- Reduction of effluent volume; and
- Improvement of effluent quality and of chrome liquor recovery.

(e) Efforts and their cost-efficiency

Implementation of Sirolime technology and a VHSP developed system. This is a system under which fats and solids are removed from the waste streams using hydrocyclone technology. Total investment costs: US$62,000. This resulted in a reduction of chrome sludge, saving US$17,000 per year, reduction of chrome usage with savings of US$30,000 per year, reduction in trade waste charges, saving US$85,000, sale of fat for US$30,000 - total annual savings are US$162,000, pay-back period 0 to 4 years.

Effects on the minimization of environment impacts are the reductions of:

- Total dissolved solids in wastewater;
- BOD discharge by 5.6 per cent;
- Total oxidized sulphur emissions by 37.9 per cent;
- Total nitrogen discharge by 8.5 per cent; and
- Chrome discharge.

6. Environmental management best practices in the agrochemical industry

(a) Company and location: TJC Chemical CO Ltd (Thailand)

(b) Production: Agrochemicals like herbicide, fungicide, and insecticide

(c) Environmentally sound activity

- Reduction of waste volume;
- An improved end product with no toxic production residuals;
- Reuse of the process effluent into the formulation of the product.

(d) Efforts and their cost-efficiency

- Installation of a package drum crusher and drum rinsing; this reduces by 75 per cent the distance travelled by disposal material and by 80 percent the volume, in addition to the prevention of misuse of the package drums. Total investment: US$70,000 including two units rinsing equipment, which resulted in annual savings of US$7,700 and a payback period of nine years.

- Reuse of active ingredient from drum rinsing and reduction of costs for transport to the smelting plant provide further savings which have yet to be quantified.

(e) Effects on the minimization of environment impacts

- Volume reduction of packaging waste contaminated with hazardous material;
- Reduction of transport mileage for waste drum for disposal or recycling; and
- Recycling of crushed drum in smelting plants for other purposes, saving resources; and creation of recycling opportunities for suppliers of complimentary products and services.

(f) Benefits

Aside from cost-savings and environmental achievements, the company benefits from the following:

- Promotion of TJC's image, especially less economic damage from copied products using the companies original packaging; and
- Minimization of manpower required at the rinsing facility.

7. Cleaner production in pulp and paper mill

(a) Company and location: Beijing No.7 Paper Mill (China)

(b) Production: Production of pulp and paper, total output of paper and paperboard is 33,000 tons per year

(c) Environmentally sound activities

These activities cover improved environmental management and housekeeping, including the following:

- Use of white water in processing to reduce water consumption and use of condensed water from dryers to save energy;
- Reduction of energy consumption;
- Use of paper lints from press section to reduce and prevent pollution;
- Improvement of the washing of straw pulp, reducing consumption of aluminium sulphate;
- Increasing scraping times in air floating tank to reduce the re-precipitation of the fibers;

- Use of dispersive rosin instead of soap rosin; and improvement of water flow by changing the valve in the air inlet pipe; and
- Use of grooved press roll instead of the normal plain press roll in order to reduce energy consumption in the subsequent process.

(d) Main objectives

- Reduction of water consumption and of waste water generation; and
- Reduction of emissions.

(e) Efforts and their cost-efficiency

- Changing the valve in the air inlet pipe at a cost of US$2,200, payback period: 4.3 years;
- Adopting the grooved press roll instead of the normal plain press roll at a cost of US$5,000 internal rate of return is 19.6 per cent; and
- Using dispersive rosin instead of soap rosin at a cost of US$100,000, payback period: 1.1 years.

(f) Effects on the minimization of environment impacts

- Reduction of wastewater discharged from 672,000 m^3 per year to 470,000 m^3 per year; and of COD amount in discharged waste water from 580 tons to 370 tons per year;
- Reduction of suspended solid (SS) from 990 tons to 530 tons per year; and
- Reduction of energy consumption and of water consumption from 980,000 m^3 to 710,000 m^3.

8. Metal related manufacturing

(a) Minimizing chemical and water consumption metal ware production

(i) Company and location: Thai Frame and Accessory Co., Ltd. (Thailand)

(ii) Production: Metal ware such as ornaments, gifts, table settings, belt and bag accessories, galvanised surface 3,800 m^2 per year

(iii) Environmentally sound activity

The environmentally sound activity is the implementation of pre-treatment processes for copper and nickel electroplating.

(iv) Main objectives

- Minimization of water and chemical consumption; and of wastewater.

(v) Efforts and their cost-efficiency

- Implementation of Reverse Osmosis (RO) for the deionised water production at a cost of US$6,000, reducing production costs due to water saving by US$4,900 per year, pay-back period 1.2 years;
- Implementation of water reuse system using an ion exchanger for US$24,000; reduced water consumption and water treatment cost, saving US$14,000 per year, payback period 1.7 years;
- Removing impurities in water with activated carbon treatment reduced rejected products to less than five per cent, savings US$5,200 per year;
- A textile filter was installed in the ultrasonic bath to remove suspended particles, costs US$1,200, resulted in 30 per cent reduction in chemical consumption, saving US$650 per year, payback period 1.9 years; and
- Prolonged the dripping time in all baths.

(vi) Effects on the minimization of environment impacts

- Wastewater reduction due to (1) ion exchange: 1,788 m^3 per year (96 per cent); (2) due to cloth filter in ultrasonic bath: 4 m^3 per year (30 per cent); and (3) due to activated carbon treatment: 27 m^3 per year (20 per cent); and
- Solid waste reduction due to activated carbon treatment: 336 m^3 per year (20 per cent).

(vii) Benefits

Aside from cost-savings and environmental achievements, the company benefits from: (1) improved of maintenance and operation of plating baths; and (2) better control of rinsing water-quality.

(b) CO_2 emission reduction in iron and steel industry

(i) Company and location: Capital Steel Corporation (China; Singapore)

(ii) Production: 8.2 million tons of steel, 7 million tons pig iron, 22 million tons iron ore and 6 million tons steel products

(iii) Environmentally sound activity

- Implementation of coke dry quenching technology in iron and steel production.

(iv) Main objectives

- Reduction of energy consumption; and mitigation of environmental pollution.

(v) Efforts and their cost-efficiency

- Installation of a coke dry quenching steam-cycle system in a 500-hole, six-meter wide coke oven to recover the heat of red coke, thus recovering the energy. Annual coke production is 500,000 tons, and 500 kg of steam from one ton of red coke. Total investment costs were US$25 million, leading to savings of 40,000 tons coal per year due to reduced coke ratio by 1.5 per cent. Estimated payback period, seven years.

(vi) Effects on the minimization of environment impacts

- Less 116,000 tons of CO2-emission per year;
- Reduction in energy consumption.

(vii) Benefits

Aside from cost-savings and environmental achievements, the company benefits from the improvement of process efficiency.

(c) Solid waste reduction in vehicle parts industry

(i) Company and location: Bangkok Springs Industrial Co Ltd (BSI) (Thailand)

(ii) Production: Leaf springs for the automobile industry, mainly for trucks and pick-up cars. Yearly production capacity: 18,000 tons.

(iii) Environmentally sound activity

Implementation of spray painting of leaf springs, involving vertical orientation with spray guns and a simple on-off trigger system.

(iv) Main objectives

- Reduction of solid waste generated from the painting of the leaf springs; and
- Improvement of workers' occupational health and safety (OHS).

(v) Efforts and their cost-efficiency

- Reduction of paint consumption due to reduction of over-spray, change of filler and of thinner, change of the mixing ratio of the filler and thinner, resulting in 50 per cent cost savings of US$12,000 per year;
- 50 per cent reduction of manpower cost by operating the new automatic spray system saved US$4,000 per year; and
- Improved production capacity by more than 450 tons per month, payback period will be less than two years.

(vi) Effects on the minimization of environment impacts

- 75 per cent less solid waste is generated as result of reduced over-spray; and
- 52 per cent reduction in volatile organic compounds from thinner emission.

(vii) Benefits

Aside from cost-savings and environmental achievements, the company benefits from: improvement of workplace safety due to the use of technology that does not require personnel to work inside the spraying booths, and the near elimination of workers' exposure to organic solvents.

8. Energy efficiency improvement in the cement industry

(a) Company and location: Cement Mill Sri Lanka (Sri Lanka)

(b) Production: Portland Cement for the local market, capacity: 420,000 tons per year

(c) Environmentally sound activity

- Installation of an energy-efficient clinker cooler system.

(d) Main objectives

- Reduction of energy consumption; and improvement of product quality;

(e) Efforts and their cost-efficiency

The production equipment was modified by the following means:

- Increasing the height of the clinker bed, which expands the resident time of the cooling air steam;

- Installation of (1) a small wall within the first and second cooling chambers for deep bed operation; and (b) spillage gates to isolate drag chain fit from cooling air chambers;
- Introduction of a "flat bottom" to prevent air leaks from one chamber to another; this allows for better regulation of air pressure; and
- Replacement of higher-capacity fans.

Overall investment for two coolers, was US$200,000; savings per month US$21,200 with a payback period of 10 months.

(f) Effects on the minimization of environment impacts

- Reduced electrical energy consumption from 135 kwh to 122 kwh per ton; and
- Reduced thermal energy consumption from 1,214 kcal to 985 kcal per kg of clinker.

(g) Benefits

Aside from cost-savings and environmental achievements, the company benefits from: (1) increased annual production, higher productivity; and (2) improved reputation by producing closer to international standards for the cement industry.

D. The market for environmental products and services in the ESCAP region

1. Overview

The Asian environmental technology market is growing at an unprecedented rate. It is believed to be most dynamic in the world and needs to grow further to close the regional imbalance between economic weight and environmental sustainability. In the Asian region lives half of the world's population. With few exceptions the negative environmental fallout of this growth is already dramatic, including degradation of entire ecosystems, loss of individual species, and intolerable urban air and water pollution levels, which in turn lead to deteriorating human health, and rapid depletion, if not exhaustion, of natural resources. Urban development is of particular concern, with rural populations migrating to cities and placing extreme strain on already inadequate public and environmental infrastructure. Ecological, environmental and social issues have become limiting factors for regional economic growth.

2. Environmental products and services defined

(a) Environmental technology

The environmental technologies, in this context "end-of-the-pipe" (EOP) technologies, control and abate, rather than prevent, pollution. These include the following:

- Air pollution control (which reduce and eliminate gases and particles);
- Water and wastewater treatment (which remove pollutants from sewage, and purifies pollutants, contaminated drinking water and industrial wastewater);
- Waste management (which reduces the amount of solid waste produced, and treats and disposes off what waste is left);
- Recovery and recycling;
- Clean-up activities (which applied remedies on contaminated land and treats environmental disasters); and
- Environmental monitoring - assessing environmental quality and performance.

(b) Cleaner technologies

Cleaner technologies (CT) compared to EOP techniques are alternative production techniques, which generate less waste streams for a given product, when compared to those produced by commonly applied production techniques. CTs are in contrast with EOP emission treatments, which transfer pollutants from one medium to another more manageable medium. They employ process changes rather than postproduction cleanup.

(c) Environmental industry and environmental market

The environmental industry and market consists may be characterized as follows:

- Activities which produce goods and services to measure, prevent, limit or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems.
- Clean technologies, processes, products and service that reduce environmental risk and minimize pollution and material use are also considered part of the environmental industry. There is however no agreement on a methodology to measure their contribution to the overall market.

3. Classification of the environmental industry and market

Table II.6 classifies the environmental industry based on environmental activities (columns) and the related environmental goods and services segments (rows). It enables the allocation of activities and products to specific categories judged to be environmental. This scheme enables a broad and flexible classification of the environmental industry. The environmental industry is defined by filling the cells to indicate where satisfactory definitions and reliable data are available. This process can be repeated to adjust the classification to structural changes within the industry. Such matrix does not take into account problems related to data collection, data reliability, and double counting etc. which influences quantitative results obtained. As already stated this applies particularly to cleaner technologies and products, because of definition and measurement problems.

Table II.6. Mapping environment activities

	Equipment manufacturing	Installation and construction of facilities	Engineering services	General services operation	R&D	Training	...
Air pollution control							
Waste water management							
Solid waste management							
Remediation/cleanup of soil and water							
Noise/vibration abatement							
Monitoring analysis assessment							
Recycling							
Cleaner technologies and products							
.....							

(a) Core and non-core activities

Environmental goods and services which are supplied for an environmental purpose only and that are statistically identifiable can be categorized into two, as discussed below.

(i) *Core activities; equipment, technology and specific materials, services and construction related to:*

- Air pollution control e.g. the treatment and removal of exhaust gases and particulate, both from stationary and mobile sources;
- Waste water management as treatment, transport; solid waste management as waste treatment, storage, transport and recycling;
- Remediation of soil and water; noise/vibration abatement and control;
- Environmental monitoring, analysis and assessment; environmental contracting/engineering;
- Environmental R&D;
- Analysis services, data collection and processing; and
- Education, training, information

(ii) *Non core activities: All the other goods and services including construction related to environment protection:*

- Potable water treatment;
- Recycling and recovery; renewable energy facilities;
- Heat and energy management;
- Cleaner and more efficient processes; cleaner and more efficient products;
- Alternative agriculture and fisheries; sustainable forestry;
- Amenity and conservation; eco-tourism.

4. Potential market of environmental technologies/services

The development of a market for environmental goods and services is subject to many influencing factors but mainly determined by the capacities of purchasers and suppliers and facilitated by intermediaries. Information on potential purchasers provides a view of the environmental industry with respect to expenditure on pollution abatement and control and other expenditures related to environmental protection. This information may be completed with data about suppliers to crosscheck information gathered and as an important data source for assessing parts of the industry.

A potential demand exists in the following sectors:

- *Urban centres:* Utilities, public services, transport and communication;
- *Public infrastructure developers*: water, power, transport;

- *Industry*: Primary production, manufacturing, construction, utilities and tourism;
- *Agriculture:* Crops, forestry, animal farming, fishery, agro-industry;
- *Land use planners and operators*: Industrial park development, town planning and land use planning for these goods and services;
- EOP environmental infrastructure and equipment;
- Value adding add-on environmental technologies;
- Environmental instrumentation, control and automation systems;
- Environmental engineering and management consultancy services;
- Environmental management best practices and guidelines;
- Environmental training and education;
- Cleaner industrial processes;
- Environmentally proactive corporate management systems;
- Policies, laws, regulation and standards; and
- Environmental culture development tools.

The main market players are the public and private sectors, however the markets their development and performance are also influenced by facilitators and intermediaries promoting environmental market and environmentally sound technology such as (1) multilateral organizations; (2) governmental institutions; and (3) NGOs.

5. The Asian environmental market - characteristics and driving forces

(a) Market characteristics

The Asian market for environmental technology has a low technology market segmentation and maturity. Either the international customers' expectations or local and international environmental legislation provide a drive for environmental investment. In the absence of an efficient internalization of external environmental cost, environmental technology needs to be value adding and [must] represent investment instead of cost. Price of goods and services, rather than their efficiency and performance, are the decision criteria. In general public and private contracts are often not publicly tendered, making the market non-transparent and requiring extensive local contacts for acquisition. On the supply side numerous and agile product "fabricators" are competing. Established Asian trading companies service a wide range of environmental markets with many newcomers diversifying into

the environment as future growth sector. There is a strong interactive play of users and suppliers about needs, techniques and technologies.

(b) Driving forces

Economic forces together with economically sensitive environmental resource depletion and pollution (water, land and air) provide a motivation for minimal environmental compliance and investment facilitated from private sector initiatives and solution providers. Demographic forces support this market drive as e.g. an increasing urbanization coupled with an enhanced willingness and ability to pay for the environment goods and services.

The improved media coverage of environmental matters results in growing public pressure and at least vocal acceptance of the "polluter pays" principle. The regulatory framework takes on more efficiency as environmental legislation and regulation become more professional and enforcement via environmental agencies is improved. In addition voluntary and participatory policies appear to enhance the importance of market-based instruments together with the ISO 14001 EMS standards and concepts (e.g. "green competitiveness").

6. Environmental market segments

(a) Waste management

The potential market for solid waste management services is focused on the provision of services and technologies. The principal components of the management system for solid waste are (1) collection and transfer; (2) treatment and recycling; and (3) disposal.

Waste management in the region is variable, ranging from very rudimentary systems to sophisticated waste infrastructure and institutional provisions. The anticipated growth in expenditure is rapid and will at least double in all of the countries in ASEAN countries over a ten-year period. The most significant growth is expected to be in Indonesia, Malaysia and Thailand. Annual expenditures on the management of domestic and industrial wastes in some ASEAN countries are summarized in table II.7.

The principal constraints to entering the solid waste management market in the region are related to the existing systems of regulation and control. Market development is mainly hindered by the institutional framework which either prohibits investment with counter-productive subsidies or does not provide potential investors with an adequate level of security. Main opportunities for waste management contractors and technology vendors appear in those countries which

encourage the development of facilities by the private sector, which in turn is prepared to provide sufficient levels of investment security. The emerging markets of Thailand and Malaysia are likely to prove attractive to waste management contractors, with emphasis placed on waste collection, transfer and disposal to sanitary landfill sites.

Table II.7. Estimated annual expenditure on waste management

Countries	Estimated expenditure (US$billion per annum)	
	1994	2004
Indonesia	1.5	5.7
Malaysia	1.3	3.9
Philippines	0.9	1.9
Singapore	1.0	2.5
Thailand	2.0	7.3

Source: "Business Opportunities in Waste Management in Eight Asian Countries," 1995 (RIET, INTEC BONN)

(i) Indonesia

Investment in waste management infrastructure is at a low level. The majority of investment needs to be in the provision of waste transfer stations and sanitary landfill sites. Particularly in the urban centres, the provision of waste management services will be taken over by the private sector.

(ii) Malaysia

The solid waste management services made progress towards their privatization. The private sector was invited to develop, operate, and generate funds for the waste management system. However, there is a pressing need for the development of sanitary landfill sites and associated waste collection and transfer infrastructure. Some municipal waste disposal facilities were too expensive; and were correspondingly closed. The underlying arguments may be political in nature. There is a potential for the use of municipal waste incineration, although the relatively high capital and operating costs currently prevent its implementation.

(iii) Philippines

Efficient collection and treatment of solid waste has become a national priority and resulted in a range of initiatives, including the Presidential Task Force on Waste Management and the Solid Waste Management Assistance and Development Programme. Current investment level is still relatively low but it is expected to double in the next ten years. However, no new sanitary landfill site has been

identified or commissioned for Metro Manila. The existing site has run out of capacity and operates as an environmental disaster. The Philippine "Clean Air Act" which bans any form of waste incineration (except open burning) aggravates the situation.

(iv) Singapore

The solid waste management is centred on a network of waste transfer stations, incineration plants and a disposal site for incineration ash, slag and fly ash. Household and industrial waste collection are being privatised and future incineration facilities shall be developed with private sector participation. For the time being, waste recycling activities are not planned in Singapore, as they cannot economically compete with government-subsidized incineration. The incinerators do not compare to the technical specifications that are set in OECD countries, as the only flue gas treatments available are neutralisation and dust filtering.

(v) Thailand

Upgrading waste management is expected to concentrate on the urban areas where the deficiencies of current arrangements have become most apparent. Provision of new facilities such as landfills, composing plants and incinerators is typically on a turnkey basis, representing major opportunities for both operating companies and technology vendors.

(b) Wastewater treatment

Urbanization and industrialization have resulted in a steady increase in the burden placed on the sewerage infrastructure and industrial wastewater treatment facilities, which partly stem from colonial times. The table below provides an indication of the size of the markets for wastewater treatment equipment and services in the selected ASEAN countries.

Table II-8. Market size in wastewater treatment

Country	Investment (US$ million)
Indonesia	747 (1994)
Malaysia	321 (1990)
Philippines	20 (1995)
Singapore	200 (1992)
Thailand	285 (1994)

Source: US ASEAN Council

(i) Indonesia

During the 1990s, the Indonesian government has placed water use and quality as one of three major environmental challenges, giving higher priority to control of water pollution than to emissions and discharges into other environmental media. The Asian Development Bank (ADB) estimated that on-site and centralized industrial wastewater treatment will require a US$2.3 billion investment; much of this has yet to be undertaken, because of economic and political instability. Of the country's 90 industrial estates, over 40 have either invested or shall invest in centralised wastewater treatment plants at an average cost of US$5 million each. However, only around one per cent of the urban population has access to sewerage systems.

Increasing requirement for wastewater treatment facilities to curtail rising pollution in major industrial areas, resulted in a need for foreign expertise in the areas of (1) consulting services related to wastewater treatment design; and (2) monitoring and enforcement of regulations on water quality and standards.

(ii) Malaysia

Malaysia does not have sufficient centralized collection and treatment systems for wastewater in cities. The government is constructing sewage systems in towns and cities at a cost of US$400 million. By the year 2020, 95 per cent of the population will have access to wastewater treatment services. The size of the industrial market for wastewater treatment is related to the enforcement of national effluent standards at the 2,300 industrial pollution sources nationwide. The major industrial sources of water pollution are palm oil mills and food processing plants that produce large amounts of effluent, followed by electroplating and agrochemical industries.

(iii) Philippines

The ecological systems of the Philippines, with its more than 6,000 small islands, are highly sensitive to environmental degradation from wastewater, 70 per cent of which comes from domestic sources and the rest from industry.

About 50 per cent of the population live in urban areas, with a large part of that figure concentrated within Metro Manila. Only 20 per cent of Manila's residents have access to the sewerage system; the rest rely on various water bodies into which is also discharged industrial effluent. The government's places more emphasis on providing portable water supply rather than wastewater collection and treatment. The government's industrial pollution control strategy is centred on low cost treatment technologies, pollution prevention, and strengthening and enforcement of pollution control laws.

(iv) Singapore

The environmental market in Singapore is at a mature stage, with the government spending about one per cent of GDP on environmental protection. Consequently nearly all of Singapore's population is served by the country's US$2 billion sewerage system, which include 2,250 km of sewers, 123 fully automated pumping stations and six municipal wastewater treatment plants. Principal sources of industrial waste in Singapore are petroleum refineries, power plants, chemical factories, cement works and steel mills.

The sewer and wastewater systems will be remodelled into a deep sewer collection system and an underground wastewater treatment facility to free precious space for urban development in land-scarce Singapore.

(v) Thailand

Government pressure and recognition of the need to preserve the surface and groundwater quality drive the demand for wastewater treatment equipment and services in Thailand. Several wastewater treatment plants have been constructed, including a US$2 billion for sewage treatment plants in major cities. Key wastewater treatment projects include the following:

- A two-stage wastewater treatment programme (US$800 million)
- Hua Hin municipality water filter plant (US$2.3 million)
- Industrial Estate Authority of Thailand Eastern Seaboard privatised wastewater treatment system (US$56 million)
- Chao Praya wastewater treatment project (US$39million), and
- Pattaya centralized wastewater treatment plant (US$80 billion)

Industrial buyers of wastewater treatment equipment are large-scale industrial plants that have activated sludge and aerated lagoons, which are the two most common systems employed by industrial estates. Foreign companies account for 85 per cent of the market for pollution control equipment. Most small factories in Thailand do not employ wastewater treatment processes due to lack of expertise, financing and space.

(c) Water supply and treatment

The growing Asian population requires clean water supply in rural areas as more than 50 per cent of population do not have access to safe water supplies. Correspondingly, consulting services and water treatment plants, in particular, are needed for the developing urban and rural areas, particularly in newly established private industrial estates. The industrial water treatment market is a substantial

segment, as many companies which require high quality process water, cannot rely on the quality of public water supply.

The pollution of water resources has resulted in many governments seeking overseas aid to fund large-scale projects or, in some cases, privatizing the water supply industry to mobilize private sector funding. The privatization of water supply in Asia has developed differently from that in Europe or the United States, where public sources had financed the water supply resources and infrastructure, which were later privatised to save operational overhead. In Asia such resources need to be developed and infrastructure financed by the private sector. Investors are frequently confronted with depleted or contaminated water resources and a decayed distribution and treatment infrastructure.

(i) Indonesia

Indonesia, like Thailand, suffers from severe water shortages as a result of deforestation in the uplands, increased water demand from the growing population and appalling levels of water pollution and depletion, including saltwater intrusion in coastal aquifers.

Demand for water for industrial, agricultural and domestic use will increase especially in Java where water demand in 2000 was 50 per cent more than that in 1980. In Jakarta alone, demand will quadruple between 1985 and 2025. To satisfy this demand, private wells are used extensively in urban areas, leading to problems such as land subsidence and saltwater intrusion.

Expenditures on hardware in public water supply and private industrial water treatment are estimated at US$327million and US$165 million respectively.

(ii) Malaysia

The water resource sector has been singled out for rapid expansion with the focus on the following:

- Optimal utilization of existing water resources, and upgrading, rehabilitating and improving the efficiency of existing facilities,
- Preserving the quality and quantity of existing sources (i.e. pollution control and dam construction), and conserving and protecting catchment areas,
- Intensifying private sector participation in the development of the water resource sector, and
- Privatizing the development and management of water resource projects in particular water supply.

Opportunities for water supply equipment and services will be based on the allocation of investment in these areas, which are estimated at US$1.5 billion. The projected water supply investment is expected to rise by 16 per cent.

(iii) Philippines

The environmental markets in the Philippines center around municipal water supply and industrial wastewater treatment. Estimated expenditures on water and wastewater market are about US$15.8 million. In the short term, the market will be focused on industrial water supply treatment and multinational donor funding will largely drive the municipal market. Metro Manila is an example for the privatization of water supply and related challenges within an Asian city. The contracted private consortium is now re-negotiating with the authorities on the fixed price for water in Manila. Due to the depreciation of the Philippine peso the current price level is insufficient to finance an extension of the supply network as agreed upon in the contract.

(iv) Thailand

Water supply in Thailand is problematic due to the depletion and pollution of lakes, rivers, and inland and freshwater resources as a result of the rapid development in industry and agriculture, dense communities and the overuse of chemicals and pesticides in agriculture.

(v) Singapore

The total market for water supply and wastewater treatment equipment in Singapore was estimated at US$200 million in 1992. To assure its water supply with the space limitations faced, Singapore cooperates with Malaysia and intends to develop a water pipeline from Sumatra to Singapore. In addition expensive high-tech solutions as seawater desalination and water efficiency increasing measures are either planned or already under implementation.

(d) Air pollution control

Air pollution has been at serious levels in ASEAN over the last two decades as a result of a rapid urban and industrial growth. Much of the emissions come from motorized vehicles, manufacturing and power generation facilities. The substances of concern include carbon monoxide (CO), carbon dioxide (CO_2) nitrogen dioxide (NO_2), sulphur dioxide (SO_2), lead (Pb) and in particular suspended particulate matter (SPM). The market for air pollution mitigation equipment in ASEAN countries is now relatively small but it is expected to grow as governments begin to strictly enforce environmental regulations and standards.

(i) Malaysia

Air pollutants arise predominantly from industrial emission and vehicle exhaust fumes, which are considered severe in Kuala Lumpur. In 1990, the Malaysian government enacted legislation which reduced lead levels in gasoline from 0.8 to 0.15 grams per litre. Nowadays catalytic converters and unleaded gasoline are required for new cars.

Table II.9. Market capacity for air pollution control equipment

Country	Description	Year A	US$ million	Year B	US$ million	Growth rate (Yr A–B) (%)
Malaysia	Market size	1993	$71	1995	$111	25
	Total imports		$79		$114	20
Thailand	Market size	1992	$122	1994	$192	25
	Total imports		$111		$173	25
Indonesia	Market size	1991	$110.7	1994	$243	25-35
	Total imports		$44.6		$98	25-35
Philippines	Market size	1993	$13.98	1995	$20.1	20
	Total imports		$13.98		$23.6	30
Singapore	Market size	1993	$834	1995	$991	9
	Total imports		$693		S839	10

(ii) Philippines

Metro Manila suffers from one of the worst levels of air quality among the cities in ASEAN countries. Only about one-third of industrial installations meet the minimal standards although emission limits for "visible emission" are regulated under the Philippines National Pollution Law (1976). A vehicle pollution control program and a vehicle emission standard have been established supported with a US$35 million loan from the ADB.

(iii) Singapore

Singapore has adopted the USEPA Pollution Standards Index (PSI). The continuous monitoring results report a PSI level of "good" 70 per cent of the time and are accessible online via the Singapore governments website. Since signing the Montreal Protocol in 1989, Singapore has reduced its CFC consumption by 50 per cent.

(iv) Thailand

The major focus is on controlling air pollution from the transport sector. Vehicle exhaust contributes about 75 per cent of lead emissions, 64 per cent of NO_x 87

per cent of CO and 41 per cent of hydrocarbons. Enforcement in air quality management has been weak so far and in part hampered by overlapping responsibilities for air quality management control (2.2.2.5).

Measures to improve air quality are the following:

- Economic incentives to promote the use of unleaded gasoline;
- Converting taxis and tricycles to liquefied propane gas (LPG);
- Requiring gasoline engine automobiles to install an exhaust gas recirculation system and electronic control of the air-fuel ratio; and
- Requiring all new cars to have catalytic converters.

Manufacturing and production industries and power generation are the next two largest sources of air pollution. Thailand has some of the highest methane (e.g. from rice paddies) and CFC emissions in Asia. It was estimated that about 10,000 of CFC are consumed per year, but the development of alternative refrigerants has reduced this emission type.

(e) Monitoring equipment

Monitoring equipment includes the following: on-site water samplers; water testing kits; turbidimeters; portable dust meters; gravimetric dust samplers; personal air samplers; pH meters; and mobile laboratories.

There is a market for analytical laboratory equipment in all ASEAN countries. Comprehensive environmental monitoring is a new development and is creating a rapidly growing market segment. Buyers are government agencies, research institutions, universities and laboratories, and private industries that need to comply with self-monitoring obligations. Accordingly the demand for monitoring equipment in the ASEAN countries is mostly for water and wastewater analysis. The market for air quality monitoring equipment is still modest.

(i) Indonesia

The market for environmental monitoring equipment in 1994 was estimated at US$11million. Companies need to monitor the quality of their wastewater discharge and have to provide validated records of their measurements to governmental institutions. Hence, the demand for analysis and logging equipment, largely in the form of low-cost testing kits is rising.

(ii) Malaysia

The estimated market in Malaysia is worth about US$20 million. The market will receive a considerable boost when the nationwide monitoring network is im-

plemented over the next five years. Air monitoring and analytical equipment is emerging as a market sub-segment, mainly as a result of government investments and pressure on private companies to conduct self-monitoring.

(iii) Singapore

The market for monitoring equipment relates to wastewater treatment and discharge and air quality monitoring.

(iv) Thailand

The market for environmental monitoring equipment largely depends on the enforcement of an initiative taken by the Thai authorities, based on industry self-regulation and voluntary commitment, including emissions self-monitoring from specific sources. Resources to monitor 15,000 registered manufacturing plants are inadequate. The lack of financial resources has not helped improve the situation.

7. Pathway to the environmental markets

The main factors which enhance environmental technology acceptance in Asia are the following:

- Maximized local production to reduce cost;
- High level of performance through the use of elements from advanced countries;
- Compact set-up to accommodate limited space especially in urban areas;
- Modular design enabling a wide range of applications;
- Value-adding technologies to allow for cost reduction and, or improvement of product quality; and
- Easy operation by manpower with low level of skills.

However, market success cannot be guaranteed even if a specific technology had the above characteristics because of some market barriers.

(a) Economic constraints

- Productive bias of industrial investment;
- Public subsidisation of environmental resources; and
- High land prices compared to facility costs.

(b) Demographic factors

- Shortage of skilled labour, engineers and professional staff.

(c) Political inaction

- Reluctance to increase charges and resistance to privatization for urban infrastructure;
- Fragmentation of decision-making processes; and
- Lack of enforcement capability.

8. Alternative strategies for market entry

The determination of the right product for the targeted market is paramount in achieving success in environmental technology in Asia and in other parts of the world. The best form of market presence in that country should be identified - agency, licensing agreement, manufacturing joint venture, etc. If these conditions are in place, the remaining task is to find the appropriate partner or representative and to make commitments to be fully represented in the targeted market. Detailed strategies will depend on the type of the product or service as well as the size of the organization which aims at penetrating a given market.

(a) Market entry strategies for larger equipment suppliers or service providers

(i) Options

- Market transactions done from the home base;
- Work with a local agent;
- Licensing and franchising agreements;
- Set up local manufacturing; and
- Foreign direct investment.

(ii) Advantages of joint ventures

- Possibility of joint production development and existence of large market through broader and more flexible production palette;
- Possibility of transparent and incremental pooling of assets; and
- Regulation of technology transfer.

(iii) Preferable approach - joint venture partnership:

- Exchange of technology for market knowledge;
- Joint product development; and
- Collaboration across business functions.

(b) Options for SME co-operation and collaboration

Collaboration and co-operation can be developed in a situation where there is an exchange of proven technologies for the Asian market. A joint product development scheme to fit technology to cost constraints and actual performance requirements would be advantageous. Collaboration can be established across business functions, where the local partner does not need a strong technology and capital base. Such collaboration can lead to a larger market share through broader and flexible product range; however, transparent and incremental pooling of assets should be possible while contractual constraints can be minimized. Likewise important is the monitoring and regulation of technology transfer.

(c) Some success factors for market entry

Collaboration with local firms is indispensable. Knowledge of the language and local insight into the market is important. The use of well-established and competent brokers with good contacts can result in enormous savings in costs and time in identifying appropriate partners. Advertising the company profile and carefully selected products by means of seminars and similar events would be useful in attracting the interest of local professionals and investors. Preference may be given to collaborative co-operation (joint venture) over licensing-type approaches, as intellectual property rights are still difficult to enforce in some Asian countries.

E. The environmental markets in Lao PDR, Nepal, Sri Lanka and Viet Nam

1. Environmental constraints to economic development

Environmental damage from growing industrial production and the impact of this growth on the natural resources base and environment are already being felt in the less developed countries (LDCs) of Lao People's Democratic Republic, Nepal, Sri Lanka and Viet Nam. The demand for energy and raw materials as well as industrial and consumer wastes has risen in step with the economy.

The environmental impacts due to industrial activity in the LDCs are similar to those already described for ASEAN-6 countries. The situation is aggravated by:

- Undeveloped environmental awareness;
- Inefficient administrative structures including human and financial resources;
- Unavailable environmental protection infrastructure for waste disposal or wastewater treatment;

- Degradation of the natural environments due to deforestation; and
- Concentration of attention on military conflicts.

In a situation where renewable and natural resources are already severely limited, LDCs face the challenge to manage development in a way that avoids further depletion which involves high and long-term economic cost. Agriculture, fishery and forestry - still an important income source for the LDCs - depend on the maintenance of these resources. Nevertheless, increasing pollution will continue to damage natural assets and impose additional health and production costs. LDCs will inevitably pay the price for continued degradation of the environment, if current trends continue. Due to the dependence on natural resources the space to maneuver to kick start development and clean up later is not available.

2. Role of policies in the environmentally sound industrialization in LDCs

It is difficult to tackle the problems mentioned above with the traditional model of regulation ("command and control") alone. While industry must ultimately implement more environmentally sound technologies, the role of government is to lead by providing a conductive framework that will accelerate the process and encourage industry to initiate its own cleaner production programmes.

Despite the fact that environmental regulation in Asia is not new, environmental legislation in the LDCs is not an effective environmental tool. The factors that are responsible for the lack of sufficient and appropriate regulations based on the identified constraints in chapter 2 are the following:

- Insufficient technical expertise, manpower and financial resources;
- Non-awareness of contamination by industries, in particular liquid and solid contaminates that are dumped into the waterways by industries;
- Inappropriate standards, in terms of design norms, technical content and specifications;
- Scientific underpinning of standards is missing as they have been taken from other countries' legislation; and
- Lack of awareness of appropriate or advances in technologies.

It is necessary to promote environmental consciousness within the government, because without public sector intervention, the industry will not act in an environmentally sound way. A *desideratum* is good governance, which via legislation, policy and enforcement will put pressure on companies to consider environmental technology investment. In addition, new policies in the field of industry and the environment provide incentives to adopt environmentally sound and

cleaner technologies for industrial processes. Developing and revising policies need to be hand in hand with the practical application of environmental know-how, improving efficiency, adopting better management techniques, changing housekeeping practices, and revising procedures and institutions as necessary.

A strategy for the development toward a more environmentally sound industrialization needs to assess the existing system of environmental and industrial policy, identify areas and sectors requiring change and take corrective action as may be necessary. This process will however need technical and financial assistance from developing and OECD countries.

3. Trade and investment opportunities in environmental markets of LDCs

Due to the requirements of sustainable industrial development, trade and investment opportunities in environmental services and environmental sound technologies offer new business challenges for more advanced developing countries. The improvement and expansion of the infrastructure system, and the development of the industrial sector, offer enormous opportunities for companies active in industrial water supply, industrial wastewater management and treatment and industrial waste management and treatment. The areas of industrial water supply, treatment and waste disposal are described below.

(a) Industrial water supply

Sources of industrial water supply are mainly groundwater and surface water, which has industry competing with less value-adding agricultural use of water. The main industrial water users in the LDCs include textile, dyeing, food processing, beer brewing and soft drink industries.

Industrial water consumption accounts for a high percentage of future total water consumption, in particular in urban areas. But in terms of both quality and quantity, urban water supply systems are not sufficient to meet this industrial water demand. Quality standards for industrial water supply are higher than for domestic water supply, particularly in terms of hardness and the minimization of suspended solids, iron and manganese; hence requiring frequent pre-treatment. Therefore many factories need to invest in in-house water treatment facilities. Most of these private treatment facilities will use very simple technologies similar to urban water supply: aeration, contact sedimentation, and filtration for groundwater with additional chemical preparation for surface water.

(i) Special technology gaps and demand

- Water softening; water circulation; and ion exchange.

(ii) Management knowledge needed

- Technical and water resources management expertise.

(b) Industrial drainage, sewerage and wastewater management

Operational wastewater treatment plants are the exception in LDCs. Industrial facilities discharge effluent into sewer systems, drainage, canals and watercourses, making the streams the receiving end of highly concentrated wastewater in totally septic conditions. In most of the main rivers in the LDCs, the BOD and concentration suspended solids are too high, due to discharge of untreated effluents. To make things worse many industrial plants discharge toxic waste directly to the aquatic environment.

(i) Special technology gaps and needs

- Pre-treatment of industrial toxic sewage; oxidation ditches; and activated sludge plants.

(ii) Management gaps and needs:

- Technical expertise; water resources management expertise; and the willingness of management to comply with environmental protection legislation and technical specifications.

(c) Industrial solid waste management

Industrial waste is not systematically collected. Even if it were, there are no satisfactory avenues for the disposal of toxic and other industrial wastes in the target countries. Consequently industrial wastes, even from large industrial units, that are not recycled end up in domestic disposal sites or are dumped directly into canals and rivers. Where disposal sites are available they are not properly designed and operate as dumpsites rather than as sanitary landfills, which are poorly sited, and lack equipment, daily cover, treatment and features to protect groundwater from contamination.

(i) Technologies needed

- Proper disposal facilities for industrial (particularly hazardous) wastes; and treatment technologies for industrial wastes.

(ii) Management skills needed

- Awareness of the urgent need to dispose industrial wastes in an environmentally sound manner.

III. ORGANIC AGRICULTURE: ENVIRONMENTAL ISSUES AND ESCAP COUNTRIES*

A. Introduction

Global awareness of human health and environmental issues has grown significantly over the last two decades. At the root of this is a strong consumer movement in developed countries. In developing countries as well, the rapid and widespread environmental degradation has led to a growing recognition that environmental integrity is a necessary condition for human prosperity and sustainable development. The practice of organic agriculture and the harnessing of its production and export potential could provide opportunities for developing countries to meet their long term environmental and development needs.

This paper discusses trade and environmental issues and prospects relating to organic agriculture products (OAPs) with focus on the export opportunities for developing countries. It emphasizes that although the market for OAPs is booming, certification of organic origin and knowledge of importing markets are keys to export success.

B. Background

Agricultural practices are shifting from segregated, uniform, mechanized and specialized systems (monoculture practices with high chemical dependence) to more integrated, holistic systems that seek to create a more biologically sound environment for agriculture, living organisms and people.

Organic agriculture encompasses several farming methods and approaches. Essentially, it is a farming system which supports and strengthens biological processes without recourse to inorganic remedies, such as chemicals or genetically modified organisms. The principles of organic farming are found in ecology. Farmers imitate at the farm level various processes found in the ecosystem. Therefore, organic farming relies heavily on soil management techniques (e.g. mulching, the use of fallow periods), various cropping systems (e.g., intercropping) agrofor-

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estry (where woody perennials are grown in association with crops/livestock) and recycling of on farm resources (e.g. fodder, manure, organic waste etc.). Organic farming is also concerned with correlating the number of animals kept on the farm and the available land area so that the farm can cover its feed and soil nutrient needs from within the same system. In Europe organic farming is also concerned with social issues, and covers a wide range of attitudes towards rural lifestyles and harmony with nature.

Organic agriculture is said to be the most regulated from of ecological agriculture as it adheres to very specific principles, norms of production, processing and labelling requirements. Consequently, other forms of environmentally friendly farming do not fall under the definition of organic farming. These practices essentially seek to integrate the efficiency of chemical techniques with the benefits of organic practices into a holistic system of agriculture. For example, in pest control programmes, chemicals are still used, but at lower levels because of the use of natural pest control techniques (e.g. the introduction of natural predators, the widespread use of nets, etc.). These integrated farming systems are seen by some as a compromise between organic agriculture and conventional farming.

Many of the principles of organic agriculture are part of a heritage of ancient wisdoms that were handed down from generation to generation of farmers. Organic agriculture is said to have had its beginnings in Germany at the turn of the 19th century during the land and food *Reform* movement. The movement originated as a reaction to the negative impacts of the Industrial Revolution on people. As the name implies, it proposed an alternative, more wholesome and natural way of life. In 1903 Gustav Simons wrote an important booklet on the relationship between the health of the soil, the growth of plants and the health of mankind. Less than a decade later across the world, in India, Lord Albert Howard, was developing his first composting methods. Today Lord Howard is known as one of the founding fathers of organic agriculture.

By the late 1920s organic agriculture had spread to the United States and the rest of the world. However it was only in the 1980s that interest in organic foods gained an important base in North European countries, as people became increasingly concerned about the nutritional content of foods and the need to preserve the environment. A small group of highly dedicated consumers took the lead. They demonstrated their willingness to pay significantly higher prices for organically produced food. Environmental movements and "green" political parties were formed. The media played an important role in promoting the "green" message. However, even up to the mid-1990s in most markets (with the exception of Denmark and Switzerland), OAPs retained a very small share of total food sales. This slow progress was due to high prices; unavailability of supplies owing to insufficient involvement of farmers and food processors; limited participation of super-

markets or the mainstream grocery trade; and lack of consumer confidence in organic quality.

Since the mid 1990s however, organic food sales have increased dramatically in Europe. Today the EU is the leading producer of, and the largest market for, organic products in the world. A much larger segment of the population is now interested in OAPs, although they may be less willing to pay higher prices. Four factors in general (effects differ from country to country) have contributed to the significant development of markets for OAPs in the EU.

First, under EU and national agricultural policies relating to organic agricultural products, various forms of financial support or direct payments have been given to farmers to enable them to break their dependency on chemical inputs and maintain organic farms as commercially viable alternatives.

Second, while there are significant differences among individual EU countries, retailing of OAPs has generally moved out of the small farm stores to mainstream supermarkets. Because European consumers do most of their household shopping at supermarkets, supermarket chains hold a powerful position in overall food retailing. Demand for OAPs grew highest therefore, in those countries where supermarkets were most active in promoting OAPs.

Third, uniform standards for organic production and labeling and for organic certification were introduced throughout the EU by Council Regulation (EEC) 2092/91.

Fourth, consumer outrage at increasing food scandals (for example, sewage sludge fattened cows, dioxin contamination of food) and public distrust of the untested effects of genetically engineered foods have given rise to a new generation of farmers and consumers strongly opposed to the excesses and errors of the past.

C. Organic agriculture as a development issue

Many contend that organic agriculture meets the development needs of the developing countries, particularly the rural sector. Large segments of the population in developing countries continue to rely on the rural sector for their basic food needs and for income generation. Increases in agricultural productivity and real incomes are therefore of high priority. Modern farming techniques and the conversion of farmland to cash crops, however, have exacerbated problems of land ownership and access to credit for the rural poor. The indiscriminate application of agro-chemicals, coupled with commercially managed single crop farming led to severe soil degradation, thereby increasing the need for fertilizers, which in turn led to further soil degradation. As the use of agro-chemicals increased, workers were unable to cope with high costs and debt burden. Workers were eventually

forced off the land either to become migrant workers thereby further increasing food insecurity and urban poverty, or they were forced to clear more forestland to extend farmland, thereby further exacerbating environmental degradation.

Organic farming on the other hand offers farmers the opportunity to break this vicious cycle of poverty. While productivity levels for organic farming are lower than those of conventional farming[1], the levels are sustainable for a long period of time because soil fertility is preserved and input costs are much lower. Poor or marginal farmers can therefore retain their land (lack of land ownership is the single most important factor contributing to rural poverty), produce sufficient food for their community and practice sustainable agricultural production.

Organic agriculture therefore is promoted by women's groups, NGOs and farmers associations to restore the quality of soil and recover land in desertified areas or to prevent soil erosion, or boost export potential. Often new insights are gained which result in a return to traditional farming practices that were passed down over the centuries, but lost in more recent years.

Furthermore, as will be discussed in subsequent sections, world demand for OAPs is increasing. Over the medium term, an insufficient global supply will be the main problem. This opens up opportunities for exporters in developing countries and interest in promoting organic agriculture is rising in those countries. Nevertheless, trade in OAPs poses a number of difficulties. A proliferation of labeling and certification schemes has made it particularly difficult for exporters to comply with the requirements of these schemes.

D. Major markets

This section presents an overview of the major markets of OAPs, and describe the particular characteristics of each market. The information provided is indicative and qualitative because statistics on OAPs are not collected separately. In all markets, trade in OAPs form part of conventional trade in food and beverages. The information provided is based on a study conducted by WTO/UNCTAD International Trade Centre ("Organic Food and Beverages: World Supply and Major European Market"). The data for the study was collected in 1998 through interviews conducted with importers, retailers, certification and accredita-

[1] It is estimated that productivity levels of organic farming as compared to conventional farming are about two thirds. (http://www.purefood.org/Organic). However, some claim that this figure is in relation to farming in developed countries where the intensity of farming is much higher than in developing countries. For developing countries organic farming productivity levels are closer to conventional farming therefore.

tion agencies and trade promotion organizations (such as Protrade/GTZ, the Centre for the Promotion of Imports from developing countries (CBI) etc.)

Trade in OAPs is of particular interest in a development context because of the spectacular growth that has taken place in recent years. Retail sales in the three major markets - the EU, the United States and Japan - were estimated at about US$11 billion in 1997, US$13 billion in 1998 and close to US$20 billion in 2000. Annual sales in OAPs are expected to continue to grow between 5 to 40 per cent (with some variations across markets) over the next 10 years or so, which is quite remarkable considering that sales in food are growing slowly or stagnating.

1. Markets in developed countries

In the EU, the percentages of agricultural land managed organically range from 10 per cent in Austria, to about seven per cent in Switzerland, three per cent in Germany and below one per cent in Southern Europe. Only about 1-3 per cent of total food sales in the EU is organic. While these figures may seem low for the time being, organic farming in the EU is booming with annual increases of organically farmed land exceeding 20 per cent in the past decade. Similarly, sales are expected to grow between 10-30 per cent over the next ten years (Table III.1).

Table III.1. World markets for organic food and beverage, 1997

Market	Approximate retail sales (US$ million)	% of total food sales	Expected growth rate (%) over the medium term
Austria	225	2	10-15
Denmark	300	2.5	30-40
France	720	0.5	20
Germany	1 800	1.2	5-10
Italy	750	0.6	20
Netherlands	350	1	10-15
Sweden	110	0.6	30-40
Switzerland	350	2.0	20-30
United Kingdom	450	0.4	25-35
Other Europe [a/]	200		
Total, Europe	5 255		
Japan	1 000		
United States	4 200	1.25	20-30
TOTAL	10 455		

Source: WTO/UNCTAD International Trade Centre Organic Food and Beverages: World Supply and Major European Markets, p.35

[a/] Belgium, Finland, Greece, Ireland, Portugal, Spain, Norway.

This has resulted in an increasing and more reliable supply of organic produce (especially dairy produce, grain, vegetables and fruit), in almost every European country. Furthermore, those products that cannot be grown in the EU, increasingly have been brought in from worldwide sources, including from many developing countries, thereby further increasing the variety of products available. This includes tropical fruits and vegetables, cereals, cocoa, coffee and tea, dried fruits and nuts, herbs and spices, fats, oils and sugars.

Germany is by far the largest market in Europe and the second largest in the world after the United States. It accounts for about one third of total sales followed by France, the United Kingdom, the Netherlands, Switzerland, Denmark and Italy (In Italy, supplies are mainly of domestic origin). Germany would seem to be the country that offers the most opportunities for OAPs because of its size; an environmentally sensitive population of around 82 million people, with very high purchasing power and a long tradition of natural foods and medicines. Furthermore, Germany has well-organized promotional programmes for OAPs. The largest fair in organic agricultural products, BIOFACH, is organized annually in Germany, while Protrade/GTZ runs the GreenTradeNet Web site, which is an important tool for linking organic farmers in developing countries with the German market. However, Asian exporters are finding it increasingly difficult to enter the German market because it is an extremely exigent market in terms of quantity/price ratios. Cheap imports from East European countries, and rapid conversion of farmland to organic farming in former East Germany have led to an oversupply of OAPs. Furthermore, of late, consumers are increasingly reluctant to paying price premia for OAPs, thereby further lowering prices. Overall therefore, the German market seems to have reached a saturation point.

A more interesting market for Asian exporters is the United Kingdom. In comparison to other EU markets, it is relatively underdeveloped and consumption growth rates over the next decade are expected to be the highest (Table IV.1). At present the UK imports about 70 per cent of its requirements, and this situation is expected to continue.

The Netherlands is a significant gateway for potential exporters from developing countries interested in penetrating the North European market. Dutch traders are highly specialized importers and re-exporters of bulk organic produce, especially non-seasonal fresh fruits and vegetables, tropical fruits, preserved fruits (dried, concentrates, purees etc) grains, nuts, herbs, spices etc. They typically work very closely with producers from the very early production stages to the final stage of distributing to consumers according to the standards of the EU and national regulations.

The United States is the largest market for organic agricultural products, however second to EU as a group. The market grew from US$ 78 million in 1980 to about US$ 6 billion in 2000 and sales are expected to grow at an annual rate of about 10 to 15 per cent over the medium term. The United States is an important exporter of cereals, pulses and processed products predominantly to Europe and Japan, but it is also a major importer of OAPs. Similarly, organic food production is booming at over 20 per cent growth per year and the number of organic farmers is increasing by 12 per cent per year. This is all the more astounding when one considers that most other sectors of agriculture are losing farmers. At the same time however, the United States food market is the most highly genetically engineered with large American multinational companies are at the forefront of biotechnological advances. However, according to standards set by IFOAM, GMOs are banned from organic agriculture, with the result that the two sectors at various times have been in conflict with each other. At other times, the food conglomerates have made efforts to co-opt the organic sector into the transgenic market. (This will be taken up again in subsequent sections.)

2. Emerging markets in ESCAP developing countries

Organic agriculture is not confined to developed countries. There are interesting markets emerging in developing countries. According to ITC, of the 130 countries involved in organic agriculture, about 65 are developing countries, of which about 15 are LDCs.

Organic farming in developing countries is generally on a small scale. The absence of an organized national market and local distribution system is a major hindrance to the further development of organic agriculture in almost all countries. In the ESCAP region, OAPs are starting to be sold in supermarkets and specialized stores in some countries, but generally organic products are sold in improvised markets with hardly any premium on prices. Access to technical assistance remains difficult, as is the case with preferential credit schemes.

Furthermore, in most developing countries certification either for the national or export markets has high cost implications that are beyond the means of most farmers. Nevertheless, some developing countries are emerging as important exporters, for example, Egypt, Argentina and South Africa while in the ESCAP region, China, India and Sri Lanka and the Republic of Korea are by far the most important producers. In all cases, in the ESCAP region production is export-oriented. The products exported include fresh tropical fruits and vegetables, cocoa, coffee, essential oils, herbs and spices, peanuts, rice, tea and vanilla. Azerbaijan produces organic apples that are on the verge of being certified by SKAL, an internationally accredited certification body of the Netherlands. Since no country has

obtained equivalency of its standards with those of the EU, foreign inspection and certification bodies are actively involved in developing countries of the ESCAP region.

China is by far the largest exporter of organic products in the ESCAP region, and it has enormous potential for further development of the sector. In only two years China has experienced a ten-fold increase in the area allocated to organic farming (from 450 to 4,000 hectares). In addition, about 10,000 hectares in the wild have been certified as organic. China has a comprehensive plan for the development of organic foods under the China Green Food Development Centre (GFDC) which was established by the Chinese National Environmental Protection Agency in 1994. Production is strongly export-oriented and records show that as early as 1994 certified organic tea was being exported to the EU by the Import and Export Tea Corporation of Zhejiang Province. Similarly, as early as 1994 organic soybean was exported to Japan.

Early on therefore, China gave high priority to the development of standards, and the setting up of inspection, certification as well as extension and training facilities. The OFDC is the main certifier, while SKAL of the Netherlands, and OCIA of the United States as well as the German BCS, the Swiss IMO and the American QAI also contributed to the development of certification in China. The first fully organic food trading company, Winged Ox Organic Food Co. Ltd, was formed in 1995 and since then four other companies have been established.[2] The overall turnover increased almost tenfold in recent years having reached US$600 million in 1997/8.

India is also a major producer of OAPs and as is the case for China is considered as a country with tremendous potential for further expansion. Basmati rice and specialty teas are among the most successfully exported products. The number of organic traders is growing rapidly. Certification is done by ENCON, a professional consultancy network based in Maharashtra State and actively involved in pre-certification consultancies and promotion of organic produce in international markets. ENCON worked closely with the Soil Association a leading UK organic food and farming organization, as well as several other European and American certification bodies.

Sri Lanka is one of the world's leading sources of organic tea. It also produces other certified organic products, including cane sugar, coconut products, coffee, fruits, fresh dried and canned fruits and concentrates, grains, nuts, herbs

[2] These companies are China Environmental Organic Food Company based in Beijing, Hei Agriculture Cultivation International Organic Food Development Co. Ltd (based in the Dalian tariff free zone), Huan En Organic Foods Ltd also in the Dalian Development Zone, Naturex Organic Foods based in Jiangsu.

and species, oilseeds. In fact, Sri Lanka has one of the oldest organic tea plantations in the world, the Needwood Tea Estate, which was converted during the mid-1980s and certified by Naturland and the National Association for Sustainable Agriculture Australia (NASAA). The development of organic tea is one of the world's success stories. Tremendous efforts were necessary to put into practice principles of fair trade and organic agriculture. Safer and healthier jobs, fair wages and better living conditions, health care and education facilities and last but not least an environmentally sound usage of natural resources have led to the production of high quality certified organic teas. Some companies now sell their products online with attractive sample pictures of the products on offer (an example of such a website is www.stashtea.com).

Furthermore organic agriculture was characterized by a very close relationship between the small holders who have formed the Lanka Organic Agricultural Movement (LOAM) and the destination market traders (mainly EU). The national market distribution system is mostly informal and about five European, American and Australian certification agencies are active in Sri Lanka, including IMO, NASAA and SKAL. Gepa markets itself as the world's largest fair trade company and a pioneer producer of organic tea.

Until recently, in South-East Asia, production of OAPs was insignificant. However over the past couple of years, output has increased significantly. Domestic consumption however remains low and more concerted consumer campaigns combined with export promotion strategies are required for economic sustainability of the sector. Nevertheless, there are an increasing number of export success stories emerging in Asia.

In Indonesia, vanilla has become an export product, while the Philippines has become an important producer of organic coffee (in fact coffee is the highest traded OAPs). Furthermore, about half of the 400 tons of sugar produced in the island of Negros is sold in the EU market under fair trade schemes[3]. The other half is sold in Japan.

Thailand has significant production in grains. Fragrant organic rice has been successfully grown in Chiang Rai province. Certification of both the production process and end product is undertaken by Bio Agricoop. This is an Italian institute with accreditation to IFOAM. The institute provides technical assistance, training

[3] Fair trade organizations play an important role in distributing a number of product groups from developing countries especially bananas, cocoa, coffee, honey and tea, in Northern Europe. The primary concern of the fair trade movement is the social and economic situation of farmers and producers in developing countries rather than organic agriculture as an ideal. However the two movements are converging in many aspects, as both contribute to environmental sound and sustainable development.

and assists in marketing the product in Europe. Most of the rice is exported, but it is also available on the domestic market selling at about double the price of regular rice. Certification is undertaken by Bioagricert, a certification body accredited to IFOAM. Furthermore, since October 1999, on-line purchase of OAPs is possible, through a website called "veggies basket" at (www.vegbasket.in.th). Customers select the vegetables on line; they are packed into baskets and delivered home on a weekly basis. The cost is about US$6 per two-kilogram basket.

In Nepal, the Kanchajunga Tea Estate in Panchtar and other farms produce some certified green and black tea, which is traded by Highland Trading Co. Ltd. Some organic herbs and spices are also produced. Local distribution is almost non-existent while the export trade is beginning.

In Viet Nam, organic agriculture is beginning and efforts are underway for obtaining certification while in Lao People's Democratic Republic, there is no certified organic agriculture, although as for other low-income countries of the region, dependence on chemicals is low, while natural farming methods are practiced widely.

E. Issues and prospects

1. Genetically Modified Organisms and organic agriculture in developing countries

The astounding technological advances transforming all sectors of economic activity have impacted on agriculture as well. Agriculture however is unique in so far as it is multifunctional. It provides food, one of the essential needs of mankind. It also has to do with the protection of the environment, the health of consumers, the preservation of culture, the welfare of animals, the profits of large food conglomerates to mention but a few. Agriculture is intimately linked to the past, present and future of mankind. Consequently, agriculture is linked to emotive issues. It is therefore of little surprise that the emergence of genetically modified organisms (GMOs) in the foodchain has been highly contentious. Lack of scientific evidence regarding the risks involved has given rise to many uncertainties and widely different perceptions of the benefits and costs involved.

The United States accounts for about three-quarters of total world production of GMOs, while other major producers are Argentina, Canada and China. In 1999, about 33 per cent of maize, 55 per cent of cotton and 50 per cent of soybean grown in the United States were genetically modified. In Argentina, 90 per cent of the soybean crop, and in Canada 62 per cent of the rapeseed crop were genetically modified. These represented the largest shares of genetically modified crops in

1999[4]. In Europe, however, consumer and environmental groups are strongly opposed to GMOs and since June 1999, a de facto moratorium on the authorization of new releases of GMOs into Europe has been in effect. This could be a prelude to a future ban on the cultivation of GMOs and on imports of food containing GMOs. In fact, some developing countries e.g. Sri Lanka, have already taken that step

What are the implications for developing countries and organic agriculture? While it is true that the controversy is primarily between activists in the European Union and multinationals in the United States (high profile controversies led by Greenpeace and Monsanto, respectively), developing countries with their large shares of agriculture in employment and national income will also be affected.

From the early successes of the 1960s when the first semi-dwarf breeding lines introduced for rice triggered the Green Revolution, to today's genetic engineering feats, an ever-widening variety of products has been introduced to agriculture. Today's developments are therefore part of a continuing process aimed at improving the quality and yields of agriculture. The primary difference is that instead of improving yields through selective breeding, modern biotechnology is directly manipulating genes (e.g. by inserting, removing, or altering DNA). This sense of "playing god" lies at the basis of the anxieties and the controversy surrounding GMOs.

Much of the concerns in fact center around their impact on the environment and on human health. What will their effect on biodiversity, on the earth's wildlife, the balance of ecosystems and ultimately the future of mankind? Well-documented evidence of the type of ecological damage that is possible in the future is that of Monarch butterflies. Caterpillars that fed on leaves dusted with pollen from corn containing the Bt gene[5] died, thereby proving that insects other than the intended ones can be wiped out by the bio-engineered plant. Furthermore, scientists point out that chemical applications would still be necessary because pest resistance to Bt could develop quickly, while sap-sucking insects such as aphids, are not affected by the Bt toxin. Among the other concerns are that genetically modified plants may turn into superweeds that destroy the ecosystem; viral genes engineered into plants to offer resistance may recombine with invading microbes to form new and more virulent hybrids; proteins introduced from other organisms may increase food allergens[6] (food allergens are proteins).

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[4] James, Clive, Global Status of Commercialized Transgenic Crops: 1999 International Service for the Acquisition of Agri-biotech Applications (ISAAA) Briefs No. 12 Preview.

[5] Bt crops carry the gene from a soil bacterium Bacillus Thuringiensis which produces a toxin harmful to certain pests.

[6] A Brazil nut protein was introduced into soybeans, but was picked up by regulatory authorities before it was released into the market. (Millions of people are allergic to nuts.)

Furthermore, unlike the self-contained, one-off harm caused by environmental accidents to date (e.g. oilspills, toxic runoff in rivers), because genetic codes are permanently altered, the potential damage that GMOs could bring about would self-propagate with each new life form. Furthermore environmental damage would be irreversible. Therefore, opponents stress that genetic engineering has proven to be the exception to the rule that early adopters of technology reap the greatest benefit.

At the same time, proponents of GMOs emphasize the proven environmental benefits of introducing pest, mold and virus resistant strains may all but eliminate the need for pesticides/herbicides/fungicides and that it is the early adopters of new technology that will reap the most benefits. Similarly they argue that the introduction of strains of high nutrition, high yielding, drought resistant, long life varieties will result in significant productivity gains for farmers and reduce the need for chemical fertilizers and irrigation-fed cultivation. Furthermore, the resultant decrease in food prices would be of immense importance to the poor in rural and urban areas.

Proponents also argue that GMOs will increase the quality of the final product leading not only to export competitiveness, but also to better nutrition and health for millions. One example is the recent development of "Golden Rice" - rice supplemented with betacarotene and iron - which could turn out to be a low cost way of alleviating problems associated with population pressures and malnutrition. Not surprisingly therefore, China and India with their large and growing populations are at the biotech forefront in Asia. In short, advances in biotechnology hold promise for fewer toxic chemicals, higher yields, improved export earnings, better nutrition and improved health for billions of poor.

Somewhere in between these divergent views is the idea that the consumer has the right to know and the decision of whether to consume transgenic food should not only be decided by policy-makers and scientists, but by the consumer. Therefore, some have proposed differentiating the market into GMO-inclusive and GMO-free varieties thus enabling consumers to express their preferences. Work is underway on the development of national regulations and international agreements on GMOs. This would however require comprehensive testing, certification and labeling systems in accordance with the requirements of major importing countries. Additional costs would need to be incurred which would surely have further negative implications for export competitiveness of developing countries.

Furthermore, exporters of GMOs contend that mandatory labeling would single out GM products on the basis of how they are produced, (and not on the basis of their final product characteristics) which would be contrary to existing WTO rules. In fact, one of the European Commission's priorities in new negotia-

tions is precisely to clarify the role of non-product related process and production methods (PPMs) under WTO rules. This has important implications for market access opportunities of developing countries, because their possible inclusion under WTO rules, could result in many non-tariff measures, not only those related to GMOs, but also those related to labour standards, being included.

In January 2000 in Montreal, more than 130 countries finalized and signed the Cartagena Protocol on Biosafety. The Protocol sets down a global regulatory framework for international trade of genetically modified living organisms that also includes elaborate notification requirements. It is important to note that the Protocol seeks to protect the environment from introducing a living modified organism (primarily seeds), and that it does not deal with food safety issues. Furthermore, it may take two or three years before 50 countries ratify the protocol and it comes into effect.

Nevertheless, the Protocol reconfirms governments' rights to set their own domestic regulations to decide whether or not to accept GM imports and under what conditions. The Protocol also does not override previous trade rules, so the WTO remains the final arbiter in the case of trade disputes. It remains to be seen, however, how a possible trade ban on imports of GMOs would play itself out in a WTO dispute settlement case. As yet, the WTO has no special body to advise on whether new provisions are required or whether existing provisions need to be renegotiated.

In the Asia-Pacific region, Australia, Japan, the Republic of Korea, New Zealand have enacted legislation that will require mandatory labeling of all GMOs or of some, while other countries such as the Philippines have tabled proposals for mandatory labeling. Thailand does not require labeling of foods; however GM seeds cannot be imported. Press reports have appeared in the local media alleging that importation of GM seeds takes place anyway.

An objective consideration of the debate is clearly necessary. However, the pace at which genetic science is progressing is such that distinguishing right from wrong is increasingly problematic for mankind. Now the future of mankind seems to depend on a hope that human experiences will be applied wisely to the astounding advances of knowledge, as T.S. Eliot asked, "Where is the wisdom we have lost in knowledge?" Traditional agricultural methods of our forefathers may yet hold a part of the answer.

2. Gaining market access

There is a growing tendency towards sourcing supplies of OAPs more globally and developing partnerships with developing countries. New opportunities exist therefore for exports for developing countries. However, there are significant conditions that exporters should meet before they can establish a foothold in organic trade. These include standards, certification and the development of partnerships with key players in the trade.

(a) Standards

As organic agriculture progressed from the early experimental gardens of the late 19th Century to today's commercially run farms, the need arose for standards and for a system to verify that products were actually being produced according to organic standards.

Essentially the goal of organic standards is to define "organic." Standards should be based on a strict and precise definition of what is organic. They should also be uniform and easy for consumers to understand. Finally standards should bring economic benefit to organic farmers so that their activities are commercially sustainable. However, a product certified as organic is not necessarily a high quality or a safe product. Organic standards only pertain to how a product is produced. Just because a food product is labeled organic does not mean it is safer, cleaner, or fresher than conventional food. In fact, some even contend that the risk of ecoli infections in organic food is higher than in conventional food, because organic food is generally not irradiated.

There are no regulations on organic products that are applicable worldwide. Different associations, industries or governments have varying perceptions of how organic products should be defined and certified. Thus, individual brands naming products organic may in fact have widely different standards for production and certification behind them, giving rise to unfair competitive advantages in the trade of OAPs. However, work at the international level has progressed towards a common understanding of what organic agricultural products means. One pertains to the development of standards for organic production and trade in the FAO/WHO Codex Alimentarius Commission. The other forum where standards are being developed at the international level is IFOAM.

(i) Codex Alimentarius Commission

The Commission is an intergovernmental body that was created in order to protect consumers from health hazards and to facilitate international trade in food products. Two Codex committees are currently developing standards that are

relevant to organic products. The first is on food labeling, including livestock products, and the second is on export and import inspection and certification systems. The formulation of these guidelines is largely based on EU regulations on organic food products and IFOAM standards, as will be discussed below. These guidelines can be very useful to countries that are now drafting their country specific regulations on organic food products.

(ii) IFOAM

IFOAM was established in 1972 as an umbrella organization for national organic agriculture associations, but members also include certification bodies, traders and processors. It has established international basic standards of organic agriculture and food processing. The standards are updated regularly by the IFOAM Standards Committee and are approved by the IFOAM General Assembly every second year. It has consultative status with the EU and the Codex Alimentarius Commission and a formal liaison with FAO. IFOAM has also established an international Accreditation Programme, which is operated by the International Organic Accreditation Service (IOAS). As of March 2000, no Asian country certification programmes had been accredited, although Organic Agriculture Certification Thailand (ACT) is in the process of receiving accreditation. Further information is provided at the IFOAM website (http://www.ifoam.org)

(iii) Demeter International eV

Demeter International eV is a worldwide network of 19 international certification bodies. It claims to have more than 3,500 partners in 35 countries, covering 1 million hectares of cultivated land. Its internationally recognized mark is registered in over 50 countries. Further information is provided at its website *(http:www.demeter.net)*

(iv) International Standards Organization (ISO)

ISO is a worldwide federation of national standards bodies from about 130 countries, one from each country. ISO sets international standards for a wide range of goods and services. However, it has not published guidelines or standards covering OAPs. The ISO 9000 and ISO 14000 standards do not have any direct implications for the methods and principles applicable to organic food production. The most important guideline for organic certification is currently ISO/IEC[7] Guide 65:1996, *General requirements for bodies operating product certification systems* which establish principles for any certification body, including those certifying organic food products. In fact, the IFOAM Accreditation programme is based on ISO/IEC

[7] IEC is the International Electrotechnical Commission. It cooperates closely with ISO. ISO covers all technical fields with the exception of electrical and electronic engineering.

Guide 65 and the Demeter Accreditation Programme also uses this Guide. Another important guide is ISO/IEC Guide 61:*1996 General Requirements for assessment and accreditation of certification/registration bodies*, which defines requirements for accreditation bodies.

(v) Regulations in the European Union

Council Regulation (EEC) 2092/91 of 24 June 1991 and subsequent amendments establishes uniform standards and the main rules governing organic production, importation, labeling and marketing of OAPs. The use of the term "organic" is now limited to products that conform to the Regulation. Non-EU products need to show that certification has been carried out by a national authority (in the exporting country) whose equivalence has been approved according to Regulation 2092/91 or by an EU inspectorate which operates internationally like Ecocert, SKAL, KRAV etc. Once a product enters one EU country, it should be able to move across national borders without further inspections. Even then each EU country has its own national standards that in many cases are more stringent than the EU-level standards. EU standards should therefore be considered minimum level standards.

(vi) Standards applicable in the United States

In the United States the Organic Foods Production Act (OFPA) was adopted as part of the 1990 Farm Bill in order to establish a National Organic Programme (NOP). The Act was adopted to (1) establish national standards governing the marketing of certain agricultural products as OAPs; (2) assure consumers that organically produced products meet a consistent standard; and (3) facilitate interstate commerce in fresh and processed food. A regulation to implement the Act was drafted in December 1997 and published in the Federal Register for review and public comment. However, an unprecedented 275,603 comments were received on various controversial issues, especially on the substances which could be used in organic production and handling. Irradiation of food, the use of sewage sludge, and GMOs were particularly contentious issues. On the basis of comments received, the regulation was redrafted and recirculated in June 2000 for comments by the public. A total of 40,744 public comments were received and a final rule is expected by end of 2000.

According to the redrafted version, farmers must meet a set of exacting standards in how their crops are grown - as in using only approved materials which are mostly natural, and using crop rotation and other environmental practices. For fresh meats to be labeled organic, livestock must be raised according to strict requirements which include, among others, organic from birth, no antibiotics

and 100 per cent organic feed. Furthermore, irradiation, sewer sludge or GMOs will not be permitted in the production of any organic foods or ingredients.

Finally, a labelling system broken down into four categories has been created for processed foods. For something to be labeled organic it must contain at least 95 per cent organic ingredients. If however it has between 50 and 95 per cent organic ingredients then the label may only say that it was *made from* organic ingredients. Certification will be carried out by private or state regulating authorities and until such time as a uniform national organic standard comes about, individual States will continue to implement their own laws on organic products. About 20 States have no legislation on OAPs, while about 30 States have some laws. Some States have standards but no certification programmes, while about 13 States operate organic certification programmes. Further information is available at the site of the American Marketing Services (http://www.ams.usda.gov).

(vii) Agreements of the World Trade Organization

The basic aim of WTO agreements is to encourage member countries to pursue more open and liberal trade policies. Within this framework, member countries also have a right to restrict entry or import of a good or service if plant, animal or human health or life come under threat. Specifically, under Article XX of the GATT (1994), member countries have a right to set their own national environmental and food safety regulations. However, Article XX is an "exceptions" article. Member countries are therefore still obliged to meet other WTO obligations of open and non-discriminatory trade (MFN, national treatment, etc) thus restricting the extent to which countries can use trade measures to protect the environment. In short, member countries are obliged to use least restrictive trade measures when animal, plant or human life needs to be protected.

Two WTO agreements are particularly relevant to agricultural exports, one is the Sanitary and Phytosanitary (SPS) agreement, and the other is the Technical Barriers to Trade (TBT) agreement. Both agreements encourage the use of international standards, guidelines and recommendations where they exist, such as under Codex Alimentarius or IFOAM standards. Under the SPS agreement, a country may apply higher standards only if these can be justified by appropriate scientific risk assessments. In other words, the SPS agreement allows a country to set a higher standard than the international norm only if the risk to animal, plant or human health or life is based on scientific risk assessment. This is crucial in determining what is a justified trade restriction and what is a covert form of protectionism and not surprisingly, many of the cases brought to the WTO for dispute settlement center around the interpretation of these provisions.

A recent example is the beef hormone dispute between the EU and the United States, where the EU banned the import of hormone-fed beef from the United States. The Dispute Settlement Body (DSB) found that the EU was in contravention of WTO obligations under the SPS agreement because it could not provide documented scientific evidence of the risk involved to human health. The SPS agreement however, makes provision for precaution when scientific evidence is unavailable or incomplete. Accordingly, many in the EU would argue that even though there is no evidence of harm to health and/or the environment as yet, the precautionary principle should apply given the uncertainties. The precautionary principle is an important consideration in the context of GMOs, as discussed earlier.

(b) Certification

Once OAPs are produced according to domestic or international standards, this information needs to be communicated to consumers, in order to justify the price premium the consumer is required to pay. A common way of informing consumers is through product labels. It is not surprising that an extraordinary growth in labels denoting "organic," "green" or "eco-friendly" products was witnessed in the last decade as producers competed to offer the "better" product. Soon many consumers were no longer able to distinguish between the various labels and which production process had been used. Furthermore, it led to unfair competition in the sense that produce that was only partially organic could still be marketed under a "green" label and could therefore fetch a price premium.

Consequently, a verification system certifying that a product conforms to certain standards becomes necessary. Certification is one way of ensuring that products claimed to be organic are actually produced according to organic production standards. It is thus a way of protecting consumers, producers and traders from the use of misleading or deceptive labels. It is also a marketing instrument enabling producers to access markets for organic products and to obtain price premia. Furthermore, certification creates transparency as information on certified producing organizations and their products is normally made public.

It is important to note that certification of organic products is basically the certification of a production system, as opposed to the certification of a product. It is therefore more complex than a product certification because it cannot be based solely on product characteristics. It is based on certification of all operators in the product chain, including farmers, processors, manufacturers, exporters, importers, wholesalers and retailers.

Certification is also not a one-time procedure, but rather based on a continuous process of ongoing monitoring and inspection. Costs of certification vary. At

the farm level it is generally a fixed amount, calculated from the number of days required for inspection/verification. For processors and traders there may be a fixed price, as well as a percentage of the commercial value ranging between 0.3 and one per cent.

International certification is more expensive than local certification. If no local certification exists the only solution in the short term is to obtain international certification. The international price premium will determine the extent to which international certification is feasible, but in the long run it is preferable to establish a local certification programme with international accreditation.

Once certified, organic products are marketed carrying a certification mark indicating that the products are certified organic. The certification mark attests to conformity with certain standards and is in itself not a trademark. However in most countries the certification mark is also registered as a trademark so as to distinguish it from products of offered by competitors.

Box 1: Are organic foods tastier, healthier, better?

It is interesting to note that even when products are certified as organic, problems may arise in the interpretation of the claims made. An example reported in international newspapers recently illustrates this point. The Soil Association, the UK's leading organic food and farming organization issued a leaflet entitled "Five Reasons to Eat Organic". It claimed that consumers prefer to eat organic food because first it is tastier, second organic food is healthier, third it is better for the environment and fourth animals are healthier. Fifthly, organic food is free of genetically modified organisms. A complaint was lodged by the UK National Office of Animal Health which represents companies manufacturing veterinary medicines with the Advertising Standards Authority (ASA) alleging that the claims made by the Soil Association were not substantiated and that they should be removed. In its adjudication ASA upheld only the fifth claim because GMOs were banned in organic farming and processing. For the other four claims, ASA ruled that clinical evidence was missing that an organic diet is healthier than a non-organic diet. Similarly, while it is true that organic farming protects the environment and animal health, evidence was missing to prove that this was achieved in practice. The Soil Association has since referred the ruling to the independent reviewer of ASA adjudications.

Source: (http://www.organicinfo.ndirect.co.uk)

The certification process should meet the basic criteria of transparency and independence (freedom from the influence of vested interests). Certification bodies may therefore in turn be evaluated according to their ability to meet such criteria,

and this requires an assessment of their personnel, standards, inspection procedures etc. If a certification body meets the requirements, it may be awarded accreditation status, meaning that an authoritative body gives formal recognition that the certification body is competent to carry out certification activities. There is at present no international regulation on who may or may not carry out accreditation. However, several countries have designated official bodies for the accreditation of certification and inspection bodies. The International Accreditation Forum (IAF) groups together 18 of the world's 30 accreditation bodies. One of its objectives is to establish the equivalence of its member- accreditation programmes on the basis of multilaterally agreed mutual recognition.

(c) Key institutional players in importing markets

(i) Importers/processors/repackers

The most important market segment in developed countries on which exporters from developing countries should focus is the food processing and repackaging sector. Almost all organic food and beverages imported from developing countries consist of fresh produce or raw material that needs some form of repackaging/processing before it can be offered for sale to the consumer. In the EU, for each market and for each product group, a few specialized organic traders tend to dominate imports. The market is small, personal relationships are important, and establishing a long term relationship with one of these companies is a key requirement if exporters from developing countries wish to gain entry into the EU market.

The United States also has numerous organic traders, brokers, wholesalers, processors, many of whom are members of the OTA (Organic Trade Association) through which they may be contacted. Direct sales from exporters to the central purchasing units of retail chain stores/supermarkets are still rare, but this may change over time.

(ii) Food manufacturers

Until the mid-1990s, raw material imports were used for primary processing into only a limited range of manufactured food products. Specialized organic food producers did the manufacturing and their output was sold mainly in specialized stores in domestic markets. Since the mid-1990s however, growth in demand has resulted in consumers looking for a wide range of processed foods, similar to those available in conventional production. This is especially the case for convenience and ready-to-eat meals. The result is that many food manufacturers (both small and medium scale) who focused only on conventional processing are now finding it profitable to add organic products to their production lines. In fact many of the

new production units set up for organic foods are in conventional food companies, rather than in specialized organic businesses.

Furthermore, major multinational food companies are also gradually adding organic food production to their production lines. Heinz in particular stands out as a leader in organic food manufacturing. Food manufacturers prefer to obtain their imported supplies from importers or from specialized European repackers/processors because they can best meet the manufacturers specifications and ensure continuity of supply. As mentioned above, this may change and direct imports from outside Europe may become more feasible especially as more conventional food companies set up organic lines.

The degree of processing carried out varies considerably according to the product group. A few examples are given below:

- *Coffee and tea*: mainly retail, small but growing catering and institutional use;
- *Dried fruits and nuts*: used mainly in the bakery trade, but also for muesli, consumer snacks and fruit yoghurt;
- *Edible nuts*: mainly for industrial use in peanut butter, other nut pastes, sauces, bakery products, snacks, muesli;
- *Fresh fruits and vegetables*: primarily for direct consumption;
- *Grains, cereals, rice*: bread and bakery products, muesli, rice cakes, animal feed; and
- *Herbs and spices*: both retail and industrial uses, especially in soups and ready-to-eat meals.

In the United States, the most phenomenal growth in OAPs has taken place in the snacks and candies - an important sector for the United States - with annual growth rates of over 100 per cent. From the perspective of developing countries, this provides an important opportunity for export expansion. As food processors are constantly developing new products and increasing variety, opportunities for export exist in those tropical products not otherwise grown in the United States or off-season fruits. Some opportunities also exist for developing countries in semi-processed foods for further processing and repackaging in the United States. However, most of the processed food imports into the United States are from developed countries.

A small amount of organic coffee is produced in Hawaii, but besides that most organic coffee is imported (Mexico, Papua New Guinea, and the Philippines are large suppliers). Most of the roasting and bagging of organic coffee is done in

the United States itself. An interesting case is that of organic coffee grown in East Timor. The Arabica and Robusta beans grown in East Timor are of high quality because of low acidity which made them popular with roasting companies seeking to soften their blends. The Seattle-based coffee giant, Starbucks Corporation, is one of the principal buyers of East Timor's organic coffee. Although demand decreased as a result of the violence last year, the first coffee harvest since independence has come in and there is hope that it will represent a highly lucrative niche market.

Products of organic cotton and other fibres, personal care products, vitamins and herbal remedies are also important to the United States market. Levi's, Strauss, Nike buy organic cotton and mix it with conventional cotton. Demand for 100 per cent organic cotton is also growing, (e.g. bed linen, towels etc.) despite the high prices.

(iii) Retail trade

Although there are wide country variations in the EU, a greater and more committed participation of supermarkets and chain stores has been one of the main contributors to the rapid increase in retail sales of OAPs. In fact, supermarkets have shown significant commitment to OAPs, by ensuring a continuous supply of organic foods, as well as a complete assortment of products. Furthermore, the growing supply and more efficient distribution of large quantities helped to lower price premia to levels more acceptable to a larger segment of consumers. Supermarket chains were also instrumental in promoting the sale of OAPs through aggressive advertising. Table III.2 shows the percentage share of retailers in organic food sales in the EU.

The catering and institutional use of organic foods in the UE has commenced in some European markets but has not developed extensively to date. In North European countries, notably in Denmark, some municipal and other public bodies have started to require schools, hospitals, universities, homes for the aged to offer organic menus, including organic coffee and tea. Similarly, restaurants specializing in organic food are increasing in number. Some airline companies, e.g. Lufthansa and in particular Swissair offer organic in-flight meals.

European consumers also buy organic foods direct from farm outlets and at organic markets. A highly significant development over recent years has been the organic food box subscription schemes run by farm outlets. Members of such schemes pay a fixed price for a box of in-season organic fruits and vegetables, accepting as a "box" the range, quantity, quality and appearance of the produce offered. It is an attempt to promote closer relationships between consumers and producers and to promote produce that is less esthetically appealing than conven-

tional produce. Box schemes grew very rapidly in popularity in the United Kingdom and in the Netherlands, with several schemes operating via the internet and mail order. More recently, consumer complaints regarding the quality of produce offered has dampened enthusiasm somewhat.

Table III.2. European markets: retailers' percentage shares in organic food sales, 1997

Market	Chain stores/ supermarkets	Specialist shops [a]	Other [b]
Denmark	70	15	15
France	40	30	30
Germany	25	45	20
Netherlands	20	75	5
Sweden	90	5	5
Switzerland	60	30	10
United Kingdom	65	17.5	17.5

Source: Ibid

[a] Specialist organic food stores, *Reform* shops, natural/health food shops, etc.

[b] Direct farm sales, organic markets, box schemes, catering, etc.

In the United States about two-thirds of retail sales of OAPs take place at natural product stores, one third at super- and hypermarkets of which half now carry OAPs. A small percentage (about five per cent) is distributed through clubs, food box systems and food service outlets – a feature particular to the United States market. Another typical feature of the United States retail market is the presence of natural food supermarkets. The largest chain dealing in organics is run by Whole Foods Market, based in Austin, Texas. Another important chain is Wild Oats based in Boulder, Colorado.

Overall, as for the EU market, in the United States demand for imports of organic products is growing and there is a marked tendency towards sourcing new products from a much wider range of suppliers than in the past.

Box 2: Golden rules for the exporter of organic products

1. Ensure that products are organically certifiable, and meet the legal and market requirements (hygiene, weight, size, ripeness, colour, packaging, and other technical specifications) of the importing country.
2. Identify a trading partner (either an exporter/importer) for marketing and selling products to the final customer. The trading partner should be competent, trustworthy, solvent and defend the best interests of the client at all times. A long-term relationship should be established and in this respect communication on a continuous basis is important. On the one hand, the trading partner should have a sound understanding of the situation especially as regards product availability. On the other hand the exporter should also ensure that the trading partner is also kept fully informed. Nothing is more frustrating for trading partners than not to be informed about the situation of exporters, and not to receive prompt replies to requests.
3. Build up expertise on foreign markets. Is there a demand for the product? Where? When (which season?) Who are the target customers? What are the price levels? Are there quantitative restrictions to imports? What are the tariff levels? Prices and margins can vary considerably so it is essential to have continuous up to date information on prices. Trading partners can help in this and most wholesalers publish detailed price lists which give recommended retail prices and trade discounts. However it is also important to conduct independent market research. Besides paying regular visits to the target markets (preferably at least once a year) to collect market information through meetings with trading partners, visits to retail shops and specialized trade fairs, other possible sources of information include Green-Trade Net, fair trade organizations, Chambers of Commerce, and other organizations, including NGOs.
4. Do not speculate on prices. Set adequate levels through open communication with trading partners that ensures reasonable profits for all.
5. Work as much as possible in collaboration with other producers in a cooperative or other group relationships. Working together can mean producing marketable quantities at better prices, better assortments, and improved post-harvest treatment, processing, packaging, storage, transportation and administration. It may also help to cut the costs of certification and participation in foreign trade shows.
6. Exporting can be profitable business, but building up a national market is important as well, whatever the problems and hindrances.

Source: UNCTAD/WTO International Trade Centre, *Organic Food and Beverages: World Supply and Major European Markets, 1999.*

F. Conclusions and recommendations

Organic agriculture is of particular interest to developing countries because it is in consonance with long-term sustainable development strategies. Furthermore, the spectacular growth in demand for organic agriculture that took place in recent years has opened up export possibilities for developing countries. Aggressive marketing strategies adopted by major retail groups, the product innovations introduced by food manufacturers and supportive government policies all bode well for sustained demand growth in the sector over the medium term.

The introduction of transgenic plants into the food chain with new codes of genes from other species, poses some problems for the development of organic agricultural products. It is a highly controversial development and as long as scientific evidence of the effects of genetic manipulation is uncertain, the contentiousness is likely to grow. Consumer pressure and mandatory labelling requirements in some countries have, so far, forestalled the inroads of major GMO producers, primarily United States based multinationals. Overall therefore, the prospects for developing country exports of organic agricultural products over the medium term continue to be positive, despite increasing competition from new biotechnologies.

However, in order to succeed in export trade of organic agricultural products, there are a number of difficulties to overcome. Markets in developed countries are highly exigent in terms of price/quality ratios. Furthermore, certification of organic origin is critical to export success because consumers will pay price premia only when there is a high degree of confidence in the standard and organic origin of the product. Producers in developing countries need to familiarize themselves with these and other market requirements of importing countries. Carefully selecting a trading partner and developing a long-term partnership from among distributors and processors of OAPs, are an important way of gaining entry and establishing a foothold in foreign markets.

Developing countries need to develop a strategy for long-term development of organic agriculture for the export market. Some of the elements of such a strategy could include the following:

- Financial assistance under various international and government environmental programmes to assist farmers in the conversion from chemical to organic farming. (conversion periods can last between three to five years, during which productivity levels are low and significant financial support is needed to keep farms commercially viable).
- The development of country specific regulations and standards that are harmonized to the extent possible, with international guidelines of the

FAO/WHO Codex Alimentarius Commission and regulations as contained in EEC council regulation 2092/91 and its subsequent amendments.

- Local certification programmes and certification bodies should be assisted to obtain international accreditation. As no domestic certification body from the ESCAP developing countries has obtained international accreditation (ACT from Thailand is in the process of obtaining accreditation to IFOAM), so the only short-term solution is to rely on international certification bodies. However, as international certification is much more expensive, domestic internationally accredited programmes need to be given priority attention for long-term market access to developed countries.

- Devising national level policies about the import of and cultivation of genetically modified organisms, because GMOs are banned from organic agriculture.

- Growth in food sales in developed countries is declining. In contrast, the ESCAP region with its high population growth rates and increasing per capita incomes is expected to experience positive growth rates. Developing countries of the region should therefore seek to diversify their organic exports to the ESCAP region itself. Trade liberalization and facilitation measures to expand trade in organic agricultural exports under various preferential trading arrangements such as the Bangkok agreement, AFTA and SAFTA should be further explored, particular as tariffs on raw and processed agricultural products remain disproportionately high.

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IV. TEXTILES AND GARMENTS: PRESSURES FOR CHANGE*

Summary

This presents a brief review of current thinking and practice concerning the supply chain management of social and environmental questions by the European clothing retail sector. It starts with an assessment of the main commercial trends within which sustainability in the supply chain needs to be considered, and then presents the priority issues currently on the agenda. An description of the main pressures for change is then provided, followed by a look at the retail response strategies, focusing in particular on three case studies: Marks and Spencer, C&A and Otto Versand. The paper closes with some conclusions and implications for Asian producers.

A. Global trends

Globalization has transformed the patterns of production and consumption of textile and clothing products. Rapid technological innovation and market opening have made contract manufacturing with distant suppliers in a growing number of emerging economies common practice for European retailers. The Uruguay Round Agreement on Textiles and Clothing with its scheduled phase-out of the Multi-Fibre Agreement is set to accelerate these trends. As quota restrictions are removed, a more level playing field will emerge, intensifying competition. Government and industry across Asia are now getting ready for 2005 - and the signs are that high standards of social and environmental performance by textile producers and garment makers will also need be critical for success. As subcontracting becomes central to clothing strategies, so retailers are focusing on the quality of their supply chain. For many this means rationalising their supplier base to include only those producers who can meet demanding requirements for quality, price and turnaround times. C&A is not alone in cutting its supply base by three-quarters over the past three years.

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Taken together these trends provide a powerful deflationary force on costs throughout the supply chain. Overall clothing prices in the UK market, for example, have fallen by 5 per cent over the last year, with some companies cutting prices by up to 20 per cent. This deflationary pressure gives a new urgency to the search for productivity improvements - particularly in the context of environmental and social standards. Increasingly, the clothing market is dividing between high-end branded goods and the price-sensitive discounters. Brand value is becoming increasingly central to many clothing retailers - and protecting reputation from allegations of poor practice along the supply chain is now one of the major motivating forces for companies to social and environmental conditions for their producers.

B. Sustainability in the clothing chain

Among business firms, there is a growing awareness of the need to develop a more long-term and integrated approach between core operations and wider impacts on society and the environment. Starting with resource intensive sectors, such as petrochemicals, mining and forestry, social, market and regulatory pressures have extended throughout the business world, and now embrace service sectors, such as finance and retail.

Although the direct sustainability impacts of the service economy may not be as severe as other sectors, companies provide a crucial gatekeeper role regulating access to both capital and consumers. As the most powerful player in the clothing chain, the public is increasingly demanding that retailers ensure that the clothes that consumers buy are made in an environmentally sound and socially responsible manner. As yet, far less concern has been shown to the use and disposal stages of the clothing chain - although the washing of clothing, for example, can be one of the most resource intensive and wasteful.

To move towards more sustainable production and consumption of clothing, four priority issues will need to be addressed

- *Eliminating environmental hazards*: Many of the chemicals and processes used along the clothing chain can be hazardous to humans and the environment, particularly pesticides in cotton growing as well as dyes and other chemicals in textile processing. Increasingly stringent controls are being placed on chemical residues in clothing to reduce risks to consumers from skin allergy and potential cancer.
- *Achieving efficient resource use*: Producing and consuming clothing is a highly resource-intensive process - particularly in terms of water. Growing one pound of cotton requires 2.5 tons of water, and textile processing

can also consume large quantities of water. The mismanagement of water resources by and textile producers have resulted in serious environmental problems as well as reducing availability for other users.

- *Minimizing pollution and waste*: Dyeing and finishing textiles can also be highly polluting, notably in terms of water effluent. As textile producers install effluent treatment plants, so the safe disposal of the resulting solid waste is also becoming a priority issue.
- *Realizing social justice*: Increasing focus is also being placed on labour conditions in textile and garment production to ensure that basic rights are upheld, such as bans on child and forced labour, non-discrimination between workers, payment of a living wage, acceptable workweeks, safe working conditions, the freedom of association and right to collective bargaining.

C. Pressures and response

Pressures to address these issues are being forced on clothing retailers from three directions: from the public, from regulators and from the marketplace. A growing number of clothing companies have been the focus of successful campaigns to force improvements in labour practices among their suppliers. The public in Europe and North America now expect clothes to be made in safe and decent working conditions, and media exposure of 'sweatshops' in the developing world have not only proved embarrassing for a number of companies, but have damaged hard-won brand reputation. Indeed, Naomi Klein, who has followed the protests, argues that "as more people discover the brand-name secrets of the global logo web, their outrage will fuel the next big political movement, a vast wave of opposition squarely targetting transnational corporations."

Government regulation has been a secondary force for change, but critical for environmental and health issues. To date, European Union regulations on packaging as well as bans on certain hazardous azo dyes in Germany and the Netherlands have had the greatest impact on suppliers in Asia; there are now plans to extend the azo ban to the whole of the EU.

Retailers have also been prompted by the prospect of niche market opportunities. In the early 1990s, the 'natural look' trend came and went, and the market for explicitly 'environmental' clothing products is still small, perhaps as much as one to five per cent. However, there are signs that organic cotton clothing could benefit from a spillover from current consumer interest in organic food.

Clothing companies have reacted in a number of ways, driven mostly by defensive concerns to reduce risk. Many retailers have now introduced internal social and environmental requirements, which they require their suppliers to meet as part of their contractual relations. These codes of conduct commonly address chemical use and residues, along with expected labour practices. Some companies, particularly those in Germany, are also requiring suppliers to achieve certification to independent standards, such as the Oko-Tex for hazards and SA8000 for labour practices.

There appears to be no requirement for producers to adopt ISO14001 certified environmental management systems. Where market conditions are ripe, pioneering companies may also launch their own green ranges. A number of clothing companies, such as Co-op Suisse and Patagonia, have successfully introduced organic clothing, and a number of major retailers are also introducing a limited selection. Finally, clothing retailers have also launched industry-wide programmes, or joined multi-stakeholder partnerships, such as the Ethical Trading Initiative in the UK, a joint venture of business, unions and non-governmental organizations to improve labour conditions.

The following case studies will illustrate how different companies are applying these response strategies.

D. Case studies

Marks & Spencer has long been the market leader in the UK, but has recently been under considerable commercial pressure, losing market share to its rivals. The company has long had a reputation for high quality, and introduced an environmental code for clothing, restricting chemical use back in 1993. The code also covers water effluent and energy consumption in textile production. M&S is currently exploring whether to require its major suppliers to have an environmental management system, but is currently not in favour of ISO14001. After the exposure of alleged labour malpractice at one of its suppliers, M&S introduced a set of Global Sourcing Principles and joined the ETI in 1999. In mid-2000, M&S was the first high-street retailer to launch a range of organic cotton clothing.

C&A is a privately owned clothing retailer based in the Netherlands. From the early 1990s, it has been the target of the Clean Clothes Campaign, an NGO working for better labour standards. As a result, C&A has introduced a Code of Conduct for its suppliers, and achieved certification of its own operations to ISO14001. For C&A, eliminating child labour has been the priority issue, and the code is generally narrower than other programmes: for example, it does not require suppliers to ensure collective bargaining. To enforce the code, C&A has estab-

lished SOCAM, an arms length agency tasked with auditing implementation through unannounced visits to production units. During 1999, SOCAM visited around 1,500 units - and as a result, about 150 companies received warnings due to poor performance and business was suspended with 50 units. C&A has decided to use the Oko-Tex label, which it applies to all of its close to skin and baby-wear products.

Based in Germany, Otto Versand is the world's largest catalogue company - and in Germany, it has been the catalogue companies that have been leading environmental innovation in the clothing business. Otto has been at the forefront of this trend, and introduced its first environmental standard in 1993. It runs an Ecological Suppliers scheme, and is aiming to have 50 per cent of its products covered by its own brand label for hazard free clothing (similar to Oko-Tex). In addition, it has launched a Future Collection range of clothing, which uses no chlorine bleach or optical brighteners. Although the Collection makes up only one per cent of sales, the company aims to increase this to 10 per cent. Finally, Otto also has an ethical code of conduct - and has decided to enforce this by encouraging its suppliers to seek certification to SA8000.

E. Conclusions

Environmental and social issues are now a normal part of supplier relations for a growing number of European clothing retailers. As global competition deepens, so will good performance become fundamental to business relations. Nevertheless, this review has also shown that retailers are adopting a diversity of approaches, significantly influenced by pressures in different markets - with Germany more advanced on environmental issues, and the UK on social questions. The driving force for company action is to manage risk and protect their brands - for this reason, there is limited use of eco-labels, as these can be seen to interfere with brand marketing. Although explicit consumer demand for 'environmental' clothing is still weak, public expectations are set to grow.

For suppliers in Asia, these developments pose a number of challenges:

- Taking a proactive approach, and not always responding to buyer demands.
- Rewarding high performance, particularly in an era of severe price deflation.
- Keeping track of market trends and the drivers for corporate responsibility in the sector.

- Designing efficient collective action, for example, to manage wastewater effluent in textile clusters.
- Linking innovation, sustainable development and export promotion programmes.
- Moving from technical improvements to public reporting of performance.
- Anticipating new issues in the marketplace, such as organic cotton or resource use in production (water, energy).

V. LINKING SUSTAINABLE BUSINESS AND EXPORT PROMOTION: STRATEGIES FOR EXPORTERS IN ASIA AND THE PACIFIC REGION*

A. Introduction

An increasing number of companies in developing countries - notably in the garment and textile sectors -- are under strong pressure from their buyers in key markets to improve their social and environmental performance. In a situation of increasingly competitive global markets and strong downward pressures on costs, the challenge for exporters is to find ways to ensure that these improvements leads to productivity gains. The experience of making pollution prevention pay is growing in Asia and the Pacific; developing the business case for high social performance is a more recent issue for exporters. This paper draws on the experience of several countries in the region that suggests a simple three-step strategy for industry clusters to develop collective competence to respond effectively to the requirements of supply chains. The stress is placed on collective action rather than initiatives by individual firms as it is within specific clusters that enterprises learn and share experiences. Furthermore, many social and environmental issues faced by exporters frequently require a broad-based sectoral response - for example, through the installation of new common effluent treatment plants or industry-wide initiatives to raise social standards. This places a special premium on industry associations to develop both a sensitivity to changing market demands as well as a robust capacity to deliver programmes that meet their members' needs.

The first step for a sector faced by new social and/or environmental pressures from important buyers is to assess their current performance through a process of comparative benchmarking. Section 2 describes a recent benchmarking exercise carried out by UNIDO in the textile sector, and the lessons learned by participating companies. Once good analytical foundations have been built, the next step is to pilot specific measures that could be used to raise the overall performance of the cluster. Section 3 focuses on the social dimension, and explores the challenge of gaining certification to the Social Accountability (SA) 8000 standard. Based on the results of pilot schemes and demonstration projects, the industry then needs to

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develop a long-term strategy for integrating the required social and environmental improvements into their business plans. Section 4 draws on recent initiatives in Bangladesh and India to help exporters take control of the standards agenda by developing programmes that meet both their needs and buyer requirements. The last section poses some basic questions that could serve to prompt discussion within an export sector on the best ways forward.

B. The COMPARE programme

Private industry in developing countries should have a set of global norms against which to judge their own performance, as well as an internationally acceptable framework to assess their performance in terms of environmental and social parameters. This would also enable industry to identify areas for improvement to make them globally competitive, rather than become victims of non-tariff barriers such as those inherent in ecolabelling requirements.

Responding to Global Standards[8] presents such a framework and outlines an approach for assessing industrial processes, taking the textile industry i.e. woven fabric finishing (cotton) as a case study. In developing an assessment methodology, the report draws upon concepts borrowed from three different approaches and combines them in one single framework. The three pillars of the methodology are: benchmarking literature; partial LCA; and an assessment of in-factory working conditions and social aspects of the production process. Assessment results can then be compared to standards, national and international, to assess the extent to which industries are able to meet the requirements inherent in them.

The methodology follows a hierarchical approach where the first step defines the system under examination, and subsequent steps define the boundaries for investigation and select parameters to be analyzed within the system boundary. This framework constitutes the basis for a computerized software model, Cleaner Operations and Manufacturing for Productivity and Resource Efficiency (COMPARE). This is a knowledge-based tool structured to provide information on the cotton textile industry, as well as to assess an organization's performance vis-à-vis national, corporate and international norms and standards. It has a comprehensive database on international standards and corporate codes of conduct that companies can use to compare their performance levels with. It also suggests pollution prevention measures to meet prescribed standards together with case studies that illustrate the techno-economic feasibility of these measures.

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[8] Responding to Global Standards, A framework for Assessing Social and Environmental Performance of Industries, Ritu Kumar, N. Gessesse, Y.Konishi, May 1998, UNIDO.

The framework was tested for three selected factories (one each is India, Indonesia and Zimbabwe) engaged in producing woven cotton fabric for shirts and blouses. The case studies demonstrate the usefulness of assessing and benchmarking environmental, and social performance of enterprises, especially those competing in global markets. The assessment was found useful for identifying areas for improvement in the adoption of CTs and in corporate practices relating to occupational health and safety provisions, training, education and awareness of workers.

The links between environmental improvements and better working conditions are especially important. The case studies suggest a positive correlation between reduced environmental loads, and training and awareness programmes for workers. Increased awareness on input conservation (such as water and energy) results in better utilization of these inputs. It was also found that environmental performance was superior in companies that had a formal environmental policy well communicated to workers.

It is in the interest of management to ensure that workers receive technical training and made aware of the importance of conserving raw materials and resource use. However, SMEs usually cannot afford continuous training and skills upgradation. This is where governments as well as industry associations can assist by providing SMEs with access to training. Development assistance may also be targeted at providing SMEs with the necessary information, resources and capability to undertake their own assessment of environmental and social performance to enable them to identify areas for improvement and meet global standards.

The case studies also suggest that corporate managers need to pay more attention to in-factory occupational health and safety conditions. Factories that had high levels of in-factory air pollution levels were also those that had inadequate occupational health and safety conditions. In addition, if a company were to reduce emissions of volatile organic compounds through investments in cleaner technologies, it could reduce its expenditures on occupational health and safety measures and at the same time meet international requirements or specific requirements of buyers, thereby improving its export potential.

Responding to Global Standards highlights the fact that for export-oriented firms, the dictates of large international buyers reflected in their own codes of ethic, are more instrumental in bringing about improvements in social and environmental performance than guidelines recommended by international agencies such as the ILO, World Bank, and WHO. Consequently, firms that cater to corporate codes of practice of their foreign clients are better able to exploit trade opportunities inherent in the demand for sustainably produced goods. This results in increasing export sales as well as better environmental and working conditions.

The case studies underline the importance of economic incentives and removal of subsidies to improve environmental and social performance. Prolonged subsidies have resulted in overuse and waste of raw materials and inputs. Prices of inputs must reflect the full cost of using the inputs and government policies must be restructured to reflect these costs. More reliance on market-based instruments by governments is a prerequisite to better performance.

The responsibility for achieving higher levels of environmental and social performance, and thereby exploiting the opportunities for trade, rests on three key actors: corporate managers including exporters from developing countries and buyers in developed countries; national and international policy makers; and workers. A concerted effort is necessary to achieve sustainable production without impairing profits and competitive advantage.

C. Rewarding good performance: certification to SA8000

In response to the inconsistencies among workplace codes of conduct, Social Accountability International (SAI, formerly known as Council on Economic Priorities Accreditation Agency) has developed a standard for workplace conditions and a system for independently verifying factories' compliance. The standard, Social Accountability 8000 (SA8000), and its verification system draw from established business strategies for ensuring quality (such as those used by the international standards organization for ISO 9000) and add several elements that international human rights experts have identified as essential to social auditing.

In this era of instant communications, there is unprecedented momentum for global social change in the way workplace conditions are managed. Many major corporations know that their reputation for social accountability is a competitive asset, and they are beginning to see it as an issue of risk management. Many NGOs and unions also recognize that by offering technical advice and constructive criticism, they can encourage employers to improve. SA 8000, and its verification system, are a viable solution for improving workplace conditions and a good business decision - financially as well as socially.

1. The SA8000 system and standard

Based on the principles of international human rights norms as delineated in ILO Conventions, the United Nations Convention on the Rights of the Child and the Universal Declaration of Human Rights, SA8000 has nine core areas: child la-

bour; forced labour; health and safety; compensation; working hours; discrimination; discipline; free association and collective bargaining management systems

The SA8000 system is modeled after ISO 9000 which companies use to ensure quality control. Over 300,000 production sites around the world use a certification of conformance to the ISO to demonstrate that their production system ensures quality. SA8000 builds on the merits of ISO auditing techniques: specifying corrective and preventive action; encouraging continuous improvement; and focusing on management systems and documentation proving the systems' effectiveness. The SA8000 system also includes three elements essential for social auditing:

- Specific performance standards set with minimum requirements;
- Auditors are required to consult with and learn from interested parties, such as NGOs, trade unions and, of course, workers; and
- A complaints and appeals mechanism allows individual workers, organizations, and other interested parties to bring forward issues of non-compliance at certified facilities.

SA8000 also has a section on management systems, which requires policies and procedures and documentation systems that demonstrate ongoing compliance with the standard. SA8000's acceptance is growing because companies recognize the benefits of this system, both to workers and to management. A growing number of companies are currently assessing their suppliers' compliance with SA8000 and others are listing it as an alternative to the company code of conduct. So far over 60 factories worldwide have been certified for compliance with SA 8000, majority of these are in Asia[9]. The textile and clothing sector is high up on the list of certified factories.

2. Furthering the dialogue and capacity building

Although acceptance of social accountability is growing, there is still a need to promote understanding of social auditing techniques and the management systems needed to improve workplace conditions. This requires that NGOs and unions play a constructive role in the SA8000 auditing process and that companies develop social accountability policies. However, public pressure will not be the only driving force behind SA8000 in the long term. Corporations need to see SA8000 as a way to strengthen their competitive edge. Knowledge of corporations' experiences and best practices in social accountability can help corporations identify cost-effective ways to improve.

[9] See SAI website for list of certified companies and members of SA8000: www.cepaa.org

Encouraging a constructive dialogue among business and social organizations increases the accuracy and viability of audits and the cooperative use of the SA8000 system. Moreover, such a dialogue furthers capacity building among stakeholders as they forge new alliances. Informing a broad range of stakeholders helps ensure credibility, widespread use and long-term acceptance of the SA8000 certification system.

D. Developing a long-term strategy: the SPIES initiative

The task for the textile and garment sectors is the management of new environmental and social requirements without burdening themselves with additional costs - in particular, how the process of raising labour standards and cutting pollution strengthen economic performance. More than this, exporters should think ahead and anticipate likely demands in the future, thus securing a stronger competitive position - in other words, finding *new synergies* between social and environmental performance and export success. As the search for market access becomes ever more fierce, particularly with the phase-out of the Multi-Fibre Arrangement (MFA) in 2005, sustainable production could become a key ingredient for competitive advantage.

Some pioneering companies, seeking to improve efficiency and corporate responsibility, have been able to convert this challenge into new export opportunities. However, small and medium export firms often find it difficult to respond, due to a lack of access to information, and a limited capacity to assess their social and environmental performance against international benchmarks and norms. This in turn means that small and medium enterprises are often unaware of the cost advantages and/or financial savings to be gained from the simultaneous introduction of environmental protection and social improvement measures.

The Sustainable Productivity Improvements for Export Success (SPIES) is an international initiative led by the Commonwealth Science Council (CSC), London, to analyze and strengthen capacity and enable textile producers to generate economic advantage from environmental and social upgrading. SPIES is founded on the principle of partnership and tailoring international information and requirements to local demand and realities.

CSC, in collaboration with the Bangladesh Textile Mills Association and the Bangladesh Garments Manufacturers Association, hosted a successful pilot workshop in Bangladesh in January 2000 for the textile and garment sector. A similar workshop was held in August 2000 in Tirupur, a major cluster of textile and garment manufacturers in South India, in collaboration with the Tirupur Exporters

Association. Based on the recommendations of these workshops, CSC elaborated a programme of technical assistance for the textile and garments industry, as well as a wider set of recommendations and follow up activities for governments, industry and international organizations.

1. Dhaka workshop conclusions

The Dhaka workshop identified key challenges and opportunities to meet higher standards and maintain competitiveness after 2005, since the phase-out of the MFA is a matter of great concern to the Bangladeshi textile and garment sector. The workshop concluded that benefits of environmental and social improvements include: (1) better public image and market reputation; (2) reduced material costs in terms of chemicals, water and energy; (3) social benefits to local community and surroundings; and (4) fall in absenteeism.The workshop identified the elaboration of a homegrown producer-driven code of conduct as a key issue for the sector. It recommended that Bangladesh should develop its own Code of Conduct for social and environmental performance in the textile and garment sector. This Code would be a proactive step by industry in Bangladesh and could help to influence the agenda with foreign buyers, governments and NGOs. A number of options are available:

- The Code could be on a system of progressive standards that initially give special and differential treatment to Bangladesh (vis a vis international norms) but become progressively more stringent.
- The Code could start with stringent standards and seek investments from developed countries to cover costs of technical, managerial and financial assistance to meet specific targets.

Preparations for the Code could start with a participatory review, involving all stakeholders, of existing national and international standards and the identification of relevant ones for Bangladesh. The Code should include the core standards set in international agreements and conventions, with additional aspects tailored to the local situation. Targets could also be set for the achievement of certain goals, with a phased implementation, which would require capacity and skills enhancement at three levels: information systems; financial mechanisms; strengthening of a cluster-based approach for SMEs.

2. Tirupur workshop conclusions

The Tirupur workshop had the following major conclusions and recommendations:

- There is a need to design and implement an integrated sustainability strategy combining export competitiveness with efficient resource utilization, minimization of residues, environmentally friendly inputs and responsible labour practices. If this strategy were to succeed, it should be a collaborative venture bringing together government, industry, research and international organizations, and NGOs.
- R&D is needed for technology and process upgradation.
- There is need to promote a cluster-based textile park approach with provision of common infrastructure facilities (e.g. secured sludge disposal ffacility) to enhance competitiveness.
- Producers should issue public reports on their efforts to integrate environmental and social factors in production.
- There is a need to adopt a proactive approach to environmental and social issues so that others do not impose the agenda as the industry moves towards WTO requirements.
- Norms should be mutually agreed upon instead of imposed; this needs joint standard setting with buyers.
- It is important to create a 'Tirupur Brand' to proclaim environmental and socially responsible behavior.
- Pilot projects with appropriate partners should be set up to demonstrate: (1) sustainable production opportunities; (2) approach for adoption of ISO 14000 and SA 8000; and (3) best management practices.The information flow on latest technologies, standards, market requirements should be strengthened.

Key elements of a long term strategy

The following elements should be developed for a long-term sustainable strategy that combines economic, environmental, and equity issues:

- Producers must develop a homegrown code of conduct in partnership with buyers.
- Dialogue with buyers should occur on a continuous basis.
- Information systems on international and domestic requirements, cleaner production methods, social accountability tools etc. need to be established and updated.

- There is a need to improve skills and capacity to implement change.
- Producers should apply appropriate tools such as benchmarking, ISO 14000, Okeo-Tex, SA 8000 etc.
- Financial mechanisms to facilitate change need to be developed and maintained especially for SMEs.

E. Getting started: key questions for exporters

In order to develop a long-term sustainable strategy, exporters should investigate two sets of issues. First, they should assess the current situation in which they operate and answer the following questions:

- What are the priority environmental and social issues for the sector (e.g. hazards, labour, resources, pollution)?
- What are the major barriers to resolving these problems (e.g. finance, technology, information, government policy, skills etc.)?
- What are the examples of good practice that already exist in the sector?

Second, they should ask the following questions to help them design a suitable response strategy:

- How can the sector develop a strategic approach - and who needs to be involved?
- How can the sector assess the costs and benefits of social and environmental improvements?
- How can the sector achieve market recognition for its performance?
- How can the sector identify new market niches and business partners?

VI. ACHIEVING PRODUCTION EFFECTIVENESS AND INCREASING BUSINESS COMPETITIVENESS THROUGH CLEANER PRODUCTION*

A. Leather sector profile

1. Background

The United Nations Conference on Environment and Development (UNCED) in 1992 held in Rio de Janeiro marked a shift in the development process towards a more harmonious relationship with the environment. In Agenda 21, UNCED gives high priority to the introduction of CP methods and preventive and recycling technologies in order to achieve sustainable development. However, CP is not by itself a "new" concept, as many other concepts with the same scope have been discussed over the past decade, including waste minimization, pollution prevention, green productivity, cleaner technology and efficiency improvement.

2. Leather sector problems

Leather making is an ancient art, almost as old as mankind, but science was applied to this craft only about a century ago in developed countries. The industry is traditionally considered as polluting, due to the inherent nature of the processes as well as type of technology employed in the e manufacture of hides and skin into leather. encompasses several processes which generate wastes such as liquid, solid and air pollutants. Tannery wastes result from a variety of processes that employ different chemicals and materials that are discharged into the atmosphere. These wastes cause varying threats to the environment, particularly those containing surplus, spent or washed out chemicals.

The leather sector provides footwear, garments and many commonly used products with properties not generally attained by other material. The industry

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particularly in the developed world has gone through substantial changes in the past two decades due to increasingly stringent environmental regulations as well as customer-pull factor.

Leather production normally consists of three processes:

1. The beamhouse process which removes dirt and unwanted constituents of the hides like hair;
2. Tanning under which the hide substance (collagen) is treated with chemicals which cross-link the collagen molecules to form a stable material (leather); and
3. Finishing which gives the leather the properties suitable for its intended end use.

In general, the trend is to adopt the EOP solution for most of the generated waste without taking care of waste treatment. Because the investment in EOP is non-productive, entrepreneurs resort to short-cut measures. The CP principle seems a better strategy to prevent environmental degradation. The environmental problems of the leather industry as a whole are confined mainly to the tanning process, though other wastes (solid waste) also result during various post-tanning and converting unit operations, which might have some end use.

3. Cleaner production needs

CP refers to an integrated preventive environmental strategy applied to processes, products, and services in order to increase eco-efficiency and reduce risks to humans and the environment.

- For production processes, CP includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes.
- For products, CP includes the reduction of negative impacts along the life cycle of a product, from raw material extraction to its ultimate disposal.
- For services, CP incorporates environmental concerns into designing and delivering services.

The key difference between pollution control and CP is timing. Pollution control is an after-the-event, "react and treat" approach; CP has a pro-active, "anticipate and prevent" philosophy, prevention being better than cure.

CP does not always ensure that EOP technologies will never be required. The new approach is meant to tackle problems using a CP philosophy leading to better operating practices and use of efficient and environmentally sound technology. This will reduce the need for EOP technologies and in some cases even eliminate the need for them.

4. Global scenario

The world trade in leather and leather goods has increased almost ten-fold in the last 20 years. It is expected to reach US$60 billion by the end of the century (figure VI.1).

The contribution of developed countries to leather production has declined from 74 per cent to 47 per cent over last 30 years; while that of the developing countries has improved from 26 per cent to 53 per cent during the same period. This is further expected to grow as many more developed countries are banning production of raw leather because of effluent and waste disposal problems. The trends in leather production in developed and developing countries are shown in table VI.1.

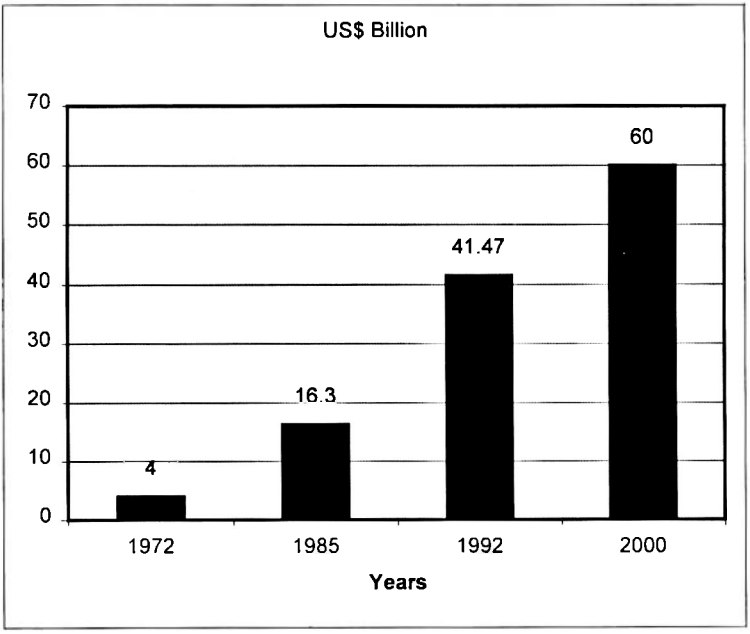


Figure VI.1. World trade in leather and leather goods

Table VI.1. Total leather production in billion square feet.
(Figures in brackets represent values in per cent)

Type of economy	Year			
	1960/65	1972/74	1981/82	1991/92
Developing	2.38 (26)	3.97 (37)	5.16 (41)	7.63 (53)
Developed	6.8 (74)	6.68 (63)	7.29 (59)	6.64 (47)

5. Domestic market

The domestic market for leather products in India is steadily growing. Per capita consumption of footwear in the country is estimated at 0.5 pair, and that with the increase in middle class population, consumption is likely to increase. Many manufacturers of footwear have diverted their attention from the export to the domestic market, in which various brands have been launched.

6. Export potential

The leather industry is one of the major foreign exchange earners in India and has recorded significant growth in the 1990s. Today the share of value added finished products in the total exports from leather sector is noted at 80 per cent as against 20 per cent in the 1970s.

Table VI.2. Export of leather and leather products
Value in US$ million

	Category	1993-94	1994-	1995-96	1996-9
1	Finished leather	270.25	382	371.33	299.08
2	Leather products	204.25	302	340.44	341.04
3	Footwear components	253.39	247	242.99	223.48
4	Leather garments	342.28	387	413.60	421.84
5	Leather goods	229.18	292	383.97	*351.30
	Total	**1299.35**	**1612**	**1752.33**	**1636.74**

However, since then a marginal negative growth in leather related exports was experienced. The main reason for the shortfall is the current depression in the international market on account of unfavourable economic conditions in the European countries. Closure of tanneries due to environment related problems; liquidity crunch faced by the exporters and the fluctuation in the European currency are other contributing factors. (Data on exports of leather and leather products for the last four years are shown in table VI.2).

7. Standards and regulations of major importing markets

The trade of leather and leather products is a complex business. Many aspects must be taken into account, including the marketing of appealing leather products, access to the right distribution channels, and compliance with the national legislation of the destination country. Thus, environmental and human health considerations are becoming increasingly important to the leather trade.

The most important environmental and health issue in trade of leather products is the legislation on azo dyes, Pentachlorophenol (PCP), Polychlorobiphenyles (PCB) and Terphenyles (PCT). Some countries have banned these while others are preparing legislation. On environmental and health legislation applicable to leather products, table VI.3 gives an overview of the legislation with which exporters to these countries must comply. (It must be noted that this table is not comprehensive. In addition, there is an EU directive (94/11/EC) for the labeling of footwear.)

Table VI.3. Overview of direct legislation relevant to leather products

	European Union	Germany	The Netherlands
Certain azo dyes		Prohibition	Prohibition
Pentachlorophenool (PCP)	1000 ppm	5 ppm	5 ppm
Cadmium	In plastic or paint: 100 ppm	In plastic or paint (surface!): 100 ppm	As pigment: stabilizer or coating: prohibition paint: 50 ppm
Polychlorobiphenyles and terphenyles	Prohibition	Prohibition	prohibition
Nickel	Skin contact: 0.5 ug/cm²/week prohibition	Skin contact: 0.5 ug/cm²/week labelling	Under consideration
Products of endangered animals	Specific legislation	Specific legislation	Specific legislation
Packaging	Specific legislation	Specific legislation	Future legislation

Over the past few decades, awareness of environmental problems has increased and in recent years "the environment" has become an important issue in the leather trade; on the one hand, on account of environmental and health legislation and on the other, due to the fact that environmental policy is increasingly executed through market forces. An overview of the most important issues is given in table VI.4.

Table VI.4. Overview of environmental issues important to trade

- The Green General System of Preferences (GSP)
- Environmental Management Systems
- Legally binding guarantees being demanded by importers
- Ecolabelling
- Public actions by consumer and environmental groups
- Growing awareness of the environmental aspects of products
- Environmental clause in conditions for governmental purchases
- National environmental agreements (such as covenants)
- Public awareness regarding fair trade, labour conditions and in particular child labour

8. Adjustment in trade-related environmental policy

(a) Introduction

This section provides an overview of some environmental issues in the major importing countries, which might affect exports from the ESCAP region. A substantial part of the importing country's environmental policies at federal and state levels is aimed at a number of specific target groups, such as retail traders, consumers and industry. The Government might induce these groups to trade or consume ecologically sound products, through environmental policy measures, which could eventually affect the whole industrial chain, including producers, in developing countries.

(b) Product-related environmental policy

In environmental policy, the product is considered directly or indirectly responsible for any adverse environmental effect which occurs in the entire industrial chain. For that reason many governments take the product as the starting point in reducing the environmental impact caused at any point in the industrial chain.

(c) Issues related to the environmental impact of a product

In determining the environmental impact of a product, varying methods (qualitative and quantitative), are used. Practically all methods used in The Netherlands, Germany, and the EU are based on the life cycle of a product (Life Cycle Assessment = LCA), wherein the environmental impact of a product is based on the pollution caused by the extraction of its raw materials, by its primary and secondary manufacturing, by its consumption and maintenance, and its waste phase. This implies that the environmental effects in the country of production are taken into account in determining whether or not a product is ecologically sound, even if the product is eventually consumed in another country.

(d) Some financial instruments

CP processes in developing countries could be stimulated through the offer of import-tariff preferences for ecologically sound products under the General System of Preferences (GSP) of the EU. The European Commission proposed the enforcement of the "Encouragement Regime" in 1998, under which 20-30 per cent additional import-tariff preferences would be offered on ecologically friendly and/or humanly sound products - in other words products that take into account human concerns - for example, the banning of child labour and the freedom of trade unions. The nature of environmental criteria for one or more specific products will be determined in the coming years. Furthermore, as a result of the latest revision of the GSP, a number of non-tariff measures have been converted into tariff measures, thus paving the way for additional import preferences.

(e) Environmental management systems

The introduction of an Environmental Management System (EMS) could be an important step for the maintenance of environmental protection and pollution prevention in the production phase. An EMS is a management tool that creates a structure in which: (1) a complete survey of the environmental impact of the enterprise can be obtained; (2) the environmental impact of the enterprise can be controlled; and (3) whenever possible, the environmental impact of the enterprise can be diminished. (This should be a continuing rather than a once-only operation.)

(e) Certification of EMS

A potentially important development in EMS is certification. Analogous to the certification of quality management systems under ISO-9000, the certification of EMS is also expanding. Companies are motivated to obtain a certified EMS for two reasons: (1) first, certification may be used as a marketing instrument (image

building) and (2) it could indicate a certain (high) level of environmental performance. The latter may be useful, especially with respect to environmental liability.

(f) Environmental report

Another potentially important marketing instrument is the "environmental report" wherein companies give an account of their accomplishments with regard to the reduction of their environmental impact in the preceding year, and what their plans are for the coming period. This environmental report is still voluntary in most countries. When substantial measures for improvement have been taken, the annual environmental report can serve as a means for the company to distinguish itself. These reports could be used as benchmark for more environmental friendly production.

(g) Waste management policy

A waste management policy aims to reduce the environmental problems caused by waste/by-products, discarded products and waste packaging material. As most of the disposal methods, especially incineration and dumping, will become more expensive, recycling and re-use will be important for future waste producers. This should be taken into consideration by producers. In this light, design for recycling" has become a prominent starting point for many product designers. Legislation on packaging is also important in this respect. In Germany, there is legislation on the obligation of producers and importers to retrieve used packaging materials. This will be implemented in the near future in other EU countries.

B. Leather: production and sources of waste

1. Production process

(a) Soaking

Tanneries often receive salted rawhides and skins, which must be cleaned and rehydrated through soaking, or by placing the skins or hides in water, usually in mixers or drums. Dirt, blood and dung are also removed in the process. Chemicals used in soaking are 0.2 - 2.0 grams per liter sodium hydroxide, up to 1 gram per liter sodium hypochlorite and/or 0.5 - 2.0 per cent wetting agents, emulsifiers, surfactants etc.

(b) Liming and unhairing

The hide is treated with a solution of lime and sodium sulphide or sodium hydrogen sulphide to remove hair and loosen the hide structure. Unhairing is

normally carried out by dissolving in a chemical solution. Chemicals generally used are 2-10 per cent calcium hydroxide (lime), 1-4 per cent sodium sulphide or sodium hydrogen sulphide. Some caustic soda may also be used. Enzymatic preparations have been increasingly used in the last years.

(c) Fleshing and deliming

Fleshing is the mechanical scraping of adhering connective tissue, fat etc. from the flesh. On the other hand, deliming solubilizes the absorbed calcium hydroxide and brings the skin to the desired pH, mainly to avoid interference with the subsequent tanning stage. The process is carried out by washing and by using water combined with neutralizing chemicals. Chemicals used are ammonium chloride or sulphate, 0.5- 2.0 per cent acids (lactic, formic, boric and mixtures), acidic salts, sodium bisulphite, hydrogen peroxide. The use of gaseous CO_2 instead of ammonium salts has been increasing.

(d) Bating

Bating treats the hides with proteolytic enzymes to purify the material prior to tanning. It loosens the hide structure and removes unwanted proteins, and is often carried out in the deliming liquor. The chemical used is often a 0.5 per cent bating material, which consists of 50 per cent wood flour (or another carrier), 30 per cent deliming agent (ammonium chloride) and 1-5 per cent pancreatic enzyme.

(e) Degreasing

Degreasing is the process of removing fats from the skin. This is especially important in sheepskin tanneries as the fat content of their raw material is large. The process uses solvent degreasing. Solvents, which are increasingly substituted or combined with surfactants and/or enzymes, include perchloroethylene, monochlorobenzene and kerosene.

(f) Pickling

Pickling brings the hide to the desired pH for tanning. Chemicals used include sulphuric acid (0.2 - 2.0 per cent) and salt (5-10 per cent).

(g) Tanning

Tanning stabilizes the collagen structure of the hide using natural or synthetic chemicals. The process imparts a particular "feel" to the leather. The most commonly used tanning agent is a basic chromium sulphate. Tanning is completed with a basification to bind the chromium in the leather. Chemicals used in tanning are: chrome tanning salts with in average of 14 per cent Cr (used in amounts of 8-12

per cent for common processes and 5-6 per cent for low chrome processes), 1.0 per cent sodium bicarbonate (basifying agent to adjust pH), 0.5 per cent masking agent (sodium formate), and up to 0.9 per cent fungicide.

(h) Sammying and shaving

Sammying brings leather to a uniform semi-dewatered state. The leather is passed through a sammying machine that squeezes surplus water out of the leather. On the other hand, shaving is a mechanical process that controls the leather thickness.

(i) Post-tanning

Post-tanning is s divided into four stages: neutralization, retanning, dyeing and fat liquoring. Neutralization de-acidifies the leather. Retanning comprises a supplementary tannage and gives the leather its final properties. Dyeing uses aniline dyestuffs, while fat liquoring softens the leather.

Chemicals used include the following (per cent of shaved weight):

- Neutralizing: 1 per cent mild alkali or syntan
- Retan: Tanning agents (often syntans)
- Dye: 1-6 per cent dyestuff/aniline dyestuff
- Fat liquor: 3-10 per cent sulphonated fish, vegetable or animal oils; mineral and synthetic oils

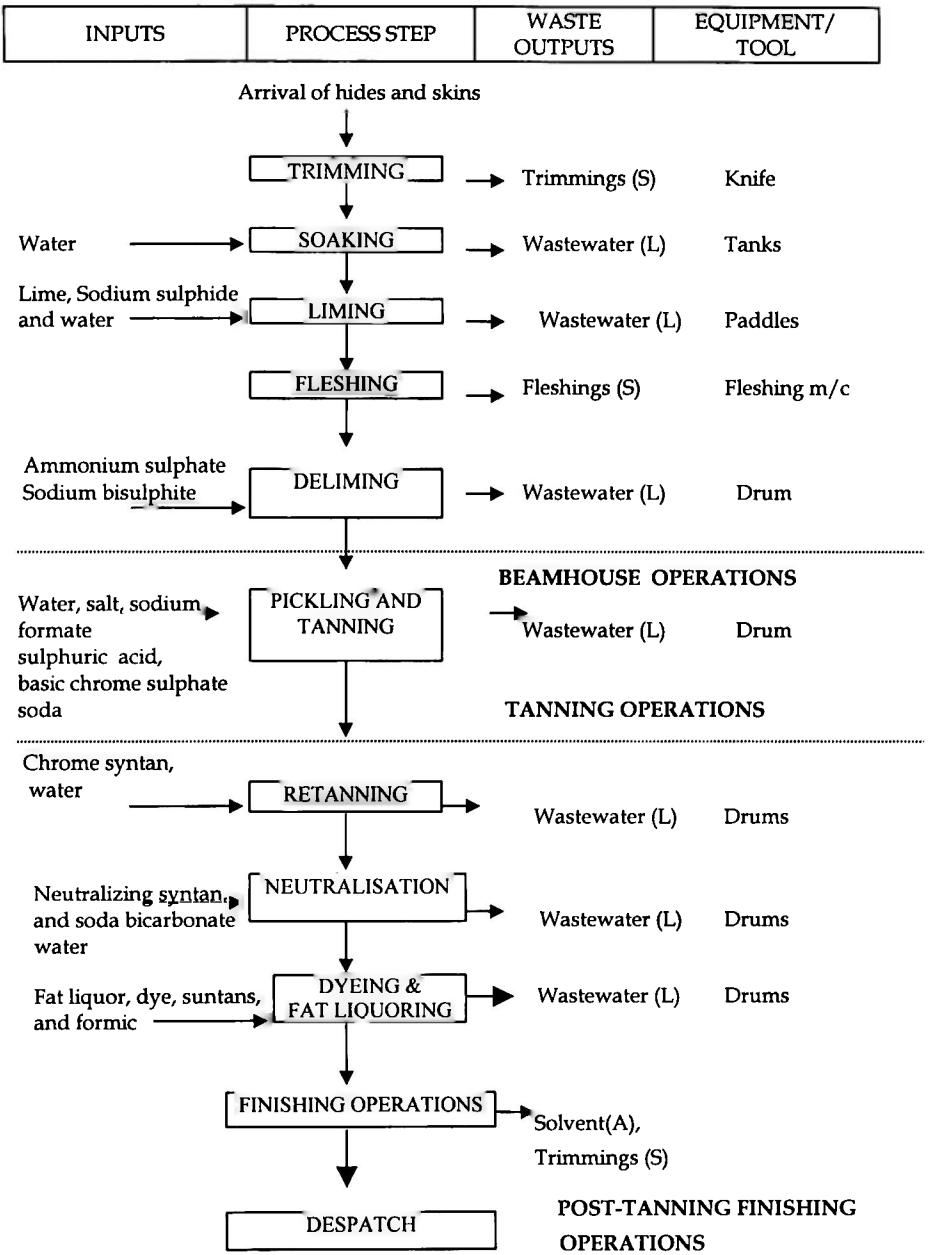
(j) Drying and finishing

Leather is dried using vacuum drying, suspension drying, toggling, paste drying, microwave drying or a combination of these.

Finishing of the crust leather is done in order to achieve the necessary fastness and properties demanded by the customers. The surface coatings which consist of a polyurethane polymer are applied by spraying, rolling or padding.

A generic process flow with major inputs and outputs is shown in figure VI.2.

Figure VI.2. Process flow chart



2. Source of waste generation

Tannery operations have adverse effects on the environment. The wastewater generated from soaking, liming, tanning and other processes is harmful to surface and subsurface water. It also deteriorates soil quality. On the other hand, ammonia is emitted during deliming and wetting while dust and solvent fumes are generated during finishing. Solid wastes generated during tanning are normally used as raw material for other products. Table VI.5 below lists various sources of waste generation.

Table VI.5. Sources of waste generation

	Section	Operation	Sources of waste generation	Nature of waste
1	Beam house	Soaking	soaking	Wastewater
		Pasting	Spills	Wastewater
		Liming	Spent lime liquor, lime mud	Wastewater, solid
		Fleshing	Cooling water, fleshings	Wastewater, solid
		Deliming, bating and degreasing	Spent liquor, wash streams, chemical spills	Wastewater, Ammonia emissions
2	Tanning	Pickling	Spent pickling bath	Wastewater
		Chrome tanning	Spent tanning bath, wash streams	Wastewater
3	Post tanning	Sammying	Squeezed liquor	Wastewater
		Splitting	Splittings	Solid
		Shaving	Shavings	Air particulate emissions, solid
		Wetting	Spent wetting liquor	Wastewater
		Retanning	Spent retanning stream, wash streams	Wastewater
		Neutralization	Spent liquor	Wastewater
		Dyeing and fat liquoring	Spent dye bath, wash streams	Wastewater
		Sammying	Squeezed water	Wastewater
4	Finishing	Drying	Fugitive	Water vapour
		Trimming	Trimmings	Solid
		Buffing	Buffing dust	Air particulates
		Colour/lacquer	Fugitive	Air

3. Environmental impact of the industry

Tannery wastes are produced from a variety of processes that use different chemicals and materials; these wastes, mostly comprised of liquids and solids, are discharged to the atmosphere. Air emissions on the other hand are basically moisture and odors. Liquid comprises much of tannery wastes. It is estimated that about 60,000 m^3 per day of wastewater are discharged by tanneries in India. The general characteristics of tannery wastewater are presented in table VI.6. It is evident that the wastewater from the tannery is highly polluting in terms of total dissolved solids, sulphides and chromium. The discharge of untreated wastewater not only makes the soil non-productive but also pollutes surface and ground water.

Table VI.6. Characteristics of composite wastewater from tanneries

	Parameter	Concentration Range
1	PH	7.5 -8.5
2	Alkalinity as CaCO3	1100-2000
3	BOD 5 days @ 20oC	1200 - 2500
4	COD	3000 - 6000
5	Chlorides as Cl	4500 - 6500
6	Total Solids	17000 - 25000
7	Dissolved Solids	14000 - 20500
8	Suspended Solids	3000 - 4500
9	Sulphides as S2-	20 - 40
10	Total Chromium	80 - 250

Note: All values except pH expressed in mg/l

Solid wastes consist of the sludge generated during the wastewater treatment, as well as animal residues produced during cleaning, scraping, splitting, and trimming. In addition to the stench emanating from degrading flesh, decaying animal matter attracts pests which help spread disease. Furthermore, pathogenic micro-organisms, such as anthrax, can be introduced to water bodies to which tannery wastes are discharges. An additional concern is the release of toxic sulfides and leather dust.

A large amount of solid waste is also generated from the various unit operations in tanneries. The major sources of solid waste are unhairing, liming mud, fleshings, splitting, shavings, trimmings, buffings and others. Most of the solid wastes are sold to local buyers for re-cycling into glue, gelatin, and inferior quality leather goods. The solid wastes from tanneries vary according to raw materials, production technology and finished product.

Air emissions from tanneries are generally fugitive in nature. Most are in the form of moisture, odors, particulate matter from the dry mechanical operations and

some vapor emissions from the painting section. The magnitudes of the problems caused by these emissions are insignificant as compared to other form of pollutants. The nature of emissions from different sections is shown below.

Table VI. 7. Air emissions

	Operation	Emission due to	Nature of emission
1	Deliming	Use of ammonia in deliming	Ammonia in the work environment
2	Shaving	Shaving dust	Particulate matter
3	Spray painting	Solvents, paints, lacquer	Fugitive
4	Buffing	Buffing dust	Particulate

C. Cleaner production options

The major CP options shown in table IV.1 are based on the results from various CP demonstration projects in tannery sectors and compilation of data from CP circles. The options are categorized by technique, ranging from good housekeeping to technology change. Once CP options have been identified, they are subjected to techno-economic and environmental feasibility for implementation. The options are then categorized as: (1) immediately implementable; (2) further analysis needed; or (3) rejected

Under CP ground rules, no option shall have a negative impact on product quality and environment. If the quality deteriorates, the option is rejected and no further evaluation is carried out; otherwise a detailed techno-economic analysis is done for the option. The techno-economic-environmental analysis provides an idea on the priority with which an option should be implemented. The entrepreneur must have a certain amount of subjectivity in deciding the implementation plan. As a broad rule of thumb, the options may be categorized as: (1) immediately implementable; (2) short-term implementable measures; and (3) long-term implementable measures, depending on the payback period of the option.

In the event that an option with low payback period requires high initial investment, it may be set aside and resources arranged to ensure its final implementation. (Some major areas of CP intervention in the leather sector are discussed in detail.)

Table VI. 8. Cleaner production options

	Cleaner production options	Benefits
	Good house keeping	
1.	Addition of water through measurement by installation of water meters	Better and consistent quality of the product, resource conservation in form of chemicals, water etc.
2.	Calibration of balances for weighing	Savings in all the chemical used for the process by 10 per cent
3.	Deeper pit for collection of pasting waste (lime and sulphide paste)	Savings in spilled lime and sulphide paste
4.	Use of recycled water for floor washing operation/use of piston grip self closing valves in pipes used for floor washing	Reduced consumption of fresh water by about 5 m3/day
5.	Regular lubrication of the gears in drums and installation of Teflon gears	Less noise, energy savings
6.	PVC pellets for piling of hides and their subsequent transport by manually operated fork lift	Reduced manpower
7.	Processing of hides on FIFO basis and proper production planning	Good operating practice
8.	Maintenance of Inventory of chemicals properly	Good operating practice and enables for advance planning
9.	Avoiding frequent change in chemical brand/supplier	Standardization of process thereby savings in inventory and by better process control
10.	Sealing of air leakage's in compressed air system	Savings in energy
11.	Replacing ordinary ballast by electronic ballast in Lighting Power	Savings in electrical energy
12	Maintaining a record of all the maintenance carried out and carrying out maintenance check up at regular intervals	Better performance by the equipment.
13.	Installation and maintenance of heating devices (rods) in the toggling and drying chambers	Uniform heating
14.	Fine adjustment of the fleshing machine with regular grinding of the fleshing roller blades.	Better fleshing will reduce pelt weight hence less consumption of the chemicals. Envisaged reduction in the pelt weight by 5 per cent

Table VI.8: Cleaner production options *(Continued)*

	Better process control/ modification/Optimization	
15.	Soaking in two stages in place of single	Tremendous improvement in quality, no wrinkles on the skin
16.	Soaking in paddles/drums	Water conserved and better soaking
17.	Reliming in paddles	Water conservation and reported better quality of soaking
18	Use of hot water for dyeing and fat liquoring	Better dye and fat liquor exhaustion
19.	Addition of sodium sulphate and soda bicarbonate in very slow feeds of about 5 in 2-3 hrs.	Better quality of the dyed leather
20.	Change from running wash of 1 hrs. duration to 3 closed washes of 10 min each in deliming operation	Savings in water by 400 lt. /batch
21.	De-dusting of hides prior to soaking	Less TDS load to ETP
22.	Use of soft water for dyeing and fatliquoring operations	Reduced consumption of dyes and fatliquors by 3-5 per cent of the total amount
23.	Reduction in water use to 70 per cent in pickling. Subsequently there is no need for draining pickling bath	Reduced water consumption and thereby reduced salt consumption in the pickling bath.
24.	Use of sammying machine in place of sun drying	Uniform drying of hides results in 5 per cent increase in area at that stage
25.	Elimination of syntans at chroming stage and then using it at rechroming stage	Help in effective recovery of chrome
26.	Reduction of excess air supply in thermic boiler	Savings in fuel consumption
27.	Using compressed air at optimum pressure	Energy savings
28.	Optimization of air supply in the drying chamber of spray dryer	Savings in fuel used
29.	Stricter pH control in dyeing operations	Consistent quality
30.	At least 48 hr. ageing after chrome tanning operations	Better quality
31.	During basification stage addition of sodium bicarbonate should be made at many levels – 10-20 additions over 2-3 hrs.	Better quality

Table VI.8: Cleaner production options *(Continued)*

	Input material change/ elimination reduction	
31.	Reduction in lime and sulphide in pasting liming	Less load to ETP, resource recovery
32.	Elimination in use of acetic acid in washing before rechroming	Less COD load to the ETP, resource savings
33.	Reduction in use of fat liquor from 18 per cent to 8 per cent of shaved weight of wet blue (Along with change in process sequence)	Savings in fat liquor leads to less COD load to the ETP
34.	Elimination of Soda Ash in Second soak	Less load to treatment system and saving in chemicals
35.	Elimination of degreasol in liming	Less COD load to the ETP, resource savings
36.	Elimination in use of Glucose for reliming	Less COD load to the ETP, resource savings
37.	R Reduction in use of formic acid and water by 50 per cent in rechroming, thus avoiding 50 per cent discharge	Less COD load to the ETP, resource savings
38.	Optimize use of dyes with suitable modification in neutralization steps	Better dye exhaustion
39.	Use of MgO for basification in place of soda ash	Better quality
40.	Use of CO2 for deliming in place of NH4Cl	Less TDS load to the ETP
41.	Use of Na2 CO3 in place of ammonia for dyeing	Better quality of the dyed skins
42.	Use of soft water/DM water for all dyeing operations with reduced chemicals	Better quality of the product with reduced use of chemicals
43.	Elimination of washing after bating	-
44.	Draining of waste water after bleaching, then giving a mild wash then perform chroming operation	Better quality
45.	Replace hard water for compressor cooling with soft water	Choking of pipe avoided
46.	Segregation of non-compatible wastes	Segregation of the effluents for recovery and better treatment
47.	Mechanical feeding mechanism for chemicals in drums	Less COD load to the ETP
48.	Installation of a capacitor bank of 40 KVAr on the main line before the transformer	Increase in power factor from 0.65 to 0.95 Leads to savings in Rs4000 per month
49.	Insulation of hot water storage tank	Energy conservation
50.	Insulation of thermic fluid and hot water pipes	Energy conservation
51.	Installation of a cooling tower for hot water from the compressor	Energy conservation

Table VI.8: Cleaner production options *(Continued)*

	Equipment modification/ change	
52.	Installation of variable speed drive for drums	_
	Technology change	
53.	Use of auto toggling machine/toggling machine for toggling operations	Increase in yield of leather
54.	Auto spray/roller coating in place of manual hand hold spray guns	Less paint loss
55.	Hydraulic fleshing machine in fleshing operations	At least 10 per cent reduction in the pelt weight
56.	Use of dip dyeing machine in place of drum dyeing	Reduction in pollution load ETP
57.	Use of dosematic steel drums in place of wooden drums	At least 10 per cent savings of the entire chemical, energy etc reported by the supplier.
58.	Use of briquetting machine for making of briquette of shavings or buffing dust	-
59.	Use of sammying machine for uniformly squeezing water and then subjecting skins for drying	-
	RECYCLE/REUSE/RECOVERY	
60.	Reuse of lime liquor for 2-3 batches with make up and removal of sludge	Savings in quantity of lime and sulphide used
61.	Recovery of chrome by chrome recovery unit	Savings of about Rs 650/batch.
62.	Recycle of wash water prior to deliming to liming if still excess water is available, it should be used for 1st soaking	Savings in water use to about 1000 lt. /batch
63.	Reuse of dedusted salt for preservation of skins at slaughter house	Reduction in TDS load.
64.	Recycle liming waste water after sedimentation & filtration for 1st soak along with make up	Reduced load to the treatment unit, reduced water consumption
65.	Recycle predeliming first wash (without NH4Cl) to reliming	Reduced load to the treatment unit, reduced water consumption
66.	Recycle of 2nd unhairing machine waste water to first soak after filtration	Savings in water use
67.	Recovery of chrome from spent tanning bath and tanning wash	Reduced load to the treatment unit, reduced water consumption
68.	Glue manufacture from fleshing	-
69.	Recovery of salt from the skins by desalting machine	-

1. Water conservation

Water usage may be reduced through good housekeeping and low float processing, as well as through operating batch rather than running washes. Besides saving on water costs, lower water consumption leads to a lower-level capacity of an effluent treatment plant or makes upgrading of an existing treatment plant possible. Lower water consumption also reduces energy consumption. Low float processing with good process control improves the uptake of chemicals and consequently reduces the amount of chemicals used and discharged to the effluent. It also ensures greater product uniformity.

General measures are the installation of spring actuated valves and water meters, good maintenance of water piping and metering equipment, and effective spray nozzles (with spring valves) for water-hoses used in cleaning. The installation of modern tannery vessels (compartment vessels, mixers or drums with automatic regulation) and the possibility of incorporating recycling and filtering equipment, makes water savings and low-waste technologies (e.g. hair-saving unhairing) possible. Approximate prices per unit are US$100,000 for a compartment vessel, US$50,000 for a drum with regulation and recirculation. This investment is highly justifiable by better quality leather quality, hence more economic benefits and environmental improvements.

Low float processing using 40 to 80 per cent water (based on weight of raw material) instead of the conventional 100 to 250 per cent floats must be controlled since friction between the hides and the body of the drum produces high temperatures which could in the end affect leather quality.

2. Reducing salt consumption

Salt from the hides in the effluent is a major problem of tanneries in developing countries which use salt as a preservative. The problem can be overcome by processing "green hides," which would be possible if the tannery is near a large abattoir, where hides could be chilled, thus preserved without salt, for a few days. Chilling prevents bacterial decomposition, and its effect can be extended using a combination of ice and biocides. It is estimated that approximately 65 per cent of the salt discharge from tannery operations is attributed to rawhide and rest is discharged from the pickle.

3. Reducing pollution load from beamhouse processes

Over 80 per cent of the organic pollution calculated in terms of BOD load originates from the beamhouse processes (much of this is degraded hide/skin and hair matter). Of this about 10 per cent is from the soak, 70 per cent from unhair-

ing/liming and three per cent from deliming and bating. The soaking water contributes approximately 65 per cent of the salinity and high dissolved solids in wastewater. Alkalinity and sulphide originate from the liming/unhairing process and ammonia nitrogen is generated during deliming and bating.

One way to reduce the effluent is to use a hair-saving unhairing method by recirculating and sieving the float. This method, which some tanneries already use, demands precise operating conditions and control. The chemical costs are higher than in the hair-dissolving process. The increased chemical costs more or less counter-balances the savings in effluent treatment costs, but in the future the balance will shift to the advantage of the hair-saving method.

For deliming, nitrogen free deliming operation may be adopted. It can be carried out by organic dicarboxylic acids, which however increase the COD discharge. Alternatively, deliming with gaseous carbon dioxide has no adverse impact on COD load and is cheap, besides. Chemical costs for the carbon dioxide deliming are low, or about the same as in the ammonium sulphate method. The method can be done using the existing process equipment. Supplementary carbon dioxide dosage equipment is not expensive (US$5,000) and may be leased from the supplier. The method is used in many tanneries worldwide.

4. Tanning

The main tanning agent is chromium which is used in processing 80 per cent of the world's leather production. Before tanning, the hides are pickled to adjust the pH of the pelt and at the same time prevent prolonged enzyme activity from the bating. The chromium in the effluent may be reduced in several ways: (1) improved chromium uptake/exhaustion; (2) chromium recovery/reuse; (3) wet white pretanning; and (4) chromium substitution (partial or complete).

(a) High chrome exhaustion techniques

Several commercial systems for high-exhaustion tanning exist. Chrome fixation during tannage is favoured by the following: (1) short float; (2) increased temperature; (3) increased time of tanning; (4) increased basification; and (5) decrease in neutral salts.

The chromium fixation level may be raised using a combination of these techniques and with self-basifying chrome compounds and dicarboxylic acid. Good fixation is critical; otherwise chromium may be released during subsequent mechanical and wet processes. In effluent from conventional systems only 60 per cent of the chrome is discharged with the tanning liquors while 20 per cent comes

from the draining and wringing (sammying). The remaining 20 per cent comes from the combined post-tanning wet processes (retanning, dyeing and fat liquoring).

High-exhaustion tanning enables the exhaustion of 80-98 per cent of chromium from the liquor. The concentration of chromium in the total effluent is reduced to 4-25 mg per liter. In terms of weight of raw material, this means a reduction of chromium discharge in effluent from 5-6 kg chrome per ton hide (using conventional tanning) to 0.2-0.5 kg per ton (using high-exhaustion tanning).

(b) Chromium recovery and re-use

As an alternative, recovery and re-use of chromium is possible. This is done by the precipitation of chromium with alkali, possibly by adding a flocculant and adjusting the temperature to accelerate settling. After filtration the supernatant liquor can be discharged, while the precipitate is redissolved in sulphuric acid, adjusted to the required basicity and re-used in the tannery. Magnesium oxide and sodium carbonate are the most commonly used precipitating chemicals and considered the most efficient. The amount of chromium in the effluent could be reduced from 5-6 kg per ton hide (conventional tanning) to less than one kg per ton.

The investment costs for chromium precipitation and re-dissolving plant depend on the size of the tanning operations. Experience in developing countries has shown that direct and indirect savings in terms of chemical costs, treatment costs and product quality justify the payback period of chrome recovery investment. In addition, it is environmentally friendly.

(c) Wet white pre-tanning

Another way to reduce the chromium waste is to produce a pre-tanned leather in a wet-white rather than wet-blue condition. Wet-white leather can be split and shaved thereby eliminating chrome in waste split and shavings (solid waste). Pre-tanning is followed by chrome tanning. This technique, has gained some acceptance and is primarily used to minimize the amount of solid chrome leather waste, and in the process also lowers chromium consumption and discharge.

(d) Chromium substitution

A fourth possibility is to use an alternative to chrome, such as aluminum, titanium and iron. These materials have so far mainly complemented chrome tanning and are used either as pre-tanning or as re-tanning agents. Vegetable tanning is normally applied to heavy hides for the production of sole or industrial leather. Vegetable tannings are naturally occurring polyaromatic materials, divided into

hydrolysable and condensable types. The most important are mimosa bark, quebracho wood and chestnut. However, the effluent from vegetable tanning is dark-coloured and contains a higher load of poorly biodegradable COD than chrome liquid waste. Furthermore the renewable raw material is limited.

In summary it can be concluded that the most realistic and economic ways to reduce chromium is to apply a high-chrome exhaustion tanning or use precipitation of chrome.

5. Optimization of fat liquor and dyestuff in post-tanning wet-treatments

It is important to fully exhaust the fat liquors and dyestuff in the process in order to reduce the COD and BOD load of the tannery industry. A high level of exhaustion can be obtained by using amphoteric polymers combined with proper pH and temperature control. A balance must be sought, as measures to increase the fixation of fat-liquoring agents could lead to an increased chromium release.

6. Reducing finishing chemicals

Conventional finishing is comprised of spraying of the grain using a polymeric dispersion diluted in solvent. This leads to firmness and smoothness of the surface. The dispersion contains the pigment. Conventional spray equipment is inefficient and its use leads to a loss of 30-50 per cent of the finish which ends up in environment. A roller-coating machine leads to a loss as low as five per cent.

Alternatives to conventional finish are the use of aqueous based finishes and roller coating instead of spraying.

Annex 1. Case Study - Tannery Sector

About the company

M/S Naser Tanning Co. is located at Vaniyambadi in Tamilnadu State. It is a medium sized tannery that produces various types of leather from sheep and goat-skin. The unit processes around 2500 skins per day to produce quality leather like suede, nubuck, nappa and glove. The unit is export-oriented and its finished leather is either exported as such or converted into value added products by other concerns. It processes around 300 batches annually and has an annual turnover of US$45 million. It has 230 employees including administrative staff. The unit consumes about 100 m^3 of water per day on an average and sources it from its own tubewell. The effluent from the tannery is sent to a common treatment plant after pre-treatment, in the tannery itself, through screening and sedimentation

Process overview

Briefly the production in both units is divided into three major sections:

1. *Beam house operations,* where the raw hides are cleaned and prepared for processing into leather. This is the most polluting section, contributing around 50-55 per cent of the total pollution load of the tannery.

2. *Tanning operation.* The hides and skins are transformed into leather by tanning. The skins/hides may be vegetable-tanned or chrome-tanned depending on the desired product. This section is the major contributor of chrome pollution to the environment.

3. *Post tanning, finishing operation.* Here the tanned skins are dyed to impart colour and fat-liquored to soften the leather. Some mechanical operations to enhance the quantity of the leather are also performed in this section.

Annex Table 1. Type of pollutants generated in tannery process

Section	Major equipment	Type of pollutants		
		Air	*Water*	*Solid*
Beam house	Paddles, drums, fleshing m/c, unhairing m/c,	-	✔	✔
Tanning	Drums	-	✔	-
Post tanning	Drums, setting m/c, sammying m/c, shaving m/c, buffing m/c, splitting m/c, staking m/c	✔	✔	✔
Finishing	Auto toggling m/c, roto spraying m/c, buffing m/c, glossing m/c	✔	-	✔

Sources of waste generation and nature of wastes from various unit operations employed are presented in Annex Table 2.

Annex Table 2. Sources of waste generation

Operation	Sources of waste generation	Nature of waste
Beamhouse section		
Soaking	First soaking Second soaking	Wastewater
Pasting	Spills	Wastewater
Unhairing I	Hair	Solid waste
Liming	Spent lime liquor, lime mud	Wastewater, solid
Unhairing II	Hairs, waste water	Solid waste, wastewater
Fleshing	Cooling water, fleshings	Wastewater, solid
Deliming, bating and degreasing	Spent liquor, wash streams, chemical spills	Wastewater, ammonia emissions
Tanning section		
Pickling	Spent pickling bath	Wastewater
Chrome tanning	Spent tanning bath, wash streams	Wastewater

Annex Table2. Sources of waste generation (*continued*)

POST TANNING SECTION			
	Sammying	Squeezed liquor	Wastewater
	Shaving	Shavings	Air particulate emissions, solid
	Wetting	Spent wetting liquor	Wastewater
	Retanning	Spent retanning stream, wash streams	Wastewater
	Neutralization	Spent liquor	Wastewater
	Wetting	Spent wetting liquor	Wastewater
	Dyeing & fat liq-uoring	Spent dye bath, wash streams	Wastewater
	Sammying	Squeezed water	Wastewater
FINISHING SECTION			
	Drying	Fugitive	Water vapour
	Trimming	Trimmings	Solid
	Buffing	Buffing dust	Air particulate
	Color/ lacquer	Fugitive	Air

Major waste streams were subjected to detailed cause analysis. The more important causes are shown in Annex Table 3.

Annex Table 3. Cause analysis of the waste generated

Operation	Sources of waste generation	Nature of waste	Probable causes of waste generated
Soaking	1st soak 2nd soak	Wastewater	Soaking – to rehydrate the skins and remove salt, dung etc.
Pasting	Spills	Wastewater	Excess paste is spilled due to operational procedures
Liming	Spent lime liquor, lime mud	Wastewater, solid	Lime mud is impurities of lime and the waste water discharged is the left over after use
Fleshing	Cooling water, fleshings	Wastewater, solid	Cooling water falls on the blades that cut the flesh from the skin and falls down as wastewater with high-suspended solids.
Deliming, bating and degreasing	Spent liquors, wash streams, chemical spills	Wastewater, ammonia emissions	Lime in the skins needs to be neutralized and extracted from it so that next operation can be carried out.

Annex Table 3. Cause analysis of the waste generated *(continued)*

Pickling	Spent pickling bath	Wastewater	Spent liquor
Chrome tanning	Spent tanning bath, wash streams	Wastewater	Spent chrome bath is discharged.
Sammying	Squeezed liquor	Wastewater	Squeezing of the hides
Shaving	Shavings	Air particulate emissions, solid	To bring the hides to required thickness
Wetting	Spent wetting liquor	Wastewater	Spent liquor
Retanning	Spent retanning stream, wash streams	Wastewater	Spent retanning liquor
Neutralization	Spent liquor	Wastewater	Spent neutralization liquor
Dyeing and fat liquoring	Spent dye bath, wash streams	Wastewater	Spent dye and fat liquoring bath
Drying	Fugitive	Water Vapor	-
Trimming	Trimmings	Solid	The edges are trimmed
Buffing	Buffing dust	Air particulate	To give a smooth finish and bring the leather to uniform thickness

Critical process steps were identified based on the cost of the wasted material and its environmental impacts. The costs associated with waste stream, and treatment costs are presented in Annex Table 4.

Annex Table 4. Assigning cost to waste streams

For sheep skins (chemical lost in kgs per batch)

	Waste stream	Chemical lost	Parameter to be measured	Qty (kg /batch)	Rate of chemical rs/kg	Total cost of stream	Treat ment cost Rs.
1	Soaking	-	-	-	-	-	462
2	Spent liming liquor	Lime	Alkalinity	90	1.6	144.00	
		Sodium sulphide	Sulphide	36.6	17.5	640.50	688
3	Washing before de-liming	Lime	Alkalinity	11.9	1.60	19.00	21
		Ammo-nium chlo-ride	Ammonia	NQ	-	-	
3	Spent de-liming and bating	Bate pow-der	COD	12.0	46.0	552.00	60
		Ammo-nium chlo-ride	Ammonia	NQ	-	-	
4	Pickling	Salt	TDS	214.0	1.0	214.0	10
		Sulphuric acid	Acidity	30.0	5.5	165.0	
5	Tanning and basification	Salt	TDS	120	1.0	120.00	
		BCS+Chro me Syntan	Chrome	99.7	31.00	3090.70	47
		Acid	Acidity	6.5	5.5	35.75	
6	Retanning	BCS	Chrome	10.7	31.00	331.70	
		Acetic Acid	Acidity	1.14	40.00	45.60	16
		Syntans	COD	40.00	60.00	2400.00	
		Fat Liquor	Fat content	Negligi-ble	-	-	
7	Dyeing and fat liquoring	Fat Liquor	Fat content				152
		Dyes	Colour				
	TOTAL					7710	1456

Environmental impact

Some of the waste streams may not have profit enhancement potential but may be highly detrimental to the environment. Such streams should be treated with care. If possible they should be treated separately and disposed of in a safe manner. However the waste streams may be both, i.e. have a large profit enhancement potential as well as be quite detrimental to the environment. For such streams it must be tried to recover and recycle the components. The following matrix was used to evaluate the Environmental Impact.

Annex Table 5. Environmental impacts

	Description of the waste stream	Probable environmental impact	Recycle/recovery potential
1	Soaking waste water	High TDS bearing stream will cause excessive salinity problems and would increase the TDS of the ground water	Nil
2	Liming waste-water	High alkalinity with sulphides would render the soil alkaline leading to barren lands.	Recycling of the spent bath is feasible
3	Spent chrome bath	Chrome in the environment is proved to be toxic to human health and vegetation	Possibility of recovery of chrome is very high
4	Spent dye and fat liquoring stream	Colour is aesthetically unpleasing and the some organic compounds in the dye are reported to be carcinogenic	Nil

Percentage yield calculation

The thickness of the skins processed was in the range of 0.45 to 0.20 mm. At such small thickness there is not much scope of yield improvement, hence for this unit, yield measurement was not made.

Energy audit

Annex Table 6. Energy studies

SN	Equipment	Motor capacity in hP	Voltage in volts	Current in amperes	Power factor	Per cent load
1	Pump	7.5	380	5.95	0.89	62.02
2	Setting m/c	13	370	10.1	0.73	48.6
3	Drums 6 nos	7.5	370	9.32	0.83	67-75
4	Paddles 3 nos	7.5	368	4.12	0.36	16.7
5	Buffing m/c I	5	401	4.2	0.79	45.6
6	Buffing m/c II	15	399	13	0.81	63.7
7	Unhairing m/c	7.5	403	4.6	0.76	45.8
8	Reverse setting	15	369	7.9	0.86	38.8

Results of the demonstration project

Environmental and economic benefits accrued from few major CP options implemented by the unit are given below:

Annex Table 7. Major options

SN	Options	Environmental benefits	Investment US$	Annual savings US $	Remarks
	Deep pit for collection of spilled lime and sulfide paste during pasting	Reduced organic and inorganic load to the environment, and resource conservation of 2 kg lime and 6 kg Na_2S per day	24	764	-
	Optimization of air supply to thermic fluid boiler	Cleaner exhaust due to better combustion with conservation of about 1 liter diesel per hour	48	1,318	-
	Elimination of fungicides, wetting agent in the first soak with recycle of spent lime liquor to first soaking after sedimentation and filtration	Reduced COD load and resource conservation of fungicides and wetting agent	nil	16,195	-
	Elimination of degreasol in liming	Reduced COD load to the environment and resource conservation of degreasol	nil	9,143	-
	Recovery of chrome from spent tanning bath and tanning wash	Less chrome load to the environment; elimination of chrome sludge from the ETP	7,060	16,235	-
	Desalting of salted skins by desalting machine	Reduced TDS load	470	-	TDS load reduced by 558.1 kg per day

At the time of compilation of this case study, 65 per cent of identified options had been implemented. The table below presents a summary of results achieved by implementation of techno-economically viable CP solutions.

Annex Table 8. Summary results of the demonstration project

SN	Item	
1	Total number of cleaner production options identified	59
2	No. of options implemented or under implementation, to date	37
3	Distribution of options Good house keeping Process modification/optimization Input material change/elimination Equipment modification Technological change Recycle/reuse/recovery	 9 10 18 6 9 7
4	Reduction in COD load	157.2 kg per batch = 17.2 per cent
5	Reduction in BOD load	31.8 kg per batch = 15.1 per cent
6	Reduction in TDS load	1046.8 kg per batch = 40.3 per cent
7	Reduction in waste water generation	15 cu m per batch = 17.9 per cent
8	Improved quality of the product	Improved
9	Savings in chemicals (tons per year) Lime Sodium sulphide Dyes Fat liquor Acetic acid Basic chrome sulphate Fungicide Wetting agent Degreasol Soda ash Glucose LDO	 15 6 - - 1.5 27 2.9 6.8 4.38 7.2 4.3 560 lt/yr
10	Compliance with the regulatory standards	Member of CETP
11	Total investment made (US$)	8,320
12	Total savings (US$ per year)	60,825
13	Pay back period	<2 months

Conclusions

This cleaner production study shows that the application of creative thinking results not only into financial benefits to the factory but allows it to comply with regulatory requirements. It also shows distinctly that CP is the only tool towards sustainable development.

A step-by-step approach will help enterprises, especially in the small and medium sector, to generate CP opportunities, which if analyzed and implemented could lead to profitability and reduced environmental impacts.

23. *Inter-networking through Electronic Commerce to Facilitate Intra-regional Trade in Asia* (ST/ESCAP/1721)
24. *Tea Marketing Systems in Bangladesh, China, India, Indonesia and Sri Lanka* (ST/ESCAP/1716)
25. *Private Sector Development and ODA in Indo-China* (ST/ESCAP/1723)
26. *Implications of the Single European Market for Asian and Pacific Economies: Opportunities and Challenges* (ST/ESCAP/1744)
27. *Trade Effects of Eco-labeling* (ST/ESCAP/1792)
28. *Assistance to Small and Medium-sized Enterprises for Enhancing Their Capacity for Export Marketing* (ST/ESCAP/1816)
29. *Border Trade and Cross-border Transactions of Selected Asian Countries* (ST/ESCAP/1824)
30. *Market Prospects for Pulses in South Asia: International and Domestic Trade* (ST/ESCAP/1825)
31. *Electronic Commerce Initiatives of ESCAP: Business Facilitation Needs* (ST/ESCAP/1854)
32. *Assistance to Economies in Transition in Export Promotion* (ST/ESCAP/1808)
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36. *Trade and Investment Scenarios and Liberalization Agenda for Asia and the Pacific* (ST/ESCAP/1965)
37. *Implications of General Agreement on Trade in Services (GATS) fpr Asia-Pacific Economics* (ST/ESCAP/1926)
37. *Implications of General Agreement on Trade in Services (GATS) for Asia-Pacific Economies* (ST/ESCAP/1926)
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