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Final Report

UNIDO Project on

Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries

Business and Environment Program

Thailand Environment Institute

March 2002

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Final Report
Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries

1. Background

This Final Report on the "*UNIDO Research Project Assessing the uptake of ESTs in selected developing countries - Preparatory Activities for Rio + 10 (World Summit on Sustainable Development*, provides a general overview and environmental background of Thailand, particularly that of the Textile sector, as well as providing the outcomes of the survey on Environmentally Sound Technologies (EST) carried out by the companies and institutions of this sector in Thailand, pursuant to the objectives of the Project.

1.1 Objectives

The general objective of the project is to determine the factors, reasons, cost and benefits of installing and operating process technologies (cleaner technologies) and pollution control equipment (end-of-pipe technologies) in industrial plants towards a better environmental performance in Thailand, specifically those sample group of companies in dyeing, printing and finishing processes.

1.2. Scope of Study

This study consists of two parts:

1. Reviewing data, literature, documents and reports on industrial waste management and pollution control policies related to Textile subsector, with emphasis on the following:
   - 1.1 synopsis and synthesis of current installation and operation concerning waste disposal in Thailand;
   - 1.2 study of existing information regarding the current installation and operation of pollution control equipment and cleaner production techniques in the Textile subsector – Dyeing/Printing & Finishing processes – in Thailand.
2. Conducting field surveys and study of industrial waste managing capability by interviewing industrial companies in Textile subsector – Dyeing/Printing & Finishing processes – on the following topics:
   - 2.1 Key informants to determine which factors governed the installation and proper operation of EST;
   - 2.2 Waste disposition cost; and
   - 2.3 Operation cost and financing.

1.3 Methodologies

1. Data collection: data will be collected through the use of a Thai version of the questionnaires provided by UNIDO and interviews with factory managers from selected textile companies which are into dyeing, printing & finishing processes, officials of regulatory agencies at the provincial and national levels of government, producer associations, major technology/raw material suppliers, national subsector technology centres and non-governmental and community organisations.
2. Analysis of the results, are done in four different forms, as follows:

a) Descriptive statistics for all questions where there is a quantified answer and descriptive summaries for consolidating information gathered for each sector.

b) Use of ranking in the questions that present scale for weighting the answers, expressing the level of importance for each item and allowing comparisons between different actors and countries.

c) Descriptive indices, to indicate the strength of some factors such as: technology capacity, community pressure, government regulation pressure, etc. Composite indices will be developed using information from several answers in the questionnaire.

d) Qualitative analysis, to supplement the preceding forms with the use of more detailed qualitative answers form questionnaires.

The items c) and d) will be performed by UNIDO.

1.4 Expected Outcome

The expected outcome of this study includes:

1. A greater understanding and more information on current EST uptake by firms in Thailand for both cleaner production processes and pollution control equipment.
2. Guidelines to support UNIDO in its issue of technology transfer for the industrial sector through its technical cooperation programmes.

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2. Policy Environment and Institutional Framework

2.1 Macro-Economic Environment

The Thai economy, which was traditionally based on agricultural exports, was transformed into a diverse economy in the last 30 years. By the 1970s, foreign investment created an industrial sector based on import substitution. In the 1980s, an export-oriented sector, which was based on labour-intensive items such as textiles and garments, began to develop. After 1990 the growth was in high-end technology goods such as computer accessories and automotives.

Table 1 shows the relative importance of the manufacturing sector in the Thai economy. In 1990, the sector accounted for 31.2% of GDP. In 1999, its share increased to 34.6%, but growth rate fell to 11.4% in 1998, after the 1997 economic crisis. However, in 1999 it rebounded with a 11.9% growth rate (a slight increase from 1997), together with a 4.2% increase in GDP. During that same period, there was a slight decrease in the textile industry's share in the country's GDP in manufacturing, from 15.8% to 14.5%. Furthermore, the textile subsector presented lower growth rates than the manufacturing sector. There was an exception in 1998, when it dropped to 4% while the sector decreased to 11.4%.

Table 1: Gross Domestic Product (GDP) at 1988 Prices

	1995	1996	1997	1998	1999
Gross domestic product, GDP	2,946,252	3,119,621	3,074,582	2,743,360	2,859,159
Growth rate (%)	9.3	5.9	-1.4	-10.8	4.2
GDP in manufacturing sector	919,740	981,463	997,011	882,917	988,202
Growth rate (%)	12.5	6.7	1.6	-11.4	11.9
Share of GDP (%)	31.2	31.5	32.4	32.2	34.6
Textile subsector	145,774	145,241	146,372	140,482	143,183
Share of GDP (%)	4.9	4.7	4.8	5.1	5
Share of GDP in manufacturing (%)	15.8	14.8	14.7	15.9	14.5
Growth rate (%)	3.3	-0.4	0.8	-4	1.9
Electrical Machinery and supplies	88,761	97,816	99,719	96,465	105,286
Share of GDP in manufacturing (%)	9.7	10.0	10.0	10.9	10.7
Growth rate (%)	-	10.2	1.9	-3.3	9.1
Petroleum refineries and allied industries	66,922	85,928	107,033	100,792	102,875
Share of GDP in manufacturing (%)	7.3	8.8	10.7	11.4	10.4
Growth rate (%)	-	28.4	24.6	-5.8	2.1
Beverage	62,529	65,269	75,954	73,955	94,477
Share of GDP in manufacturing (%)	6.8	6.7	7.6	8.4	9.6
Growth rate (%)	-	4.4	16.4	-2.6	27.7
Machinery	70,914	82,179	87,376	85,298	93,397
Share of GDP in manufacturing (%)	7.7	8.4	8.8	9.7	9.5
Growth rate (%)	-	15.9	6.3	-2.4	9.5
Food	68,979	72,471	71,962	66,081	76,109
Share of GDP in manufacturing (%)	7.5	7.4	7.2	7.5	7.7
Growth rate (%)	-	5.1	-0.7	-8.2	15.2
Other manufacturing industries	415,861	432,559	408,595	319,844	372,875
Share of GDP in manufacturing (%)	45.2	44.1	41.0	36.2	37.7
Growth rate (%)	-	4.0	-5.5	-21.7	16.6

Source: The National Economic and Social Development Board
Compiled by Textile Economics Study & Research Group, Textile Industry Division, BISD, DIP

The differences were more dramatic as compared with the main manufacturing subsectors such as electrical machinery, petroleum refineries, beverage, machinery, and food. Between 1995 and 1999 these sectors, except food, increased their share in the GDP for manufacturing and presented higher growth rates than textile. Petroleum refineries subsector presented the best average performance, followed by electrical machinery. However, the textile subsector showed the highest share in the manufacturing sector during the period, as shown in Table 1.

Macro-economic stability

The financial crisis in 1997 has greatly affected the economy. Many businesses experienced difficulties as a result of the decline in demand and an increase in debt obligations. The instability among financial institutions affected credit intermediation. Private investment declined, and unemployment increased. After experiencing an annual growth rate of over 9% between 1986 and 1996, real GDP fell to 1.4% in 1997 and 10.8% in 1998.

However, government measures and interventions have somehow improved the economy. The GDP increased by 4.2% in 1999 and 4.4% in 2000. The fiscal and monetary situations were gradually relaxed. The Government encouraged foreign and local investments, with attractive incentives for easy investment payback. It has also taken measures to encourage corporate restructuring to increase competitiveness and enhance exports, such as tax and tariff measures to promote private investment, lower production costs, and reduce consumer prices, as well as equity investment measures to support new investments and assist the companies' recapitalization, and provide credit for SMEs.

Table 2: Thailand's Inflation Rate, Interest and Exchange Rate

Key Economic Indicator	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Inflation rate (CPI)	%	5.9	5.7	4.1	3.3	5.0	5.8	5.9	5.6	8.1	0.3	1.6
Interest rate: Prime rate *	%	16.25	14.00	11.50	10.50	11.75	13.75	13.25	15.25	12.00	8.5	8.25
Average exchange rate **	Baht/US$	25.59	25.52	25.40	25.32	25.15	24.92	25.34	31.37	41.37	37.84	40.16

Source : Office of The National Economic and Social Development Board, Bank of Thailand, Thailand board of investment Department of Customs, Department of Internal Trade Ministry of Commerce

* Interest rate of 5 Commercial Bank of Thailand ** Average exchange rate between Bank from July 97

The inflation declined as a result of the above measures, and eventually, brought down interest rates. The Minimum Loan Rate (MLR) had come down from 16.25% in 1990 to about 8% in 2000. The stringent policies of the government had created confidence to allow interest rates to come down without affecting exchange rate stability. Thus, after 1998, with lower interest rates, the manufacturing companies started to reinvest in new projects, resulting in the economic recovery and consequent growth of the sector in 1999, as observed in Table 1.

2.2 Trade Policies

The textile industry policy encompasses a combination of protection, promotion and restriction. In 1970, the government gave the industry 100% protection aimed at sheltering the industry from subsidised imported products. Import tariffs remained high, however, even up to the early 1990s. Since then, rates have fallen to a third of their original value.

Table 3: Import Tariffs for Textiles and Clothing (in percentage)

	1974	1978	1982	1992	1995	1997
Synthetic Fibre	20 (30)[a]	20 (30)	20 (15)	30[b]	20	10
Yarns (polyester-Cotton)	20	20	22	30	20	10
Cotton Yarns	25	25	27	30	20	10
Fabrics	60	80	66	60	40	20
Clothing	60	100	66	60	45	30

(...): Import surcharge as a percentage of CIF import prices a: 1975 b: Import surcharge was abandoned
Source: Textile Intelligence Unit, Textile Industry Division
Textile Industry in Thailand, November 1998

The rate on fabrics had fallen from 80% in 1978 to 20% in 1997 while the rate on clothing had fallen from 100% in 1978 to 30% in 1997. During this period, the tariff on fibre and yarn imports remained relatively low. By 1997, it had fallen to 10%. In 1997, the rates on fibres and yarns, and fabrics fell to 10% and 20% respectively, while that on clothing fell to 30%.

The implications of these economic liberalization would be that the markets for textile goods are likely to be more competitive, helping to maintain downward pressure on costs and prices, but at the same time, an increased in the penetration of imports goods. Finally, integration with international markets facilitates the transfer of technology, further contributing to lower costs of production and increased product quality and variety.

Table 4: Import of Textile Machine and Equipment (1996-2000) unit: million baht

	1996	1997	1998	1999	2000
Extruding, drawing, texturing machines/cutting man-made textile materials	161.4	801.0	167.0	187.6	62.3
Spinning machines & equipment	4,374.7	5,124.6	3,045.2	2,240.5	4,721.0
Weaving machines & equipment	1,440.1	1,332.5	909.5	1,289.6	2,071.8
Knitting machines & equipment	2,049.3	1,437.3	1,283.0	2,312.2	3675.4
Auxiliary machinery, part and accessories	83.6	140.0	89.6	70.7	146.0
Machinery for the manufacture or finishing of felt or non woven	52.3	228.9	42.2	30.3	93.5
Machinery for washing, cleaning, drying, pressing, bleaching, dyeing, finishing, coating, or impregnating	1,758.8	1,284.7	1,334.7	1,404.5	2,339.8
Sewing machines & equipment	1,533.3	1,387.1	1,461.7	1,838.3	2,955.7
Total	11,453.5	11,736.1	8,332.9	9,373.7	16,065.5

Source: Customs Department
Compiled by Textile Economics Study & Research Group, Textile Industry Division, BISD, DIP

In terms of textile machinery and equipment imports, the trade policy in the 1990s allowed a considerable growth in the importation of new machines. Between 1996 and 2000, there had been a growth of about 40% in the total import of machinery, in terms of value. The only group of machines that decreased its imports were those for extruding, drawing, texturing or cutting man-made textile materials, falling 61%. In contrast, the sewing

machines and equipment group almost doubled its imports, growing about 93% in the same period. The machinery for washing, cleaning, drying, pressing, bleaching, dyeing, finishing, coating, or impregnating increased their imports of 33%, bellow average.

In an attempt to assist the textile and garment manufacturers, the Ministry of Finance had announced a reduction in import tariffs of parts and equipment in textile machinery from 20-30% to 5% in 1999. The Board of Investment had also lifted the import duty of machinery for replacing old machinery, as well as giving privileges to existing garment makers while lifting also import duty on raw materials for exports to improve their liquidity.

High import tariffs have been a chronic problem compounded by the need to raise revenues and balance the budget deficit. Tariff adjustment is delayed due to fiscal constraints. Protection of the local petrochemical industry has also contributed to high production costs. Despite growth in production, the industry is still dependent on high import content. Furthermore, global trade liberalization by year 2005 could hurt Thai textile industry as production shifts to more competitive bases in South Korea, Taiwan and China while garments orders could move to China, Bangladesh and Vietnam.

Textile companies, who survived the recent crisis lack financial capability to upgrade their production processes or facilities. Most producers still focus on massive market products, which require either economies of scale and quality or low labor costs. Thai research capabilities in terms of new yarns, fibre blends, fabric construction and finishes are limited. Producers who are mainly sub-contractors lack marketing initiatives and makers import about 60% of fabrics and have no linkages with textile manufactures; as subcontractors they also lack product innovation and marketing know-how.

Since the international market demands high quality products with more specific function and design, textile dying and finishing subsector has adjusted its production technology and process to serve market needs. In addition, the government promotes Thai local brand products for international market.

2.3 Domestic Industrial Regime

In 1971 the Thai government regulated the textiles industry by prohibiting capacity expansion and the establishment of new firms. The objective was to avoid excess capacity of production. In 1975, controls were eased due to a rapid expansion of textile exports. Once again in 1978, regulations limiting textiles capacity, with the exception of those granted export promotion privileges, were reintroduced.

While the regulation of textiles sector continued until 1987, the rules were never implemented effectively. The number of textile machines continued to increase by about 10% per year during the period of regulation. Textile machines were imported and installed without being registered. The regulation also came under pressure because yarn exports increased in 1983. Yarn prices rose from below the world market price to above it. The increase in prices and shortages of yarns hit small weaving firms lacking integrated spinning capacity. Then in late 1986, the government partly abolished the limitation on capacity and in 1987 abolished the limitation on expanding capacity.

Once the regulation was abolished, new firms were established. The number of looms rose from 80,000 to 130,000 between 1987 and 2000, while the number of spindles increased from 1.9 million to 3.6 million. Modern textile machines for both spinning and weaving were imported and installed. About 62,000 units of shuttle looms machines and 20,000 units of shuttleless machines were imported between 1988 and 2000.

2.4 Price Policies

In 1999, the energy prices were reduced, including electricity price as part of the recovery measures in the private sector after the 1997 economic crisis. The price dropped from 1.712 Baht/kWh to 1.591 Baht/kWh, a fall of 7.1%. However, those measures were temporary and in 2000 the electricity price rose considerably, reaching 1.779 Baht/kWh, an increase of 11.65%.

Table 5: Average Energy Sales Price

	1995	1996	1997	1998	1999	2000
Baht/kWh	1.309	1.370	1.460	1.712	1.591	1.776
Per cent Increase (decrease)		4.67	6.56	17.31	(7.10)	11.65

Source: Electricity Generating Authority of Thailand

Costs for both groundwater and tap water represent a future challenge for the textile companies due to the increasing price trend as well as the intensive use of water by the textile industry. There are no groundwater charge before 1996. From 1996 to 1999, there are groundwater charges but it remained stable (3.50 Baht/m^3) until in the year 2000 when the rate rose to 28%; that is, 4.50 Baht/m^3. In 2001 the rate reached 6.50 Baht/m^3, 86% higher than in 1999. It is expected that the price will increase to 8.50 Baht/m^3 in 2003, 143% more than1999. See more detail in table 6.

Table 6: Groundwater Rate

Year	Ground water Rate (Baht/m^3)
2003	8.25-8.50
2002	7.00-8.00
2001	5.00-6.50
2000	3.50-4.50
1999	3.50
1998	3.50
1997	3.50
1996	3.50

Source: Groundwater Control Division, Ministry of industry

As for tap water, the average rate of increase was 21% between 1992 and 2000. However, there was a slight decrease between 1993 and 1997. After the 1997 economic crisis, the rate increased again. For example, the rate for 31 to 50 m^3 range increased from 14.00 Baht/m^3 in 1992 to 19.00 Baht/m^3 in 2000, a 35.7% increase. The lowest growth occurred between 301 to 1000 m^3 range, a 8.7% increase during that period, with the rate rising from 20.00 Baht/m^3 to 21.75 Baht/m^3.

Table 7: Tapwater Rate

Unit (m^3)	Tapwater Rate (Baht/m^3)					
Year	1992	1993	1994	1997	1998	2000
0-10	8.00	6.00	6.00	6.00	10.00	10.00
11-20	10.00	7.00	7.00	9.00	13.00	13.00
21-30	12.00	9.00	9.00	12.00	16.00	16.00
31-50	14.00	12.50	12.50	15.00	19.00	19.00
51-80	16.00	13.75	13.75	17.00	21.00	21.00
81-100	18.00	14.75	14.75	17.25	21.25	21.25
101-300	19.00	16.75	16.75	17.50	21.50	21.50
301-1000	20.00	17.75	17.75	17.75	21.75	21.75
1001-2000	19.00	16.75	16.75	17.50	21.50	21.50
2001-3000	18.00	16.50	16.50	17.25	21.25	21.25
Up to 3,001	17.00	15.50	15.50	17.00	21.00	21.00

There was a slight decrease in the prices of raw materials. Unlike spinning, weaving and garment industries which make use of local product content, the bleaching, dyeing, printing and finishing industry depends on imported pigments and chemicals which are subjected to relatively high import duties. However, the tariffs decreasedsteadily due to government measures to promote the recovery of the Thai industries, including the textile sector.

Table 8: Imports of Dyes – Value in 1,000 US$

	1996	1997	1998	1999	2000
Disperse dyes	11.36	9.59	6.74	5.84	4.78
Acid and mordant dyes	13.07	9.65	7.62	7.73	6.99
Basic dyes	8.96	7.55	6.89	6.56	6.09
Direct dyes	3.88	4.69	4.61	4.29	3.71
Vat dyes	10.51	11.41	9.98	11.50	6.32
Reactive dyes	11.88	10.32	8.65	7.11	7.02
Other	10.38	8.26	7.60	7.61	6.74
Total	10.29	8.83	7.40	6.87	6.07

Source: Customs Department
Compiled by Textile Economics Study & Research Group, Textile Industry Division, BISD, DIP

Table 8 shows the costs reduction trend for imported dyes. Prices decreased for every type of dye during the period between 1996 and 2000 which can be attributed to the government's policy towards reduced import taxes on dyestuffs.

Table 9: Pricing trends of resources in Textile Industries

Cost	1992 (10 Years ago)	Present (2002)	2011 (The next 10 years)
Water Consumption	1.5%	3%	5%
Energy cost (Electricity, Fuel)	15%	25%	30%
Raw material (Dyestuff, Chemicals)	50%	25%	25%
Pollution Control cost	2%	5%	8%

Source: President of Association of Thai Textile Bleaching, Dyeing, Printing and Finishing Industries

On the other hand, the cost profile in the sector is expected to change in terms of the resources' share in the total cost for the textiles firms. In 1992, the highest cost was on raw materials which was 50% of the total company cost. In 2002, this is expected to decrease to 25% while energy increased its share on the total cost from 15% to 25%. In 2011, raw material and energy will have the biggest share, at 25% and 30% of the total cost respectively. It is interesting to note that water cost double its share between 1992 and 2002, rising from 1.5% to 3%. This can also be observed on the share of pollution control cost that showed an increased from 2% to 5% for the period 1992 and 2002. Both are expected to increase further in 2011, at 5% and 8% respectively.

2.5 Environmental Policies

Development planning in Thailand has historically favoured economic growth at the expense of quality of life. However, since the 1970s successive Thai Governments have put forward their commitment to environmental protection, and the National Development Plans have emphasised the need to manage environmental quality.

2.5.1 Environmental Impact of the Textile Sector

Pollution problems from the textiles industry require much concern and attention because some pollutants, such as dyed chemical, are visible but difficult to treat. In Thailand, the textile industry was one of the key industries promoted in the early stages of industrialisation. Thus, many factories were constructed when there was little understanding of the environmental impacts of production. More recently, this industry has been the focus of various attempts to clean up different industrial sectors.

Treatment facilities in the textile industry vary widely. The more sophisticated plants are well designed and often operating up to international standards. However, smaller manufacturing facilities have difficulty in providing adequate treatment and often discharge wastewater to adjacent canals. In the provinces wastewater treatment standard shows signs of decline. In the ten most-heavily industrialised provinces in Thailand (all close to

Bangkok), the textile industry consistently ranks as one of the worst polluters of all manufacturing industries with regards to BOD. However, BOD is not the worst pollutant generated by the industry nor the least manageable.

Annex 2 presents the Operational Performance Indicators (OPIs) for the textile subsector in Thailand. Those OPIs allow an accurate overview on environmental impact of the Textile sector.

2.5.2 Regulation Related to Environmental Issues

The following are eight major laws that affect industrial environmental practices:

a) Factories Act (1969) and its 1992 Amendment - The Act provides the legal basis for regulating industrial plants, and makes the Department of Industrial Works, Ministry of Industry responsible for industrial safety and pollution, licensing, setting and enforcement of emissions standards; and monitoring of procedures for wastewater and hazardous waste treatment facilities. The 1992 amendment increased the levels of fines. The Industrial Effluent Standard, the Standards for Occupational Health and Safety, as well as the Effluent Standards for Textile in Thailand and the Notification of the ministry of Industry can be found in Annex 3.

b) Public Health Act (1941) and its 1992 Amendment - Some sections provide legal authorization for the prevention and abatement of water, air and noise pollution. The enforcement mechanisms contained in the act are still some of the very effective legal controls for pollution. This act was amended in 1992 to cater to the changing problems related to public health and environment.

c) Poisonous Substances Act (1967) and Its 1992 Amendment - Controlled substances used in industry come under the control of the Office of Toxic Substances in the DIW. The Office can issue regulations for storage, transportation, manufacture, use, labelling and disposal of poisonous substances and their containers. The 1992 amendment added regulations affecting the use of dangerous substances and responsibilities for their effects.

d) National Environment Quality Act (1975) and 1992 Amendment - The 1992 revision formed the Ministry of Science, Technology and Environment with enforcement authority. It is conceived as the framework legislation for environmental management and control, concerned about the implementation of the environmental impact assessment (EIA) requirement and provides punitive measures against companies for non-compliance.

e) Energy Conservation Promotion Act of 1992 - requires factories to assign one person responsible for energy programs, set targets and plans for energy conservation, conduct regular energy audits and submit information related to energy consumption. The Act provides punitive measures for non-compliance leading to imprisonment or fines.

f) Groundwater Act of 1997 - institutes Governmental control over groundwater development and management. The Act governs drilling and the use of groundwater as well as the disposal of wastewater into an aquifer.

g) Notifications of the Ministry of Finance from 1983/84 and 1988 - announce a duty reduction on imported machinery, materials and equipment for the purpose of energy saving, wastewater treatment; pollution control; solid and hazardous waste disposal; industrial noise control; and research, analysis and monitoring equipment.

h) The Investment Promotion Act (1977) - states that the investment project approved by the Board of Investment shall incorporates measures for the prevention and control of adverse effects on environmental quality.

2.5.3 Incentives / Market Based Instruments

The Board of Investment is the agency responsible for providing fiscal and non-fiscal incentives and, most recently, BOI's policy focuses on high technology industries, low polluting or pollution-controlled industries. BOI offers special privileges like customs duty exemption for equipment to be used in pollution control.

The Seventh National Economic and Social Development Plan (NESDP) states that the development mechanism and environmental management should follow Polluters Pay Principle (PPP). Accordingly, under its project on "Development of Economic Tools in Industrial Environmental Management in Thailand" supported by Department of Industrial Works (DIW) and GTZ, the study of suitable economic tools to be used by industries to deal with industrial pollution has been just recently completed. A review of waste characteristics, economic situation and market environment of the industries has been done and, the type and the extent of economic incentives were analyzed. Afterwhich, a feasibility study of applying a market based instrument to specific type of industries was carried out, and the willingness to pay and acceptance of the scheme were assessed. From the results of the study, a policy and implementation plan for the industries are being developed.

2.5.4 Regulatory Authorities

a) Department of Industrial Works (DIW), under the Ministry of Industry (MOI), has the responsibility to approve and monitor the industrial environment inside the enterprises. DIW issues the annual operating permit, sets standards and monitors industrial emissions, and carries out inspections at industrial plants. DIW promotes Cleaner Technology (CT) in 12 specific sectors, including textile sector.

b) Office of Environmental Policy and Planning (OEPP), Ministry of Science, Technology and Environment (MOSTE), formulates environmental protection policies;

coordinates with other agencies on pollution prevention measures; supervises industries in their effort to follow pollution standards, and requires environmental impact assessments on all major projects.

c) Pollution Control Department (PCD), MOSTE, is responsible for the external control of industrial pollution. It sets ambient water and air quality standards and monitors air and water quality. Since the 1992, PCD is allowed to establish effluent and emission standards that are more stringent than those fixed by DIW.

d) Department of Environmental Quality Promotion (DEQP), under MOSTZE, primarily conducts public education and awareness programs including work with ecological camps for young people, recycling campaigns, and media programs.

e) The Industrial Estate Authority of Thailand (IEAT), under MOI, constructs, owns and operates most of the industrial estates in Thailand. IEAT controls individual industries within an industrial estate and imposes the pre-treatment level on the plants.

f) The Board of Investment (BOI) is the agency responsible for providing fiscal and non-fiscal incentives to stimulate investment. BOI's policy focuses today on high technology industries, low polluting or pollution- controlled industries, and the location of industry outside of Bangkok.

2.5.5 National Policies and Plans Promoting Cleaner Production Practices

Several plans have been made on Thai environmental quality and economic development activities. While their content do not focus on cleaner production, these documents assist in justifying the need for a practical action plan focused on CP activities.

a) Eight National Economic and Social Development Plan (1997-2001) - emphasises the need to upgrade the capability in science and industrial technology through increasing efficiency in the adoption and adaptation of production technology. The plan also advocates the creation of systems to disseminate information on production technologies.

b) Enhancement and Conservation of National Environmental Quality Act - it is the primary law relating to Thailand's environmental protection measures and embodies the principles of pollution control and pollution prevention. The Act provides authorisation for the creation of relevant policies, plans, and recommendations for the enhancement and conservation of environmental quality.

c) Policy and Prospective Plan for Enhancement and Conservation of National Environment Quality, 1997-2016 - The plan encourages the use of clean technologies and strategies to reduce pollution, and also serve as supplement to traditional pollution control measures. It recommends numerous strategies for capability building and better environmental management practices through research, education and training.

d) PCD's Pollution Management Policy and Planning (1997) - The document sets guidelines for establishing prevention systems and action plans. It calls for the

establishment of criteria and methods for solid waste reduction, support for clean technology promotion, and increase in investment on pollution control and prevention. The guidelines also address investment promotion and training for the implement ation of pollution prevention and control.

e) Industrial Restructuring Plan (1998-2002) - The industrial restructuring plan's objectives (e.g. enhanced competitiveness of Thai industry, reduction in production costs and human resource development) complemented the increase in industrial CP activities. It is an important document for seizing opportunities which can be integrated with CP activities and projects. The Plan explicitly states the need for projects and activities to increase the use of cleaner technologies and improve environmental management.

f) Thai National Pollution Prevention Master Plan - The Pollution Control Department (PCD) under the Ministry of Science Technology and Environment has prepared a National Pollution Prevention Master Plan, approved by National Environmental Board on 17 Jan 2002, making use of the past Cleaner Production policy formulation activities. This master plan presents short and long term strategic plan for all sectors including industry.

2.6 Institutional Framework

2.6.1 Technology infrastructure in Thailand for Textile Subsector

A general characteristic of the technology infrastructure relevant to the firms in the Textile subsector (for dyeing/printing & finishing processes) is given in this section. Technology infrastructure can be defined as the set of institutions – private as well as public – that provides firms with technological services.

a) Textile Industry Division (TID), Department of Industrial Promotion (DIP)

The TID was established in 1972 with the assistance of UNIDO. Their responsibility is to promote the textile industry by means of providing technical training, consulting services, quality testing services, as well as carrying out research and experiments in the textile field. In addition, the TID promotes and develops new design, quality improvement standards and the popularity of locally produced textile products, collects and disseminates statistical, commercial and technical information concerning the textile industry, and promotes and develops textile industry in the remote rural areas.

b) Thailand Textile Institute - THTI

The Thailand Textile Institute was established in 1996, at the initiative of all textile associations, endorsed by the Ministry of Industry. Two main objectives are to upgrade the entire textile industry to enable Thailand to become a quality textile manufacturing, and to equip the Thai textile industry with the readiness to enter a value-adding age under the same free-trade system as in the developed countries. The major directives which are to

be implemented by the Institute for 1997-2001 were the replacement of existing machinery, quality management towards ISO standards, human resource development, appreciation and competency of textile industry professionals, establishment of business and technical relations with foreign textile industries, information exchange with the Institute's foreign counterparts, preparation for value addition to the textile industrial system through applying the proven practices in countries with highly developed textile industries.

2.6.2 Relevant Education and Training Institutions

Chulalongkorn University – Training and Education
Rajamangala Institute of Technology – Training and Education

Rajamangala Institute of Technology provides education in vocational, certificate level and also bachelor degrees. Chulalongkorn University provides education at the bachelor and graduate levels. However, they cannot supply enough manpower that the industries need. There are also a high demand for research and development personnel.

3 Textile Sector Description

3.1 Sectoral Development

The textile industry plays an important role in Thailand's economy. Since the mid-1980's, clothing and textiles have been the most important national exports. Its rapid growth over the past two decades has catapulted the industry to its present position as the nation's largest manufacturing industry. However, recently, there have been signs that other industries such as electronics may overtake the textile industry. The growth index for the sector were already presented at page 5, in the Table 1

3.1.1. Investment trend

The investment trend is still high for the textile and garment industries, particularly in the garment sector. In 1998, 22 garment projects, with an investment of 1,554 million baht, had received the approval for the investment privileges from the Board of Investment, resulting in 13,520 new employments. At the same time, 3 yarn spinning projects, with an investment of 3,928 million baht, and 2 weaving/knitting projects with an investment of 378 million baht., brought about 754 employment and 237 employment respectively. This trend

still exists but only for textile factories that have a good performance and possibility to expand their exports.

3.1.2. Characterisation of Textile Industry

The textile industry is characterised as a sequential industry comprising five major activities, namely fibre production, spinning, weaving and knitting, dyeing, printing and finishing, and garments production. Each sector is related to the others in such a way that the product from one sector may be a raw material for the subsequent sector and so on.

In Thailand, most textile firms are located in Bangkok and its satellite provinces. There are about 4,500 textile mills nation-wide and they employ 1,080,000 people (Preliminary data, 2000). Among these, 90% are small and medium scale enterprises. The status of the Thai textile industry by sectors is shown in Table 10.

Table 10: Number of Factories and Workforce for the Textile Industry by Sector in 2000

Sector	Number of Factories	Employees
1. Man-made fiber	17	15,400
2. Spinning	148	60,310
3. Weaving	677	58,870
4. Knitting	631	58,740
5. Dyeing/Printing & Finishing	412	47,180
6. Garment Factories	2,672	843,200
Total	**4,557**	**1,083,700**

Source: Department of Industrial Works

Although the clothing sector (garments) has the largest number of firms, weaving and spinning firms are also competitive in the international market. This is attributed to the low labour cost of Thailand as compared with other developing or industrialised nations. With the opening of China and Indochina, however, the competitiveness of some textiles companies in Thailand is being adversely affected.

Table 11: Number of Dyeing/Printing & Finishing Factories by Employment Size (2000)

Employment Size	Dyeing/Printing & Finishing	
	No. Factories	Ratio %
Small-scale (under 49)	282	68.4
Medium-scale (50-199)	99	24.0
Large-scale (200 and over)	31	7.6
Total	412	100

Source: Textile Industry Division, Department of Industrial Promotion. 2000

The Dyeing/Printing & Finishing industry in Thailand may be classified into three types according to the characteristics of textile mills:

(i.) Integrated mills, which combine all textiles processing in one place. The processes start from spinning and weaving up to garment production.

(ii.) Dyeing, printing and finishing mills which start from fabric preparation, i.e., desizing, scouring and bleaching, through Dyeing/Printing & Finishing, up to finishing.

(iii.) Dyeing/Printing & Finishing mills, with incomplete processing. This type is the least important in terms of number of mills.

Dyeing/Printing & Finishing mills in Thailand are classified according to the following sizes:

1. Small-scale mills are those with 10 to 49 employees.
2. Medium-scale mills are those with 50 to 199 employees.
3. Large-scale mills are those with over 200 employees.

Table 11 shows that in 2000, 68.4% of dyeing/printing and finishing firms could be classified as small firms with less than 50 employees and 24.0% had between 50 and 199 employees; therefore, 92.4% were SMEs. In terms of employment figures, the Thai dyeing/printing and finishing industry employed 47,180 persons, accounting 4.35% of the total textile employment in 2000.

Geographically, around 90.0% of the dyeing/printing and finishing factories are located in the Bangkok Metropolitan Region. This situation was due two main reasons:

1) continuous process, which is the need to be close to the dyestuff suppliers, as well as raw materials suppliers like those for grey fabric.
2) localisation of the garment industries in this Region.

3.1.3 Market and Trade

The domestic market consumes around 60% of total production. Most of the consumption is for medium to low quality products with cheap prices. However, textile has led Thai exports for many years with big and important markets such as the United States, Europe, and Japan.

The textile industry exports declined markedly between 1995 and 2000 (from US$ 6.4 billion to US$ 5.5 billion), reflecting a loss of competitiveness in the labour intensive part of the industry, specifically in garments, with a drop from US$ 4.1 billion to US$ 3.1 billion. Textiles, the more lightly protected and more capital-intensive subsector, remained almost stable, increasing slightly.

It is possible to observe the decline of Textile and Garments, from being the most important export commodity in 1995, to being second only in 2000. In terms of percentage share, the Textile and Garment industry dropped from 11.42% in 1995 (garments with 7.25% and textile products with 4.17%) to 8% in 2000 (respectively, 4.47% and 3.53%).

Table 12: Export Commodities, 1995-2000. Value, in million US$

Product	1995	1996	1997	1998	1999	2000
Textile Products and Garments	6,443	5,446	5,409	5,053	5,103	5,531
- Textile Products	*2,354*	*2,305*	*2,326*	*2,086*	*2,199*	*2,440*
- Garments	*4,089*	*3,141*	*3,083*	*2,966*	*2,904*	*3,091*
Computer and parts	5,154	6,521	7,261	7,641	7,922	8,454
Integrate circuit and parts	2,333	2,308	2,414	2,246	2,950	4,464
Plastic Products	2,494	1,247	1,582	1,706	2,001	2,749
Canned food	2,138	2,254	2,348	2,270	2,650	2,581
Vehicle parts and accessories	656	744	1,070	1,295	1,979	2,522
Transformer, generator and motors	990	1,189	1,435	1,228	1,537	1,678
Rice	1,951	2,002	2,075	2,098	1,951	1,631
Precious stones and jewellery	2,004	2,032	1,685	1,308	1,497	1,580
Rubber	2,458	2,501	1,831	1,339	1,161	1,513
Others	23,367	24,037	25,074	23,090	24,654	30,933
Total Exports	**56,433**	**55,727**	**57,593**	**54,326**	**58,509**	**69,167**

Source : Bank of Thailand.

A major constraint in the industry is the Multi-fibre Arrangement (MFA) which allocates quotas on exporting members. In the early years of the agreement, it helped Thailand by curtailing sales of other rival textile exporters. However, Thailand was filling its quotas by the late eighties and the agreement has limited the industry ever since. The MFA requires the Thai government to allocate export quotas among companies. Although the allocation is supposed to be open, in practice, it favours larger integrated companies and acts as a barrier to new entrants. Small, medium and new exporters concentrate on servicing non-MFA countries, such as those of the ASEAN region. Until the recent economic crisis, this was a region with a good growth market prospect. But, these nations also competes with Thailand in the textile industry. Indonesia, in particular, has been building its textile industry with lower labour cost than Thailand.

Table 13: Textile and Garment Exports Classified by Markets

Markets	Value (Million US$)				Share (%)			
	1997	1998	1999	2000	1997	1998	1999	2000
USA	1,627,879	1,837,698	1,861,072	2,098,521	29.69	35.96	36.06	37.71
EU	1,151,474	1,086,723	1,077,277	1,081,704	21.00	21.27	20.87	19.44
ASEAN	409,380	342,688	407,553	455,863	7.47	6.71	7.90	8.19
EASTERN ASIA	483,140	370,514	375,986	417,994	8.81	7.25	7.29	7.51
JAPAN	504,493	358,730	369,218	369,082	9.20	7.02	7.15	6.63
MIDDLE EAST ASIA	475,636	375,870	350,690	327,343	8.67	7.36	6.80	5.88
AFRICA	177,669	156,680	162,619	186,425	3.24	3.07	3.15	3.35
SOUTHERN ASIA	159,590	160,241	172,310	186,402	2.91	3.14	3.34	3.35
AUSTRALIA & OCEANIA	103,327	90,902	88,461	89,156	1.88	1.78	1.71	1.60
CENTRAL AMERICA	65,959	69,832	51,553	59,501	1.20	1.37	1.00	1.07
EASTERN EUROPE & CIS	112,271	59,578	48,699	54,912	2.05	1.17	0.94	0.99
SOUTH AMERICA	32,111	32,030	35,610	43,798	0.59	0.63	0.69	0.79
OTHERS	180,842	168,702	159,935	194,543	3.30	3.30	3.10	3.50
TOTAL	5,483,771	5,110,188	5,160,983	5,565,244	100.0	100.0	100.0	100.0

Source: Customs Department
Textile Economics Study & Research Group, Textile Industry Division, BISD, DIP

While Thailand exports textiles and clothing, it also imports raw material, including cotton and intermediate inputs such as synthetic fibres, yarn and fabric. Import values have

grown steadily since the 1960s and have increased markedly since the mid 1980s as a result of the rapid expansion of exports. But, the high growth in garments exports since the mid 1980s, moreover, left Thai textile suppliers behind. For example, some of the yarn and fabrics required for exports could not be produced domestically.

In 2000, the United States and EU were the major markets for Thai textiles. However, while the exports to USA increased dramatically in the period represented below, from 29.7% to a share of around 37.7% of the export value, the exports to EU went down moderately, dropping from 21% to 19.4%. Japan, the most important commercial partner out of MFA members, showed an alarming fall, declining from to 9.2% to 6.6%.

The devaluation of the Thai currency, brought about by the 1997 economic crisis, restored some competitiveness in Thailand's exports. This is particularly true in the garment exports to the U.S., the EU and the Japanese markets. But, lower priced exports to other markets, on the other hand, have been affected by competition from countries with lower labour cost, namely China and Indonesia.

Problems and obstacles in the manufacturing and exporting of textiles and garments can be summarized as follows:

1. **Inadequate quotas to the U.S., and Europe**. Due to the increasing demand from the U.S. buyer, the quotas are fulfilled before the end of the year.
2. **Not price competitive in the low-end market**. The attempt to expand the export of lower-priced garments to other markets has not been successful. Thai goods cannot compete in price with products from lower wage countries (i.e. China, Vietnam)
3. **Liquidity shortage**. Lack of credit lines from banks. Some manufacturers tried supporting one another by giving each other credits.
4. **Fabric dumping from China and Indonesia**. Local weaving mills faced fierce competition from cheap imported fabrics.
5. **Low domestic consumption**. As half of weavers produce goods for domestic consumption, they are directly affected by the economic crisis, which has reduced local demand and consumption.

Industry Trends

Under ASEAN Free Trade Agreement rules, textiles must reduce its import taxes in the short term. But it is expected that Thailand will not be much affected because it is a net exporter among ASEAN countries. But in the long term, Thailand may be challenged by much competition from countries offering cheaper labour. For NAFTA, there has been no impact on Thailand because Mexico, which is a production base for the textile industry in North America, is still using low technology. But in the longer term, when Mexico develops

its textile industry, this will have an adverse effect on Thailand since the US is an important export market.

3.2 Technology Development

Tariff protection, high demand for export and local consumption as well as perception of business opportunities led to the building up of surplus capacity in all textile industry sub-sectors. Obsolete textile machines present a hurdle for the textile industry. About 80% of weaving machines, 70% of spindles and most dyeing finishing mills (the latter category are aged from 10 to 30 years) need to be upgraded to improve product quality and value addition.

Low technology textile manufacturing is no longer competitive in the world market because the labour costs of Thailand's competitors, especially those of China, are lower. To survive, low technology firms will have to upgrade themselves to supply the upper end of the market, where Thai products are still very competitive. An alternative strategy, which many producers have considered, is the relocation of production facilities out of Thailand, (e.g. in China, Laos) where labour costs are lower. In addition there have been moves on the part of foreign investors, often from the NICs (Newly Industrialised Countries) of Asia, to take-over Thai companies and invest in improving their production facilities.

The dyeing, printing and finishing subsector is a high investment industry. Thus, the larger scale companies, 7.6% of total (see table 11), use high technology equipment and produce high quality products. The remainings 92.4% produce low to medium quality products. In this subsector, the technology level depends directly on scale of factories. However, the medium scale firms are using a suitable technology. And, because the industry has a great impact on the environment, water treatment is strictly controlled. Establishing a new factory or factory expansion has to take into consideration the environmental impact and must register the new factory.

The Ministry of Industry and the Bank of Thailand sets aside 25 billion baht to fund low-cost loans for textile companies wanting to upgrade machinery. The loans are part of a government' s effort to revitalize the local textile industry due to the financial problems and loss of comparative advantage over rival countries in recent years.

For the period 1997-98, textile plant owners were reluctant to fund factory improvements through loans because of the economic slump. They had shown little interest in the loans since they were worried about high interest rates, the rising price of imported machinery caused by the baht's depreciation and fluctuating exchange rate. For these reasons, only

about 10% of the reserved fund were availed as loans. Currently, with the lower interest rate, stronger baht and more stable rate of exchange, it is practical to use the loan.

Textile manufacturers tend to invest in production machinery rather than new software technology, neglecting high value-added areas (e.g. product development, marketing and desig. Nonetheless, Thailand remains a strong player with much opportunities to improve its position in the global market. A strategy is recommended based on joint effort between the Thailand Textile Institute and private entrepreneurs:

- Cooperation with Italian companies through licensing agreements for S.E. Asian markets, combined with technology transfer and buy-back agreements;
- Product development support to small groups of homogeneous companies;
- Training in marketing, organization and product development;
- Benchmarking with major competitors

As a competitive strategy, Thai Garment Manufacturers Association had hired French designers to design and develop Thai fabrics, making them more appealing to the world market. This was an attempt to promote the use of local fabrics among garment manufacturers for exporting. There had also been projects organized to promote Thai garment designers to enter the world fashion through training, contests, etc. Attempts also have been made to enhance garment manufacturers' potential and helping them build brand names within the regions in the short term, and to worldwide market in the future.

3.3 EST Characterisation

This chapter presents the sector-specific ESTs found in Thailand and its content was based on the estimation of the President of Association of Thai Textile Bleaching, Dyeing, Printing and Finishing Industries as well as TEI experts involved in the project. The ESTs adopted by the textile firms – Dyeing/Printing & Finishing processes can be summarized in seven major types as follows:

a) **End-of-Pipe System:**
   - About 10% of firms use activated sludge system as wastewater treatment. However, this is suitable only for large scale production.
   - Air emission is the major environmental problem. Wet scrubber is the most common equipment used to control air emission. Hinge grade bunker oil and gas are used to reduce the odor problem.

b) **Input Material Change:**
   - Change in high dyestuff affinity to enlarge more color fixation to the fiber, less color in wastewater
   - Use of degradable soap.

- Use of enzyme in bleaching agent.

The consumption trend of material input recently changed to 50% and would be more in the next ten years, therefore the raw material price will be reduced.

c) **Better process control:**

Computer color machine (CCM), an automatic process control, is used in about 70% of the textile firms, and is expected that the use would increase to 100% in the future. It affects the control of appropriate time, efficient chemical raw material use and shading color according to customer requirements.

d) **Equipment modification:**

The revolution of equipment is valve manual, automation, and automation proportional in chronological order. Equipment modification is about 80% of the cases with main process (e.g. water, steam, electricity).

d) **Technology change:**

- Formerly the dyeing process used to be done on stagnant water. The modern counter current flow water on fabric brings shorter time and saves water.
- In the past , the function of the dyeing machine was either water circulation or fabric movement, but present technology makes circulation of both fabric and water at the same time. Due to a shorter time required on fixing dyestuff on the fabric, there is a higher demand on good quality dyed fabric, so dyestuff has been developed as well as auxiliaries and chemical, resulting to many different types product, with higher quality, available in the market.
- Many factories started to use compact machines, a technology change which focuses on market and customer, decreasing inventory cost.

e) **On-site Recovery and Reuse:**

- Energy and steam recovery are widely-used.
- Reused of cooling water in the treatment site makes wastewater treatment harder.
- On-site recovery and reuse will be about 50% within ten years and will save cost that is generally expended on condensation.

f) **Product modification:**

Product modification towards more environmentally friendly product is an important survival market strategy for textile companies. The environmentally friendly product is being 5% of exports and the customer agree to pay more for that type of product.

There are currently 80 textile factories out of 400 factories that have ECOTEX standard, about 20%, and use this standard more continuously.

3.4 Relevant Technical Cooperation Programmes on ESTs

Over the last years, several initiatives have been undertaken to promote the application of Cleaner Production in Thai industries. International donors have supported the majority of

these initiatives, with Thai universities acting as Thai counterparts. The main activities have been training, outreach projects, and demonstrations. Ten industrial sectors have implemented CP through various projects. The recent activities are described below.

USAID set up and funded the Industrial Environmental Management Programme (FTI/IEM) of the Federation of Thai Industries from 1990-95. US cleaner technologies were promoted through the completion of environmental audits in industries such as textile dyeing, pulp and paper, food processing and chemical.

The Carl Duisberg Gesellschaft (CDG), in association with its South Asian Programme Office, assisted SMEs in the textile, electroplating and food industries with a number of training, capacity building and industrial audit activities. The project was implemented with the assistance of educational institutions such as Asian Institute of Technology, Chulalongkorn University, and Chiang Mai University.

The governments of Japan, Australia and Canada financed Cleaner Technology workshops for representatives from public and private sectors involved in industry and the environment.

The 'Promotion of Cleaner Technology in Thai Industry' project, supported by Danish Cooperation for Environment and Development (DANCED) , attempted to strengthen Thai environmental auditing and Cleaner Technology expertise at the advisory and implementation level. The project was conducted between 1996-98 with TEI and Industrial Environmental Management Office of the Federation of Thai Industries (IEM/FTI). Its activities included capacity building and training of TEI and IEM/FTI staff to culminate in the establishment of a Cleaner Technology advisory service. In addition, environmental audits were carried out in the food, electroplating and textile industries. A component of the project was the establishment of a 'Cleaner Technology Information Centre' at TEI.

The European Union (EU) had been implementing the 'Public Participation in Environmental Management in Samutprakarn' project jointly with TEI. This project involves introducing target industries to the concept of Cleaner Technology and to CT practices by conducting environmental audits and demonstration projects.

Asian Development Bank (ADB) and DANCED supported the first Asia Pacific Roundtable on Cleaner Production in Bangkok (1997). The Roundtable was organised by the Pollution Control Department. DANCED also supported a three-year project focused on building institutional capacity for Cleaner Technology within the Department of Industrial Works (DIW), Ministry of Industry (MOI).

Thailand received a loan from ADB and the Japanese Overseas Economic Cooperation Fund to support funding the Samutprakarn Wastewater Management Project. The major focus of the project is the construction of a large-scale wastewater collection and treatment system. It also includes pollution control and CP measures. The four-year programme aims to promote and develop CP and Industrial Efficiency (CPIE) among industries in the province. The essential features of the programme include establishment of a resource centre, provision of advice on CPIE to local industry and demonstrations of applied CP processes.

4 Methodology and Sample profile

The methodology utilised in this project is summarised as a data collection through the use of questionnaires and interviews with companies, business associations, regulators, technology centres, suppliers and NGOs/Community associations, and an analysis and interpretation of results.

4.1 Objective of survey

The main objective of the survey is to report the drivers behind the adoption of Environmentally Sound Technologies by the companies in the Textile subsector, Dyeing/Printing & Finishing processes, in Thailand. The questionnaires documented the reasons that lead the firms to uptake EST and assessed the relative importance of those drivers according to the specific conditions that the companies in that subsector are facing.

4.2 Companies and Institutions Identification

The first step in this activity was the identification of an adequate number of companies (20-30) to join the project. The companies were divided into two groups:

1. Companies that have adopted both process technologies and treatment technologies
2. Companies that have adopted only treatment technologies.

The sample comprised small, medium and large-scale companies with dyeing and printing processes (wet processes). This stratification followed the UNIDO requirements for different categories of enterprises to be surveyed and Thailand specific conditions. Under Thai law, the textile companies must have some types of wastewater treatment. The Department of Industrial Works – DIW, regulates this law. Thus, the survey did not comprise companies without treatment procedures.

The first group identified was the companies that have adopted both process technologies (cleaner technologies) and treatment technologies (end-of-pipe technologies). For the other companies (i.e. that have adopted treatment, but not implemented process technologies towards a better environmental performance), the methodology used was the distribution of the questionnaire to the company members of the Association of Thai Textile Bleaching, Dyeing, Printing and Finishing Industries (ATDP), and those companies that do not belong to the association, in the Provinces of Samutprakarn, Nakornpathom, and Samutsakhon (Bangkok Metropolitan Region). The selection of companies was made after receiving back the filled questionnaires. This sequence facilitated the identification of an adequate number of firms and allowed the selection of companies that represent the stratification requested by UNIDO.

A total of 30 companies participated in the survey but only 28 companies returned the questionnaires by 28 January 2002 (see the translated questionaires in annex1). The survey also covered 10 raw material and technology suppliers, 4 technology centres, 2 regulators, and 1 business association (see the translated questionnaires in the Annex 4, Annex5, Annex 6 and Annex 7 respectively).

4.3 Questionnaires Translation and Adaptation

The original questionnaires provided by UNIDO were in English language. They were translated into Thai language and adapted to match Thailand particular conditions.

4.4 Survey of companies and key stakeholders

To carry out the survey companies, institutions and suppliers were divided into two groups;

- *Group 1*
  Companies, institutes and suppliers already identified:
  1. Companies that have adopted process technologies and treatment technologies;
  2. Institutions and Suppliers
- *Group 2*
  Companies to be identified:
  1. Companies that have adopted treatment technologies;

To accomplish the survey objective the Project Work Team was divided in two Sub-teams, each group is responsible for a specific group of companies, institutions or suppliers to be interviewed:

- Sub-team 1 – Companies that have adopted treatment technologies, Institutions and Suppliers

- Sub-team 2 – Companies that have adopted CT processes technologies and treatment technologies.

The companies were interviewed first before the institutions and suppliers. This sequence allowed a cross-examination methodology to confirm and support the companies' answers against the institutions and suppliers information and find any possible inconsistencies.

For the Group 2 (companies that have adopted treatment) the methodology used was the distribution of the questionnaire to the companies located in the Provinces of Samutprakarn, Nakornpathom, and Samutsakhon (Bangkok Metropolitan Region).

The questionnaires were distributed by mail and TEI provide support by telephone to the pre-selected companies throughout the questionnaire filling in activity. The general approach to the companies in the Group 2 is described bellow:

1. A letter, introducing the need for the survey, with the questionnaire, was mailed by TEI to the group of 400 pre-selected manufacturers.
2. Follow-up telephone calls were conducted by TEI one week after the initial survey mailing.
3. The companies return back the questionnaires by mail.
4. An advanced selection was carried out to identify the companies that fit the survey requirements;
5. The surveys were presented face-to-face, with the completion of the 'Gross measures of firm environmental performance' form as well as the question that were not totally/correctly completed in the previous surveying.

The interviews were made with a senior level manager (general manager; production manager) and, whether possible, with the presence of the environmental manager.

The most important problem faced by the work teams in collecting data was the lack of both environmental and commercial data available in the companies. Furthermore, the characteristic of business and size, like those in textile dyeing and finishing, more than 90 % are small and medium size and also family business since there is no good collecting data system.

5. Main Findings of the Survey and Policy Recommendations

This section is divided into two parts, wherein, the first presents the main recommendations gathered from the questionnaires answers. The second part presents the textile's policy recommendation gathered from the interviews.

5.1 Questionnaire main findings

From the survey of the business association, major changes facing the textile sector in the next years has been exposed. There are three goals to be achieved by the textile companies:

- To improve process for energy saving and environmental effect reduction.
- To increase production efficiency to the maximum, even at the start.
- To recover more than 50% of water to use in process.

The reduction of government's direct tax was the policy indicated to strengthen the response of the firms for the environmental regulation, as well as a way to improve the performance (production efficiency) of the companies. In addition, the business community is actively involved in formulating national environmental policy/regulation, participating in driving environmental policy/regulation without discrimination and impartiality. One example given was business association pressure on the government to suspend the regulation that requires firms to feed the fishes in the last wastewater treatment pond.

The regulators remarked that some firms should be monitored more regularly than others. This is particularly the case of the firms that have BOD loading up to 100 kg/day and the small businesses. To improve the effectiveness of the penalty system, three suggestions were proposed: increase penal provisions, observe a strict monitoring and serious penalty. The changes required to improve the current regulatory framework were:

- Change the role from command and control to supportive roles.
- Compile environmental management regulations.

Furthermore, the environmental regulations should be strengthen and become a more important issue for the government policy. However there are some obstacles delaying these changes:

- Central government agencies do not trust in the capacity of lower authorities.
- Lack of monitoring capability in the local administrative organization.
- Lack of central coordination.

In the future, the environmental regulation will be much stricter, more stringent penalties on the people and companies that violate or refuse to follow the environmental law.

Over the next few years the Technology Centres expected the following changes for the firms in the textile sector:

- Product/process improvements to create a higher value added product.
- Increasing problems with both wastewater and hazardous waste in case of the historical low prices of textile sector cannot endure, with consequent loss of market share.

- Creation of Thai brand names for clothing as a strategy to be competitive in the international market and increase confidence in product quality in the domestic market.

Finally, the Technology Centres intend to adapt their services to accommodate expected changes in market. Thus, quick responses and high effective services should be offered by them. In addition, good practice and better concept must be presented for the customers.

Supplier companies, on the other hand, appreciate the increasing awareness on environmental issues by the textile companies, especially among the large to medium firms. Also, there is possibility for improvement towards a better environment performance of smaller to medium firms.

Most suppliers believe that environmental policies play an important role in textile market, such as: trade barriers in the international market, policy for reduction in chemical substances hazardous to the environment, environmental concern as an incentive for increase product quality, and cleaner technology. Environmentally friendly products should be developed for two reasons: opportunities for better sales (in the national and international market) and better working environment.

There are divergent opinions regarding to the trends for water, energy and raw materials prices, and their influences on the firm-level technological changes. Some suppliers affirm that the prices of the inputs did not influence the technological changes, because there was just a moderate increase in the prices, or even they remained stable. Another group affirms that process of water, electricity and raw material had increased the prices over the last 10 years, putting Thailand at a relative disadvantage against other Asian countries with lower utility costs. A supplier suggested that the prices of raw materials and water did not influence prices as much as the energy cost, that increased investment expenses, forcing many firms to reduce energy cost by process/hardware improving.

The suppliers would like to see the following changes in services, regulation and other market characteristics in order to assure greater adoption of environmental technology:

- Strict implementation of environmental, health and safety laws and regulations.
- Punishment for the wrongdoers.
- Government incentive (e.g. tax reduction, lower interest rates).
- More focused studies in environmental technology.
- Reliable services.
- Dissemination of knowledge and information.

Thus, to accommodate changes in market and demand the services should be changed in order to fit customer requirements. One example given was the necessity to inform the customers on the employment of chemical substances that are environmental friendly.

5.2 Interview main findings

One remarkable comment gathered in the interview with the President of Association of Thai Textile Bleaching, Dyeing, Printing and Finishing Industries was that Thailand's policy on pollution prevention and waste minimization is the first step of textile process. Currently, dyestuff, which has lead, Chromium or Cadmium component was no longer used for more than 10 years ago. Thailand's strictly policy in chemicals import result to decrease in extreme chemical contamination problem, with a 95% effectiveness rating. It made most producers to perform well in pollution control measures because of users awareness in chemical hazardous

Recommendations for short term policy:

- Apply CT concept to reduce cost and pollutions i.e. housekeeping, selection of appropriated chemical
- Tender knowledge on chemical and colour selection in the optimum and efficient ratio.
- Use of more efficient machines.
- Use of the degradable and environmental friendly chemical raw materials
- About 80% of the environmental friendly chemical raw material is imported, mainly from Europe, America and Japan. The use of long life and multi-design chemical in printing process is only 5% and reuse of printing color for new products is not common. There is a great effort to build up the designer knowledge according to environment needs. Whenever the designers understand these guides, trends in toxic chemical consumptions slow down. Training for the right use of chemicals was also recommended.

The technology is changing rapidly due to the rise in energy cost, and this is more capital intensive and about 50% more efficient. The success cases are used as examples especially those which do not have a high implementation cost. The important is attitude adjustment and commitment.

Recommendation for long term policy:

- Build up research and development on product.
- Build textile supply chain.
- Build value chain to make the value added in textile products apart from design and packaging to meet the consumer requirements.
- Expansion of production and searching for new markets.

- A textile agreement among countries is also important. There is the necessity to talk with partner countries because of the lack of raw materials in Thailand and due to mutual responsibility on damages concerning quality and environment. Whether the negotiations do not correspond to Thailand's needs, it is necessary to delegate the rule of origin under the Ministry of Commerce and customs tariff under the Ministry of Finance.

6. Cases Studies

This section presents a general overview on 2 particular cases of companies that participate in the survey. A brief summary of CT options is given, as well as economic benefits obtained from the project.

6.1 Sinsaenee Co., Ltd.

Background

Sinsaenee Co., Ltd. products are knitted fabric and dyed and finished fabric and established in 1977. The company currently employs 120 workers, with 5 managers, 16 skilled workers, and 99 unskilled workers. The factory produces about 312 tons per years of knitted fabric and about 1,560 tons/year of dyed and finished fabric, using 80% reactive dyes, 10% direct dyes and 10% dispersed dyes. Most of the products are sold to local trading companies for export.

Options Implemented

The factory has already installed a Computerized Color Matching System to reduce the losses and conserve resources during the processing operations. Currently, the factory decided to focus on the water and energy conservation options to be implemented in the factory. These options included:

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

In addition, a number of housekeeping activities like installing water meters, level controllers and flow control nozzles etc. were also implemented.

Options	Benefits	Investment Cost	Pay-back Period
Replacement of worn out pipes and installation of new steam pipes	Fuel saving	US$ 12,500	2.7 Years
Recovery of heat from process water using heat exchanger	Fuel saving	US$ 20,200	10 Months
Improvement of boiler efficiency	Fuel saving	US$ 4,600	10 Months
Build bunker oil dam	Fuel saving	US$ 212.50	-

Conversion rate: 1US$ = 40 Thai Baht

6.2 Thanapaisal R.O.P.

Background

Thanapaisal R.O.P. is a commission dyer carrying services for the textile industry. The factory processes heavy fabric mostly for shoes manufacturing. The average production rate is about 842,000 yards per month or 281 tons of fabric/month. The company was established in 1961 and currently employs 150 workers.

Option Implemented

Caustic soda is a very important processing chemical and accurate dosing of caustic can not only improve the quality of processing, but also help in reducing the waste generation. Therefore the company decided to install a Causic Soda Dosing Controller unit.

This was expected to present a number of benefits like:

- Reduction of labor cost
- As a part of CT implementation, understanding its importance, workers training for good operational practices and awareness building was also conducted.

Option	Benefits	Investment Cost	Pay-back Period
Caustic Soda Dosing Controller	- 6% savings from warning signs utilities due to elimination of one drying process - 40% Chemicals savings due to reduced NaOH consumption Elimination of wetting agent - 40% reduction of cost of pH adjustment in wastewater treatment system Reduction of labor cost	US$ 65,000	1.08 Yr

Conversion rate: 1US$ = 40 Thai Baht

7. Appendix: Questionnaires

This section presents the descriptive statistics and summaries, and ranking answers gathered from the questionnaires. Each chapter includes the analysis of relevant answers and a table with an overview on the survey results.

7.1 Descriptive statistics and summaries

This section present general information of the surveyed companies (see in annex 1).

Among 28 textile factories that answered the questionnaire, 17 are located at Samutprakarn, the most industrialised province in Thailand, representing 60.7% of the companies in the survey. Nakornpathom province, with 6 surveyed companies, shows 21.4% of textile factories. With 2 companies each, Bangkok and Nonthaburi province have both 7.1% in the survey. The last company belongs to Kanchanaburi province.

Only 2 companies have foreign participation in their ownership structures, but none is controll by them. Most of factories that is participated in the survey are owned by Thai.

Survey Analysis: Descriptive statistics and summaries (firm)

List	N	RANGE		ARITHMETIC MEAN	STANDARD DEVIATION
		MIN	MAX		
Section 1:					
1.4 Ownership structure:					
private domestic %	25	50.71	100	96.67	11.74
private foreign %	2	34	49.29	41.65	10.81
1.7 Installed capacity (specify unit of measurement): (million yard/year)					
In1991	6	0.63	64.60	24.05	26.31
In 2001	15	0.74	555.81	59.85	139.63
Utilized capacity (at present): %	-	-	-	-	-
1.8. Output as a percentage of?					
1991_%	5	75	100	87.72	34.52
1996_%.	12	21.9	100	70.66	38.73
2000_%	17	29.49	100	76.53	20.12
1.10 Turnover (in domestic currency):					
in 1991	6	30	1739	382.51	670.51
in 2000	14	39.41	1466	271.55	392.47
1.11 Profit ratio (total profits as fraction of sales/turnover):%					
In 1991	6	-5	13.16	6.15	6.52
In 2000	11	-1.5	95.04	13.70	27.53
1.12 Cost of production from official reports (in local currency): million baht/year					
1991	5	9.95	1088.90	278.47	458.37
1996	9	11.64	1611.10	248.91	516.48
2000	13	12.00	1252.80	203.49	327.60
Depreciation and interest payment					
1991	4	5.00	112.00	41.05	49.35
1996	8	0.54	178.70	49.17	63.53
2000	17	0.69	129.00	29.38	37.58
Labour costs					
1991	4	27.10	80.73	27.10	36.27
1996	8	1.76	157.10	34.17	52.62

List	N	RANGE		ARITHMETIC MEAN	STANDARD DEVIATION
		MIN	MAX		
2000	16	1.45	122.44	23.37	31.00
Raw material costs					
1991	4	1.91	812.22	233.33	387.40
1996	8	13.30	1085.37	201.30	369.41
2000	17	1.77	837.31	117.455	203.90
Energy costs					
1991	4	34.07	83.94	34.07	35.86
1996	9	1.13	122.69	36.51	46.35
2000	17	0.13	139.00	33.86	38.68
Water					
1991	3	0.05	29.57	11.19	16.03
1996	9	0.01	67.24	8.06	22.22
2000	15	0.01	72.00	9.82	23.38
Other					
1991	2	6.07	12.90	9.48	4.83
1996	4	8.00	106.73	43.29	45.69
2000	10	0.01	2110.00	2140.37	6661.85
1.13 Export orientation: where is the main product of the firm sold?:					
Domestic market:					
1991_%	13	70.00	100.00	93.70	10.58
2000_%	19	30	100	83.65	23.465
Exported:					
1991_%	4	11	30	20.26	7.76
2000_%	12	5	100	42.55	34.72
1.14 Main countries and regions to which the product is exported (if applicable):					
European Union:					
1991_%	-	-	-	-	-
2000_%	2	10	100	55	63.64
Other European					
1991_%					
2000_%					
North America (USA & Canada):					
1991_%	1	1	1	1	0.19
2000_%	2	0.5	20	10.25	13.79
Other (please specify):					
1991_%	2	10	90	50	56.57
2000_%	4	15	100	66.25	38.16
1.15 What percentage of revenue did your firm get from exports?					
1991_%	6	12	100	52.42	29.72
2000_%	12	14	100	69.80	27.35
1.16 Total Labor force:					
numbers in production	28	18	956	243.29	223.99
R&D	21	2	160	23.90	35.32
administration	26	2	200	30.92	45.31
proportion of labor force	13	2	300	80.23	96.36
administration from overseas with international experience (optional):	10	1	20	5.80	5.27

The companies surveyed present a very wide range of installing capacity, although 12 firms, about 70% of the sample, are medium or large scale factories, with potential to produce between 8.51 million to 98.18 million yards/year. Among the other 5 companies, there are one very small firm with an installed capacity of 0.74 million yards/year, two small companies that are able to produce 2.73 million yards/year and 3 million yards/year, and one very large company, with 555.82 million yards/year of installed capacity.

Regarding the turnover, most of the companies can be classified as medium scale. This group shows a share of about 43% of the total. The smallest company in the group has a turnover of 100 million Baht/year while the largest earns 182 million Baht/year. There are five small scale companies, 36% of the total, which the turnover vary from 39.4 million to 79 million Baht/year. Finally, three large scale companies complete the remaining 21%. However the largest company in the group, with a turnover of 1,466 million Baht/year, is 270% larger than the smallest, with 395.28 million Baht/year, the widest range within a group.

Some trends can be observed in the main costs of production. Between 1992 and 2000 Depreciation and Interest Payment costs as well as Raw Material costs decreased their share in terms of contribution to overall costs. On the other hand, the Labour costs, Energy and Water costs increased their share in the same period. Despite that, Raw Material still being the highest production cost for the surveyed companies, representing in 2000 42.5% of total costs. Depreciation and Interest Payment, Labour, and Energy presented, respectively, a share of 15.0%, 11.1% and 16.5%. Water, although showed the highest growth in the period, was just 3% of the total cost of production in 2000.

Of all companies surveyed, 11 firms export for foreign markets, directly or indirectly. The share of exported production vary from 5% to 100%. Two companies have all their production exported, while other two exported 60% and 70% of their production. The most cited markets were Middle West and South East Asia.

The labour force varies from 20 employees to 1,133 employees. In terms of Labour Force, there are just three small scale companies (between 20-42 employees), ten medium scale companies (57-200 employees), and 15 large scale companies (201-1,133 employees).

7.2 Ranking answers

Survey Analysis: Ranking answers (firm)

List	N	ARITHMETIC MEAN
2.7 What is the firm's strategy for increasing its competitiveness?		
Rank 1-5		
identifying new markets	25	3.2
developing new products	25	3.4
increasing market share	24	3.21
cutting costs	25	3.96
differentiating the products – i.e. making products	24	3
unique	–	–
2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Rank 1-5 (where 1 is not at all; and 5 is very much)		
Noise pollution	26	1.42
Air pollution	27	1.96
Water pollution	27	2.30
2.14 During the period 1991 - 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very		

List	N	ARITHMETIC MEAN
important. Write 0 if no pressure was exerted.		
Domestic customers	26	0.42
Foreign customers	24	0.50
Suppliers	25	0.40
4.4 Which were the main objectives behind the technological changes? Please rnk 1-5 (1=not important; 5=very important) and specify:		
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	27	3.63
Productivity increase (in terms of output volume)	25	4.12
Quality improvements (product/ process)	26	4.27
Meeting environmental regulations/standards	24	3.13
Opening up new markets	24	3.54
Extend product range	25	3.24
Other (please specify)	_	_
4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1-5)		
water	26	4.19
energy	26	4.19
raw materials	26	4.19
4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company: (from 1-5 with 1 denoting not important and 5 denoting very important)		
Regulatory pressure, high pollution charges and fines	24	3.63
Environmental norms and standards for selling goods in foreign markets	22	3.14
Requirements of the firm's business partners (suppliers, customers, investors)	21	2.90
Environmental requirements imposed by owners and shareholders of the firm	24	3.08
Expectations that in the future regulations will be more stringent and charges will be higher	24	3.83
The cost of wasteful energy and material input use	24	4.25
Public pressure (by local communities, NGOs)	22	2.32
Peer pressure (by business associations, other firms)	22	2.09
Incentives (loans, grants, tax exemptions,...)	15	2.13
Goal not to lag behind competitors who have achieved good result in waste reductions	15	3.40
Other: (specify)	_	_
4.11 What is the ratio between pollution prevention and end-of-pipe techniques?	22	0.95
Lack of information?	16	3.69
High implementation cost?	15	3.60
No alternative chemical/raw material input?	12	3.08
No alternative process technology?	15	2.93
Uncertainty about performance impact?	16	3.44
Lack of tradition/skills?	16	3.69
Other: specify	-	-
4.19 If your firm has not adopted new EST in recent years, can you explain why not? Rank Importance 1-5		
Lack of information?	14	3.79
High implementation cost?	15	4.53
No alternative chemical/raw material input?	14	3.21
No alternative process technology?	15	3.27
Uncertainty about performance impact?	15	3.27
Lack of tradition/skills?	15	3.47
Other: specify	-	-

The strategy, which has mostly increased competitiveness of the firm was cost cutting, with an average of 3.96, possibly an effect of the economic crisis of 1997. The most common answer was 5, with twelve entries. In contrast, product differentiation was ranked as the least important strategy for competitiveness, with 3 in average.

The kind of pollution that the companies associate themselves more frequently was Water Pollution, with an average of 2.3. However, only one company ranked this issue with 5. Noise Pollution was ranked, in average, with 1,42. The most common answer was 1, with 18 entries.

Related to the pressure exerted by the stakeholders, most of the companies answered are no pressure to be exerted. Only 4 companies admitted some kind of pressure.

Quality Improvements, with an average of 4.27, followed by Productivity Increase, with 4.12, are the main items cited as main objectives behind the technological changes. The first was ranked as very important (5) 15 times, and the second 14 times. With the lowest average, 3.13, appears Meeting Environmental Regulation. One company cited Quick Delivery as a relevant factor for adopting technology changes.

In the question 4.5, the companies ranked each item with the same values. Thus, the average was the same for Water, Energy and Raw Materials: 4.19.

The source of pressure rated as the most important by the companies was the cost of wasteful energy and material input use, presenting 4.25 in average. Sixteen companies ranked the item as very important (5), In contrast Peer Pressure had an average of 2.09. In the item the 13 companies ranked it as not important (1).

Among the reasons that restrict the adoption or development of cleaner technologies were lack of information and lack of tradition/skill, both with 3.69 in average, ranked highest by the companies. No alternative process technology, with 2.93 in average, was ranked as least important reason.

Finally, the main reason for the companies not to adopt new EST in the recent years was due to its high implementation cost, with an average of 4.53. A total of 11 companies ranked that item as very important (5).

Annex 1
Firm Questionnaires

Section 1	Basic firm data							
Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Address	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn
1.3 Year of establishment:	1972	1985	1977	1961	1969	1985	1990	1977
1.4 Ownership structure:								
private domestic %	50.71	100	100	100	_	100	100	100
private foreign %	49.29	_			_		_	_
government %	_	_			_		_	_
1.5 Major lines of business: key products; processes (please, indicate production volume for main products):	Woven fabric	Woven fabric,polyester filament	Circular knit	fabric	Nylon chip , Nylon tarn,Dyed nylon fabric :Dyeing,finishing	fabric dying: Pretreatment,Dyeing, finishing	white fabric, fabric dyeing: Dyeing	Pretreatment,Dyeing, printing,finishing
Briefly describe the firm's key products and processes in relation to its main competitors:	Bleaching,Dyeing printing,finishing	Pretreatment,Dyeing, printing,finishing	Pretreatment,Dyeing, finishing	Dyeing,finishing	_	_	_	Quality and peice not differnce from competitors
Does the firm use international standards / enterprise standards for its main products? (if so, specify):	customer standards	customer standards	international standards(QSME)	customer standards	international standards(QSME)	use international standard , ATCC, Mark & Spencer, ISO and use customer standards	_	use international standard and use customer standards
1.6 Plants Nos.	2	2	0	1	0	2	2	_
Locations	Samutprakarn	Samutprakarn	_	Samutprakarn	Samutprakarn	Samutprakarn	Bangkok	_
divisions within production proces	Spinning,/dyeing yarn and weaving	white fabric	_	fabric	_	weaving	garment	_

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
1.7 Installed capacity (specify unit of measurement):	million yard/year	million yard/year	Ton/year(million yard/year)	million yard/year	Ton/year (milion yard/year)	–	–	Tonnes/yr(million yard/year)
In1991	49.19	12	–	–	11,844(64.60)	–	–	–
In 2001	60	14.4	1,560(8.51)	–	–	–	–	101,900(555.82)
Utilized capacity (at present): %	–	–	–	–	–	–	–	–
1.8. Output as a percentage of ?								
1991_%	96.93	91.66	–	–	–	–	–	–
1996_%.	100	66.67	76.92	66.05	95.73	–	–	77.97
2000_%	100	48.61	70.51	67.91	54.36	–	–	97.01
1.9 In what year was most of your plant and equipment built?	1992	1993	–	–	1992	–	–	1993
1.10 Turnover (in domestic currency): million baht/year								
in 1991	280.05	93	–	–	1,739	–	–	–
in 2000	395.28	75	39.41	100	1,466	–	–	759.04
1.11 Profit ratio (total profits as fraction of sales/turnover):%								
In 1991	10.26	4.5	–	–	13.16	–	–	–
In 2000	1.21	9	-1.5	–	2.76	–	–	5.94
1.12 Cost of production from official reports (in local currency): million baht/year								
1991	189.00	76.47	–	–	1088.90	–	–	–
1996	231.00	68.8	32.07	11.74	1611.10	–	–	–
2000	347.00	68.81	27.93	87.20	1252.80	–	–	–
Depreciation and interest payment								

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
1991	37.07	10.13	_	_	112	_	_	_
1996	25.62	14.91	3.62	_	178.7	_	_	57.29
2000	34.63	12.79	3.53	3.49	129	_	_	75.76
Labour costs								
1991	15.71	10.83	_	_	80.73	_	_	_
1996	22.69	15.08	6.47	_	157.10	_	_	56.16
2000	51.61	14.97	5.1	20.89	122.44	_	_	55.71
Raw material costs								
1991	84.15	35.04	_	_	812.22	_	_	_
1996	91.29	14.00	13.3	_	1,085.37	_	_	295
2000	108.56	14.89	11.01	27.28	837.31	_	_	315
Energy costs								
1991	35.22	14.4	_	_	83.94	_	_	_
1996	41.11	12.67	8.59	11.04	122.69	_	_	108
2000	70.54	13.53	8.11	21.53	101.86	_	_	139
Water								
1991	3.96	_	_	_	29.57	_	_	_
1996	3.45	0.18	0.09	0.70	67.24	_	_	0.01
2000	6.05	0.63	0.18	0.89	62.19	_	_	0.01
Other								
1991	12.90	6.07	_	_	_	_	_	_
1996	46.46	11.96	_	_	_	_	_	106.73
2000	75.62	12.00	_	13.12	_	_	_	122.37
1.13 Export orientation: where is the main product of the firm sold?: Domestic market:								
1991_%	70.00	100	100	_	79.07	_	_	100

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
2000_%	40.00	100	100	–	56.35	50	–	92
Exported:								
1991_%	30.00	–	–	–	20.03	–	–	–
2000_%	60.00	–	–	–	43.65	50	–	8
1.14 Main countries and regions to which the product is exported (if applicable):								
European Union:								
1991_%	–	–	–	–	–	–	–	–
2000_%	–	–	–	–	–	–	–	100
Other European								
1991_%	–	–	–	–	–	–	–	–
2000_%	–	–	–	–	–	–	–	–
North America (USA & Canada):								
1991_%	–	–	–	–	–	–	–	–
2000_%	–	–	–	–	–	–	–	–
Other (please specify):	–	–	–	–	–	Mianmar	–	–
1991_%	–	–	–	–	–	–	–	–
2000_%	–	–	–	–	–	100	–	–
1.15 What percentage of revenue did your firm get from exports?								
1991_%	–	–	–	–	32.5	–	–	–
2000_%	–	–	–	–	43.65	50	–	–
1.16 Total Labor force:								
numbers in production	300	196	63	100	956	25	700	345
R&D	20	–	4	4	27	2	100	7

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
administration	30	4	21	9	150	3	200	26
proportion of labor force	150	30	19	12	88	2	300	223
administration from overseas with international experience (optional):	20	-	No	No	No	No	20	2
1.17 What is the firm's relative size and position?	SME	SME	SME	SME	SME	SME	Large	large
Its market niche? Would you consider the firm to be a market leader?	No	No	Yes	Yes	No	No	Yes	Yes
Section 2	environmental (semi_structured)							
(a) Market developments and determinants of profitability:								
2.1 Who are your main customers? domestic/foreign?	Domestic	Domestic	Domestic	Domestic	Domestic	Foreign	Foreign	Domestic
Are you a sub_contractor for larger company?	Yes	No	-	-	-	-	-	-
Is the firm associated with highly visible conglomerates?	Yes	No	-	-	-	-	-	-
2.2 What are your customers' main requirements?	Price, delivery period	Price	Price, quality include process certification, derivery	Quality include process certification (customer standard)	Price,quality	Price	Price,quality	Price,quality,delivery
describe the relative importance of price, quality: (incl. product/ process certification)	-	-	-	-	-	-	-	-

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
does foreign demand differ in any way from domestic demand? (if applicable)	Yes	Yes	-	-	-	Yes	Yes	Yes
Could you give a brief summary of what aspects (or types) of product quality different markets require:	-	Domestic customer want cheaper price, Forein customer want higher quality goods than domestic customer	-	-	-	-	-	-
Please specify which type of product/process certification is required:	ISO9000,ISO14000	-	-	-	ISO 9000 , ECOTEX 100	ISO certification requirement	Quality	Quality
2.3 Has the demand for your products changed over the last ten years and if so, in which ways?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(is there an environmental dimension?;how important has the environment become in terms of how the firm's products are developed and marketed?)	-	-	-	Environmental dimension are more important	NA	Fashion	NA	Customers require environmental standards product
2.4 Who are your main competitors? Proportion (%)								
1. mainly domestic	-	100	20	100	NA	NA	-	-
2. less than 50% abroad	-	-	-	-	NA	NA	-	-
3.more than 50% abroad	-	-	-	-	NA	-	-	-
4. virtually all abroad	-	-	-	-	NA	-	-	-

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
2.5 How would you rate the degree of competition on your main sales markets?:								
1. limited	–	–	–	–	–	–	–	–
2. average	–	–	–	–	–	–	–	–
3. strong	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2.6 Have there been changes in the nature and intensity of competition/ market requirements since 1990?	–	–	–	–	–	Yes	Yes	Yes
nature:								
price	harder	harder	harder	harder	harder	harder	harder	harder
quality	harder	harder	harder	harder	harder	harder	harder	harder
diversity/uniqueness	stable	harder	harder	harder	stable	stable	stable	stable
intensity:								
harder	–	–	–	–	–	–	–	–
milder	–	–	–	–	–	–	–	–
stable	–	–	–	–	–	–	–	–
market requirements:								
regulatory	–	–	–	–	–	–	–	–
domestic	–	–	–	–	–	–	–	–
foreign	–	–	–	–	–	–	–	–
2.7 What is the firm's strategy for increasing its competitiveness?								
Rank 1_5								
identifying new markets	–	5	2	5	3	5	3	1
developing new products	–	4	4	4	2	4	5	3
increasing market share	–	2	3	2	4	1	4	4
cutting costs	–	1	5	1	5	3	5	5

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
differentiating the products – i.e. making products unique	–	3	1	3	1	2	1	2
2.8 What are the main challenges for the firm in improving its competitiveness/implementing its business strategy?	Increasing sales	Increasing sales	Increasing image	Increasing sales	Profit increasing	Increasing sales	Increasing sales, image, potenttial employee increasing, and increasing employee's quality of life	Increasing sales
(b) Community / NGO/ business association pressure								
2.9 What are the main topics that community/NGO/ business associations may place pressure on your company	ISO9000,ISO14000, AZO DYE	–	–	–	–	–	ISO certification	–
2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Rank 1_5 (where 1 is not at all; and 5 is very much)								
Noise pollution	1	1	1	1	1	2	2	2
Air pollution	2	2	1	2	1	2	3	2
Water pollution	3	1	2	1	1	3	3	3
river	–	–	–	–	Ground water	Klong Pra_kod, Klong Ta_tien	–	–
lake	–	–	–	–	–	–	–	–
sea	The gulf of Thailand	–	–	The gulf of Thailand	–	–	–	Yes

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
2.11 During the period 1991 _ 2000, have any of the following groups brought pressure on your company to reduce pollution? Please note the number of times groups have telephoned, faxed, e_mailed or visited your firm. For news media, please note the number of media reports. Please use the following classifications: 0, 1 to 5, 6 – 10, 11 – 20,								
Environmental NGOs								
Objection to issuance of per	_	_	0	_	0	0	_	0
Pressure to reduce pollution	_	_	0	_	0	0	_	0
Pollution_related lawsuit	_	_	0	_	0	0	_	0
Student groups								
Objection to issuance of per	_	_	0	_	0	0	_	0
Pressure to reduce pollution	_	_	0	_	0	0	_	0
Pollution_related lawsuit	_	_	0	_	0	0	_	0
Industry Associations								
Objection to issuance of per	_	_	0	_	0	0	_	0
Pressure to reduce pollution	_	_	0	_	0	0	_	0
Pollution_related lawsuit	_	_	0	_	0	0	_	0
Consumer Groups								
Objection to issuance of per	_	_	0	_	0	0	_	0
Pressure to reduce pollution	_	_	0	_	0	0	_	0
Pollution_related lawsuit	_	_	0	_	0	0	_	0
News media								

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Objection to issuance of per	-	-	0	-	0	0	-	0
Pressure to reduce pollution	-	-	0	-	0	0	-	0
Pollution_related lawsuit	-	-	0	-	0	0	-	0
Citizens or Citizens Groups								
Objection to issuance of per	-	-	0	-	0	0	-	0
Pressure to reduce pollution	-	-	0	-	0	0	-	1
Pollution_related lawsuit	-	-	0	-	0	0	-	0
Other								
Objection to issuance of per	-	-	0	-	0	0	-	0
Pressure to reduce pollution	-	-	0	-	0	0	-	1
Pollution_related lawsuit	-	-	0	-	0	0	-	0
2.12 Has your company's strategy ever been influenced by the advice or suggestions of business associations?	-	No	No	No	Yes	No	No	No
If so, how? Which?	-	-	-	-	ATDP,CPIE	-	-	-
Are the business associations local, national, or international?	-	-	-	-	Local	No	No	No
How did they contact you?	-	-	-	-	NA	-	-	-
Did you consider this a positive development or unpopular and forced?	-	-	-	-	NA	-	-	-
Explain why	-	-	-	-	-	-	-	-
2.13 Have you ever been influenced by campaigns from NGOs or community organizations?	No	No	No	No	No	No	No	No

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
If so, how? Which?	_	_	_	_	_	_	_	_
Were the groups local	_	_	_	_	_	_	_	_
national	_	_	_	_	_	_	_	_
international	_	_	_	_	_	_	_	_
How did they campaign?	_	_	_	_	_	_	_	_
Newspapers	_	_	_	_	_	_	_	_
Non_public advice	_	_	_	_	_	_	_	_
Citizen protests	_	_	_	_	_	_	_	_
Did you consider this a positive development or unpopular and forced?	_	_	_	_	_	_	_	_
Explain why	_	_	_	_	_	_	_	_
2.14 During the period 1991 _ 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very important. Write 0 if no pressure was exerted.								
Domestic customers	_	0	0	0	0	0	5	0
Foreign customers	_	0	_	0	0	0	5	0
Suppliers	_	0	0	0	0	0	4	0
(c) Technology infrastructure:								

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
2.15 What does the firm do when it becomes necessary to consider technological change?								
Does the firm rely on institutions and consultancies for technological change? (give examples of such institutions)	-	-	-	-	-	-	-	-
international organizations	-	-		-	-	-	-	-
national government	Yes	Yes	Yes	Yes	Yes	-	-	Yes
advisory bodies								
private_sector consultancies	-	-	-	Yes	-	Yes	Yes	Yes
Other	-	-	-	-	-	-	-	-
Or from technological resources and advice from within its own company or other companies?	Find technology/raw material from organization outside the firm	Find technology/raw material from organization outside the firm and inside the firm	From within company	From within company	-	its own company	its own company	other company
2.16 How does the firm access information and support on technological change?	Good	Few	Good	Good	Not so good	Good	Good	Good
What kind of technological change ('hardware'/processes)	processes	hardware	hardware and processes change	processes change	hardware and processes change	processes	hardware & processes	processes
Does the firm rely more on technology providers within its own company (or family of companies) than organizations outside the	Yes	Yes	No	Yes	Yes	No	No	No

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
2.17 How would you assess the existing system of technological support services (range of services, quality,	-	-	-	-	-	-	-	-
In your own firm and parent company?	-	-	-	-	-	-	-	-
In the country or locality as a whole (is more support provided from within the government than from private sector? And is the support better from national or international advisers?) *1= least*	Government = 2, National Private Sector = 2, International Private Sector = 2	Government = 1, National Private Sector = 3, International Private Sector = 2	Government = 1, National Private Sector = 3, International Private Sector = 3	Government = 1, National Private Sector = 1, International Private Sector = 1	Government = 2, National Private Sector = 1, International Private Sector = 3	Government = 2, National Private Sector = 3, International Private Sector =2	Government = 1, National Private Sector = 1, International Private Sector = 2	Government = 2, National Private Sector = 3, International Private Sector =3
Section 3	Regulatory environment/pressure							
3.1 What are the key environmental regulations applicable to the firm? Please list them.	Industrial Effluent Standards by Ministry of Industry, Air standrad, Waste treatment and dangerous chemical substances by DIW	1. Factory Act B.E.2535 (1992) 2.Customer regulations	Notification of ministry of Industry about waste treatment, air pollution, effluent standard, and fuel keeping	1. Factory Act B.E.2535 (1992) 2.Customer regulations	NA	1. Factory Act 2. Pollution Standard	Industrail Effluent Standards	1. Factory Act No.2,B.E.2539 (1996), No.1,B.E.2541 (1998), No.6,B.E.2540(1997) 2. Effluent Standard
How have they affected the firm?	Yes, it cannot comply to effluent standard	No	No	No	High implementation cost	No effect	NA	Cannot comply to effluent standard

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
3.2 What are the penalties for compliance failure?	If monitoring measures are access standard, DIW may have word of command to stop their business	–	–	–	–	–	–	–
What procedures are involved?	–	–	–	–	–	–	–	–
3.3 Has the firm been penalized for non_compliance?	No	No	–	–	–	–	–	–
If so, details	–	–	–	–	–	–	–	–
3.4 Is their any form of cooperation with regulators?	Yes	No	Yes	No	Yes,	No	No	Yes,effluent quality control
3.5 How do regulators act in regard to environmental technology?	–	–	–	–	–	–	–	Yes
Do they recommend specific environment technology (both process and EoP)?	–	Yes	Yes	–	Advice recommendation	Yes	–	Advice recommendation
Do they offer incentives, or other support, referrals, and information?	Correct expecially industries	No	Yes	–	–	No	–	–
Or do they penalize only?	–	–	–	–	–	No	–	–
3.6 Do you or environmental authorities make information about the emissions of major pollutants by your firm freely available to the public? Yes or No	No	No	No	Yes	Yes	Yes	Yes	No

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
3.7 Does the firm see environmental regulations as costs or benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits
3.8 Have national environmental regulations reduced or strengthened your competitiveness?	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	–
In what ways?	–	–	–	–	–	–	–	–
Do the regulations affect the competitiveness of your competitors?	–	More efficiency in management, productivity, reducing cost	Yes	Yes	My company will be a market leader and the other company have to do as same as me.	Yes	–	–
3.9 Are environmental regulations in other countries affecting the firm's competitiveness?	Yes	No	No	Yes	Yes	No	Yes	No
if yes, in what ways?	Some countries obstruct the goods from non_environment certified firms	–	–	–	Easy for identified new market from forein country	–	–	–
3.10 Do you expect stricter environmental regulations in future?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
If yes, how do you plan to respond?	Preparing go through ISO 14000	–	Management improving	Plan to make high efficiency management system for environmental regulations	Prepareing EMS project and ISO 14001	Plan to reduce waste in production line	Preparing ISO system	System improving, reduce energy charge
Section 4	Technological change and environmental performance							
4.1 How would you characterize the level of technology of the firm compared with the sector as a whole (i.e. the								
in terms of process technology:								
Best Available Technology	–	–	–	–	–	–	–	–
standard_modern	–	Yes	Yes	–	Yes	Yes	Yes	Yes
traditional	Yes	–	–	Yes	–	–	–	–
in terms of products:								
high quality	–	–	–	Yes	Yes	–	–	Yes
standard	Yes	Yes	Yes	–	–	Yes	Yes	–
Low	–	–	–	–	–	–	–	–
4.2 Do you have a quality management system?	Yes	No	Yes	Yes	Yes	No	No	Yes
If so, is it ISO compatible?	Yes	–	NA	Yes	–	No	No	Yes
Are you ISO certified?	Yes	No	NA	No	Yes	No	No	Yes, ISO 9002
4.3 What were the major changes in technology over the past ten years?	Yes	During adjusting	NA	NA	NA	No	–	–

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
4.4 Which were the main objectives behind the technological changes? Please rnk 1_5 (1=not important; 5=very important) and specify:								
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	3	3	3	2	4	4	5	1
Productivity increase (in terms of output volume)	4	5	5	5	3	4	5	3
Quality improvements (product/ process)	5	4	5	4	5	4	5	5
Meeting environmental regulations/standards	3	2	3	3	3	3	4	1
Opening up new markets	4	1	1	4	3	3	5	4
Extend product range	4	1	1	1	3	5	2	4
Other (please specify)	–	–	–	–	–	–	–	–
4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1_5)								
water	4	5	3	5	4	5	4	4
energy	4	5	3	5	4	5	4	4
raw materials	4	5	3	5	4	5	4	4
4.6 In terms of equipment:								Dyeing
Where did the equipment come from (firm/country)?	Japan, Holland	Italy,Japan,Taiwan, German,Kouri	Hongkong, Thai, Germany	Hongkong,Denmark	Japan	Germany, Italy, Greak	Taiwan	Japan, Germany

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
How was it financed?								
loan	-	-	-	-	-	-	-	-
subsidy	-	-	-	-	-	-	-	-
Equity	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
4.7 Do financial intermediaries impose environmental regulations for equipment financing?	No	No	No	NA	No	No	No	No
4.8 What was the firm's annual average capital and operation & maintenance expenditures for pollution control in local currency?	-	-	-	NA	-	-	-	-
1991	-	-	-	NA	8.36 million baht	-	-	-
1996	-	-	-	NA	-	-	-	-
2000	-	2.21 miilion baht	800,000 baht/year	NA	-	-	1.52 million bath	-
4.9 List the most important environmental projects that the firm has undertaken since 1991.							-	

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Project 1	-	-	Bunker oil dam	Caustic Soda Dosing Controller	Chiller changing	-	CPIE	-
Year started	-	1998	2000	1998	1988	-	2002	-
Year completed	-	-	2000	2000	1995	-	-	-
Costs in local currency	-							
Total investment	-	2.21 miillion baht/year	8,500 baht/year	2.60 million baht/year	22.00 million baht/year	-	-	-
Maintenance/ operational co	-	20,000 baht/year	-	-	NA	-	-	-
Environmental impact	-	Save water and Dyestuff	Contaminate reduction	Chemical substance reduction	Electrical charge	-	-	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	4.94 million baht	-	200,000 baht/year	Estimate 20.00 million baht/year	-	-	-
Source of project financing (%)								
Company	-	-	100	50	-	-	-	-
Commercial loan	-	975,000 baht/year	-	-	100	-	-	-
Government	-	-	-	-	-	-	-	-
Other (specify)	-	(DANCED)1.23 million baht/year	-	50(Danced)	-	-	-	-
Project 2	-	-	-	Jumbo	Law material recovery plant	-	-	-
Year started	-	-	-	1999	1998	-	-	-
Year completed	-	-	-	2000	1998	-	-	-
Costs in local currency								
Total investment	-	-	-	4.35 million baht/year	21.00 million baht/year	-	-	-

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Maintenance/ operational co	–	–	–	518,000 baht/year	–	–	–	–
Environmental impact	–	–	–	Energy saving	Solid waste reduction	–	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	200,000 baht/year	8.00 million baht/year	–	–	–
Source of project financing (%)								
Company	–	–	–	100	–	–	–	–
Commercial loan	–	–	–	–	Yes	–	–	–
Government	–	–	–	–	–	–	–	–
Other (specify)	–	–	–	–	–	–	–	–
Project 3	–	–	–	Color changing	–	–	–	–
Year started	–	–	–	1999	–	–	–	–
Year completed	–	–	–	NA	–	–	–	–
Costs in local currency	–	–	–	NA	–	–	–	–
Total investment	–	–	–	NA	–	–	–	–
Maintenance/ operational co	–	–	–	NA	–	–	–	–
Environmental impact	–	–	–	Raw material reduction	–	–	–	–

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	1.00E+06	–	–	–	–
Source of project financing (%)								
Company	–	–	–	NA	–	–	–	–
Commercial loan	–	–	–	NA	–	–	–	–
Government	–	–	–	NA	–	–	–	–
Other (specify)	–	–	–	NA	–	–	–	–
Project 4	–	–	–	Bunker oil reduction	–	–	–	–
Year started	–	–	–	1999	–	–	–	–
Year completed	–	–	–	NA	–	–	–	–
Costs in local currency	–	–	–	NA	–	–	–	–
Total investment	–	–	–	NA	–	–	–	–
Maintenance/ operational co	–	–	–	NA	–	–	–	–
Environmental impact	–	–	–	chemical substance reduction	–	–	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	NA	–	–	–	–
Source of project financing (%)	–	–	–	NA	–	–	–	–
Company	–	–	–	NA	–	–	–	–
Commercial loan	–	–	–	NA	–	–	–	–
Government	–	–	–	NA	–	–	–	–
Other (specify)	–	–	–	NA	–	–	–	–

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company: (from 1_5 with 1 denoting not important and 5 denoting very important)								
Regulatory pressure, high pollution charges and fines	5	1	5	5	4	3	3	2
Environmental norms and standards for selling goods in	4	1	3	5	4	1	4	2
Requirements of the firm's business partners (suppliers, customers, investors)	3	1	_	3	3	1	5	2
Environmental requirements imposed by owners and shareholders of the firm	5	1	5	4	3	4	4	2
Expectations that in the future regulations will be more stringent and charges will be higher	4	1	3	5	4	3	3	3
The cost of wasteful energy and material input use	3	5	5	5	5	5	5	5
Public pressure (by local communities, NGOs)	2	1	2	5	2	1	2	3
Peer pressure (by business associations, other firms)	1	1	2	5	1	1	2	1
Incentives (loans, grants, tax exemptions,...)	_	_	3	1	5	1	_	_

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
Goal not to lag behind competitors who have achieved good result in waste reductions	-	-	3	5	4	5	-	-
Other: (specify)	-	-	-	-	-	-	-	-
4.11 What is the ratio between pollution prevention and end_of_pipe techniques?	1.00	1	1	0.5(CT)	0.5(CT)	1	1	1
4.12 How were the changes implemented? On which sources of information did the firm rely when identifying technology?	Supplier	Customers and Academic Institute	Supplier, Associate, journal	Supplier , customer information, Business association, Technology, Acedamic journal	Exhibition, supplier, educational institute	Consult company	Suplier, customers, journal	Supplier, customers, association ,educational institute
How would you assess your access to technological What was the source of the technology (in terms of both 'hard' and 'soft' technologies) itself ?	not so hard -	not so hard -	not so hard -	not so hard -	NA -	not so hard -	hard -	not so hard -
Please specify if the provider is located:								

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
within the same state/province as the	Yes	-	-	Yes	-	-	-	-
...or within the country?	-	Yes	Yes	Yes	-	Yes	Yes	-
...or within the region / other developing country?	-	-	-	Yes	-	-	-	-
...or in an industrialized cou	-	-	-	Yes	Yes	-	Yes	Yes
Did the firm rely on external technical support in assessing, selecting and implementing the technology (i.e. equipment) ? (i.e. firms or agencies not within the company or parent company)	-	-	No	Yes	Yes	Yes	No	Yes
Did the firm cooperate with other firms in implementing the changes?	Yes	Yes	Yes	Yes	Yes	No	No	Yes
vertical networks:	Yes	Yes	Yes	Yes	Yes	-	-	-
horizontal networks:	-	-	-	-	-	-	-	Yes
4.13 What links do you have with technological associations or other producers or disseminators of technology, and how do you use these	-	THTI	FTI	FTI,ATDP,CPIE	THTI	No	No	Department of Energy promotion
4.14 Did you experience problems in implementing the changes? If so, please elaborate.	How to use new technology maximum utilization	No	Yes	No	Yes,implementation cost and lack of instrument	No	No	Yes, investment cost
4.15 What resources or personnel do you have within your company to enhance your adoption of environmental technology?	Yes, R&D	Yes, preparation, dyeing & printing units	Lack of personel	3 persons	4 persons	1 person	3 persons	NA

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
4.16 Does the firm have an environmental policy or strategy? If so,	Yes, in 2001	Yes, in 2000	Yes, In 1999	Yes,1998	Yes,1998	No	Yes, In 2002	Yes,In 1999
What are the main objectives and how are they implemented?	-	-	-	-	-	-	-	-
Why does this firm have this kind of policy?	Want to have environment management system	Starting ISO 9002	Cost reduction production	Cost reduction and environmental prevention	NA	-	Want high quality product standards	Realize important of environment
4.17 Does your company participate in any waste minimization or pollution prevention programme?	Yes	-	Yes,CPIE by FTI	Yes	Yes, CPIE 20/20+	No	No	Yes
And why?	-	-	-	-	-	-	Lack of information	CPIE in cooperation with DIW
4.18 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1_5	Yes	No	-	-	-	-	-	-
Lack of information?	2	-	5	1	5	5	5	5
High implementation cost?	5	-	3	5	4	3	5	3
No alternative chemical/raw material input?	3	-	3	1	4	-	3	1
No alternative process	3	-	3	3	3	4	3	1
Uncertainty about performance impact?	2	-	5	3	5	3	5	4
Lack of tradition/skills?	2	-	5	3	3	5	4	2
Other: specify	-	-	-	-	-	-	-	-

Name of the firm	F1	F2	F3	F4	F5	F6	F7	F8
4.19 If your firm has not adopted new EST in recent years, can you explain why not? Rank Importance 1_5	Yes	No	-	-	-	-	-	-
Lack of information?	2	-	5	1	3	-	5	5
High implementation cost?	5	-	3	5	5	-	5	3
No alternative chemical/raw material input?	3	-	-	1	4	-	3	2
No alternative process	3	-	5	3	3	-	3	1
Uncertainty about performance impact?	2	-	1	3	3	-	5	4
Lack of tradition/skills?	2	-	5	3	2	-	4	4
Other: specify	-	-	-	-	-	-	-	-

Section 1								
Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Address	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Samutprakarn	Nakhonpratom	Nakhonpratom	Nakonpathom
1.3 Year of establishment:	1993	1990	1986	1974	NA	1990	1971	1965
1.4 Ownership structure:								
private domestic %	-	100	100	66	100	100	100	-
private foreign %	-	-	-	34 (India, Liberia)	-	-		-
government %	-	-	-	-	-	-		-
1.5 Major lines of business: key products; processes (please, indicate production volume for main products):	Printing 4,000 pieces/day	printing and dyeing : cotton,spun,T/C 400,000 yard	Woven fabric	Pretreatment, dyeing, and finishing	Blankets: Dyeing,printing ,finishing	Knitted products and yarn	Fabric dying: Dyeing	Cotton 100%, Polene100% , Nylon 100%,CVC ,TC/ to dye, to weave,garment
Briefly describe the firm's key products and processes in relation to its main competitors:	Printing	Printing, Dyeing,finishing	Dyeing,finishing	Quality: high, Price: more expensive than competitors	-	Bleaching,Dyeing finishing	-	Dyeing,Finishing
Does the firm use international standards / enterprise standards for its main products? (if so, specify):	customer standards	customer standards	customer standards and company standards	ISO 9002, and now it is implementing IQMM (International Quality Manufacturing	International Standard	ATTC, ECOTEX	customer standards	use international standards and use customer standards
1.6 Plants Nos.	-	-	1	-	1	-	0	-
Locations	Samutprakarn	Samutprakarn	Samutprakarn	-	Samutprakarn	-	-	Nakonpathom
divisions within production proces	Printing	Printing	weaving	-	Garment	-		Garment

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
1.7 Installed capacity (specify unit of measurement):	_	(yard/year)	million yard/year	million yards/year	_	Ton/year(million yard/year)	million yard/year	_
In1991	NA	NA	NA	_	_	2,400(1.31)	_	NA
In 2001	NA	NA	3	14	_	3,000(16.36)	10	NA
Utilized capacity (at present): %	_	_	_	_	_	_	_	_
1.8. Output as a percentage of ?								
1991_%	NA	NA	NA	_	_	75	_	NA
1996_%.	NA	NA	NA	_	_	73.33	66.67	NA
2000_%	NA	NA	83.33	64.69 (In1999)	_	83.33	80	NA
1.9 In what year was most of your plant and equipment built?	Not	1995	1986	_	1995-1998	1996	1999	NA
1.10 Turnover (in domestic currency): million baht/year								
in 1991	NA	NA	NA	_	_	108	_	NA
in 2000	NA	NA	70	_	_	138	40	NA
1.11 Profit ratio (total profits as fraction of sales/turnover):%								
In 1991	NA	NA	NA	_	_	10	_	NA
In 2000	NA	NA	NA	95.04	_	5	_	NA
1.12 Cost of production from official reports (in local currency): million baht/year								
1991	9.95	NA	NA	_	_	_	_	NA
1996	11.64	NA	NA	_	_	_	18.55	NA
2000	12	NA	77.30	_	_	96.81	31.68	NA
Depreciation and interest payment								

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
1991	NA	NA	NA	_	_	_	_	NA
1996	NA	NA	NA	_	_	_	0.54	NA
2000	NA	NA	12.00	21.95 (In 1999)	_	18.8	0.69	NA
Labour costs								
1991	NA	NA	NA	_	_	_	_	NA
1996	NA	NA	NA	_	_	_	1.76	NA
2000	NA	NA	9.00	_	_	11.7	2.40	NA
Raw material costs								
1991	NA	NA	NA	_	_	_	_	NA
1996	NA	NA	NA	_	_	_	15.00	NA
2000	NA	NA	39.00	225.77 (In 1999)	_	39	26.40	NA
Energy costs								
1991	NA	NA	NA	_	_	_	_	NA
1996	NA	NA	NA	_	_	_	1.13	NA
2000	NA	NA	16.80	28.16 (In 1999)	_	26.8	2.10	NA
Water								
1991	NA	NA	NA	_	_	_	_	NA
1996	NA	NA	NA	_	_	_	0.12	NA
2000	NA	NA	0.50	_	_	0.5	0.09	NA
Other								
1991	NA	NA	_	_	_	_	_	NA
1996	NA	NA	_	_	_	_	_	NA
2000	NA	NA	_	_	_	0.008	_	NA
1.13 Export orientation: where is the main product of the firm sold?: Domestic market:								
1991_%	NA	NA	NA	_	80	100	100	NA

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
2000_%	NA	NA	30.00	60	90	100	100	NA
Exported:								
1991_%	NA	NA	NA	-	20	-	-	NA
2000_%	NA	NA	70 (including direct exported 5.00%)	40	10	-	-	NA
1.14 Main countries and regions to which the product is exported (if applicable):								
European Union:								
1991_%	-	-	NA	-	-	-	-	NA
2000_%	-	NA	10	-	-	-	-	NA
Other European								
1991_%	-	NA	-	-	-	-	-	NA
2000_%	-	NA	-	-	-	-	-	NA
North America (USA & Canada):								
1991_%	-	NA	NA	-	-	-	-	NA
2000_%	-	NA	20	-	-	-	-	NA
Other (please specify):	-	Middle east	Middle East	Dubai, Liberia, Afica, Cambodia, Mianmar	South East Asia	-	-	-
1991_%	-	NA	NA	-	90	-	-	NA
2000_%	-	NA	60	-	90	-	-	NA
1.15 What percentage of revenue did your firm get from exports?								
1991_%	NA	100	NA	-	-	60	-	60
2000_%	NA	100	80	40	-	70	-	80
1.16 Total Labor force:								
numbers in production	42	50	243	238	400	140	81	700
R&D	-	-	2	-	20	5	4	60

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
administration	–	10	7	78	40	23	5	–
proportion of labor force	–	–	–	–	–	32	–	–
administration from overseas with international experience (optional):	–	–	3	All executive level	2	1	No	–
1.17 What is the firm's relative size and position?	SME	SME	SME	Large	SME	SME	SME	SME
Its market niche? Would you consider the firm to be a market leader?	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Section 2								
(a) Market developments and determinants of profitability:								
2.1 Who are your main customers? domestic/foreign?	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic	Foreign
Are you a sub_contractor for larger company?	Yes	–	No	–	–	Yes	–	–
Is the firm associated with highly visible conglomerates?	–	–	No	–	–	Yes	–	–
2.2 What are your customers' main requirements?	Price,delivery period	Price,delivery	Price, delivery period, standards	Product quality, price	Price, quality include process certification	Price, delivery period, Process certification	Price	Price ,delivery period,quality
describe the relative importance of price, quality: (incl. product/ process certification)	–	–	–	–	–	–	–	–

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
does foreign demand differ in any way from domestic demand? (if applicable)	No	-	Yes	No	No	Yes	NA	Yes
Could you give a brief summary of what aspects (or types) of product quality different markets require:	-	-	Foreign demands non-formaldehyde and non-azodye products	-	-	-	-	Spec of clothes must be 100 %
Please specify which type of product/process certification is required:	-	-	NA	-	-	ISO9002, ISO14001	NA	Change : quality of color must be 100 % , safe
2.3 Has the demand for your products changed over the last ten years and if so, in which ways?	No	Yes	Yes	Yes	Yes	-	Yes	Yes
(is there an environmental dimension?;how important has the environment become in terms of how the firm's products are developed and marketed?)	-	-	Yes, the demand for chemical substances with less environmental impact	Higher quality of product	Fashion design	Want a quality goods	Want high quality goods but stable price	-
2.4 Who are your main competitors? Proportion (%)								
1. mainly domestic	NA	NA	45	-	-	70	100	NA
2. less than 50% abroad	NA	50	55	-	-	30	-	NA
3.more than 50% abroad	NA	-	-	-	-	-	-	NA
4. virtually all abroad	NA	-	-	-	-	-	-	NA

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
2.5 How would you rate the degree of competition on your main sales markets?:								
1. limited	–	–	–	–	–	–	–	–
2. average	–	Yes	–	–	–	–	–	Yes
3. strong	Yes	Yes	Yes	Yes	Yes	Yes	Yes	–
2.6 Have there been changes in the nature and intensity of competition/ market requirements since 1990?	–	–	–	Yes	Yes	–	Yes	–
nature:								
price	harder	change	harder	harder	harder	harder	harder	harder
quality	harder	stable	harder	harder	harder	harder	stable	harder
diversity/uniqueness	stable	–	harder	few	harder	harder	stable	stable
intensity:								
harder	Yes	Yes	–	–	–	–	–	Yes
milder	–	–	–	–	–	–	–	–
stable	–	–	–	–	–	–	–	–
market requirements:								
regulatory	–	–	–	–	–	–	–	–
domestic	–	–	NA	–	–	–	–	–
foreign	–	–	NA	–	–	–	–	–
2.7 What is the firm's strategy for increasing its competitiveness?								
Rank 1_5								
identifying new markets	3	5	2	4	4	4	1	5
developing new products	5	4	4	5	1	2	2	4
increasing market share	5	2	1	–	5	3	3	5
cutting costs	5	4	5	3	2	5	5	4

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
differentiating the products – i.e. making products unique	5 –	3 –	3 –	– –	3 –	1 –	4 –	4 –
2.8 What are the main challenges for the firm in improving its competitiveness/implementing its business strategy?	Potential increasing employee	Increasing sales, potenttial employee	Increasing : sales, company's image, employee's quality of life and capability, and profit	Increasing employee's quality of life and capability	Increasing sales,potenttial employee increasing	Increasing sales, image, potenttial employee increasing, and increasing employee's quality of life	Increasing sales	Increasing image , increasing sale, employee quality improved , Potential increasing employee
(b) Community / NGO/ business association pressure								
2.9 What are the main topics that community/NGO/ business associations may place pressure on your company	No	No	No	–	–	–	Pollution and environment reduction	No
2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Rank 1_5 (where 1 is not at all; and 5 is very much)								
Noise pollution	1	1	4	–	1	2	1	1
Air pollution	2	1	4	4	1	2	2	2
Water pollution	1	3	2	5	2	3	4	2
river	NA	NA	NA	Canal	–	Yes	Yes	NA
lake	NA	NA	NA	–	–	–	–	NA
sea	NA	NA	NA	–	–	–	–	NA

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
2.11 During the period 1991 _ 2000, have any of the following groups brought pressure on your company to reduce pollution? Please note the number of times groups have telephoned, faxed, e_mailed or visited your firm. For news media, please note the number of media reports. Please use the following classifications: 0, 1 to 5, 6 – 10, 11 – 20,								
Environmental NGOs								
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
Student groups								
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
Industry Associations								
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
Consumer Groups		_						
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
News media		_						

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
Citizens or Citizens Groups								
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	2	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
Other								
Objection to issuance of per	NA	_	0	0	_	0	0	NA
Pressure to reduce pollution	NA	_	0	0	_	0	0	NA
Pollution_related lawsuit	NA	_	0	0	_	0	0	NA
2.12 Has your company's strategy ever been influenced by the advice or suggestions of business associations?	Garbage management	No	Yes	Yes	No	Yes	No	Yes
If so, how? Which?	Municipility	_	ATDP, THTI,CPIE,FTI,DIW	The Union textile Merchants association	_	ATDP,FTI	_	ATDP,FTI
Are the business associations local, national, or international?	NA	_	National	local and national level	_	National	No	NA
How did they contact you?	NA	_	Recommendation	Suggestions and advices	_	_	_	NA
Did you consider this a positive development or unpopular and forced?	NA	_	Positive Development	Positive for technology improvement	_	_	_	Positive development
Explain why	_	_	NA	_	_	_	_	_
2.13 Have you ever been influenced by campaigns from NGOs or community organizations?	No	No	No	No	No	No	No	No

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
If so, how? Which?	-	-	-	-	-	-	-	-
Were the groups local	-	-	-	-	-	-	-	-
national	-	-	-	-	-	-	-	-
international	-	-	-	-	-	-	-	-
How did they campaign?	-	-	-	-	-	-	-	-
Newspapers	-	-	-	-	-	-	-	-
Non_public advice	-	-	-	-	-	-	-	-
Citizen protests	-	-	-	-	-	-	-	-
Did you consider this a positive development or unpopular and forced?	-	-	-	-	-	-	-	Positive development
Explain why	-	-	-	-	-	-	-	-
2.14 During the period 1991 _ 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very important. Write 0 if no pressure was exerted.								
Domestic customers	0	0	NA	1	0	0	0	4
Foreign customers	0	NA	NA	1	0	0	0	5
Suppliers	0	NA	NA	1	0	0	0	4
(c) Technology infrastructure:								

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
2.15 What does the firm do when it becomes necessary to consider technological change?								
Does the firm rely on institutions and consultancies for technological change? (give examples of such institutions)	Yes	Yes	-	-	-	-	-	Yes
international organizations	-	-	Yes	Yes	-	Yes	-	-
national government advisory bodies	-	Yes	No	Yes	Yes	Yes	Yes	-
private_sector consultancies	-	-	Yes	-	-	Yes	-	-
Other	-	-	-	-	-	-	-	-
Or from technological resources and advice from within its own company or other companies?	-	-	its own company	-	its own company	-	-	-
2.16 How does the firm access information and support on technological change?	Less	Good	Good	No	Not so good	Good	Not so good	Less
What kind of technological change ('hardware'/processes)	processes change	hardware change	processes	hardware and processes	hardware & processes	processes,improve management	Hardware change	hardware and processes
Does the firm rely more on technology providers within its own company (or family of companies) than organizations outside the	No	No	Yes	Yes	No	-	No	No

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
2.17 How would you assess the existing system of technological support services (range of services, quality,	-	-	-	-	-	-	-	-
In your own firm and parent company?	-	-	NA	Group company	-	-	-	-
In the country or locality as a whole (is more support provided from within the government than from private sector? And is the support better from national or international advisers?) *1= least*	Government = 1, National Private Sector = 1 International Private Sector = 1	Government = 1, National Private Sector = 1 International Private Sector = 1	Government = 2, National Private sector = 3, International Organization = 1	Government = 0, National Private Sector = 0, International Private Sector = 3	Government = 3, National Private Sector = 1, International Private Sector = 2	Government = 2, National Private Sector = 2, International Private Sector = 2	Government = 2, National Private Sector = 3, International Private Sector =1	Government = 1, National Private Sector =1 International Private Sector = 1
Section 3								
3.1 What are the key environmental regulations applicable to the firm? Please list them.	NA	-	Industrial Effluent Standards by Ministry of Industry, Air standrad, Waste treatment and dangerous chemical substances by DIW	1. Factory Act B.E.2535 (1992) 2. Effluent Standard 3. Emission Standard 4. Machinery Act	-	Thai environmental law	Industial effluent standard	NA
How have they affected the firm?	NA	NA	NA	Yes, it cannot comply to effluent standard	-	-	NA	Control energy, water treatment, chemically,air pollution

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
3.2 What are the penalties for compliance failure?	No	No	NA	-	-	No	-	No
What procedures are involved?	-	-	NA	-	-	-	-	-
3.3 Has the firm been penalized for non_compliance?	-	-	No	Yes	-	-	-	-
If so, details	-	-	-	color dyeing	-		-	-
3.4 Is their any form of cooperation with regulators?	No	Yes	No	No	No	-	Yes,DIW	No
3.5 How do regulators act in regard to environmental technology?	No	Yes	-	-	-	-	-	No
Do they recommend specific environment technology (both process and EoP)?	-	No	No	Yes	-	Yes	Yes	-
Do they offer incentives, or other support, referrals, and information?	-	-	No	Yes	-	Support ISO 14001	No	-
Or do they penalize only?	-	-	Yes	No	-	-	No	-
3.6 Do you or environmental authorities make information about the emissions of major pollutants by your firm freely available to the public? Yes or No	Yes	Yes	Yes	No	Yes	Yes	Yes	NA

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
3.7 Does the firm see environmental regulations as costs or benefits	Benefits	Benefits	Benefits	Costs and benefits	Benefits	Benefits	Benefits	Benefits
3.8 Have national environmental regulations reduced or strengthened your competitiveness?	strengthened competitiveness	reduced competitiveness	strengthened competitiveness	-	Increasing cost investment	strengthened competitiveness	strengthened competitiveness	NA
In what ways?	NA	-	NA	-	-	-	-	NA
Do the regulations affect the competitiveness of your competitors?	NA	Yes,high cost and affect cannot competitveness in market	NA	-	-	Decrease competetiveness	Yes	NA
3.9 Are environmental regulations in other countries affecting the firm's competitiveness?	No	No	Yes	Yes	No	Yes	No	Yes
if yes, in what ways?	-	-	No direct impact to the company but it affect agents in European countries	On occupational health and safety	-	Environmental management improving and ECOTEX	-	Control better system
3.10 Do you expect stricter environmental regulations in future?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
If yes, how do you plan to respond?	NA	Try to improve process for reduce pollution	Improving management system , changing technology, monitoring	_	Saminar, potential employee increasing	Decrease cost by use ISO 14001 and CT concept	Plan to improve high efficiency waste treatment according CT concept	Pollution improving
Section 4								
4.1 How would you characterize the level of technology of the firm compared with the sector as a whole (i.e. the								
in terms of process technology:								
Best Available Technology	_	_	_	_	_	_	_	_
standard_modern	_	Yes	Yes	Yes	Yes	Yes	_	Yes
traditional	_	_	_	_	_	_	Yes	_
in terms of products:								
high quality	_	_	_	Yes	_	_	_	_
standard	Yes	Yes	Yes	_	Yes	Yes	Yes	Yes
Low	_	_	_	_		_	_	_
4.2 Do you have a quality management system?	Yes	Yes	No	Yes	Yes	Yes	No	No
If so, is it ISO compatible?	_	_	_	Yes	Yes	Yes and ECOTEX	No	_
Are you ISO certified?	_	_	No	Yes	Yes	No	No	_
4.3 What were the major changes in technology over the past ten years?	No	Yes	No	_	_	Yes	Hardware implementation	Yes

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
4.4 Which were the main objectives behind the technological changes? Please rnk 1_5 (1=not important; 5=very important) and specify:								
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	5	3	4	4	2	5	2	5
Productivity increase (in terms of output volume)	5	5	NA	5	1	5	5	5
Quality improvements (product/ process)	5	5	NA	3	3	5	3	5
Meeting environmental regulations/standards	2	3	NA	2	4	5	4	4
Opening up new markets	3	3	5	2	5	5	_	5
Extend product range	3	_	5	2	5	5	1	4
Other (please specify)	_	_	NA	_	_	_	_	_
4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1_5)								
water	NA	5	5	2	3	4	4	4
energy	NA	5	5	2	3	4	4	4
raw materials	NA	5	5	2	3	4	4	4
4.6 In terms of equipment:								
Where did the equipment come from (firm/country)?	Denmark	Japan , India	Germany, Taiwan	India, Belgium, Korea, Germany, Japan, Thailand	Europe	Hongkong, Thai, Germany,ITALY,Spain	Thai,Taiwan	German,Taiwan,Italy

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
How was it financed?								
loan	-	-	No	-	-	-	-	-
subsidy	-	-	No	-	-	-	-	-
Equity	-	-	No	-	-	-	-	-
Other	-	-	No	-	-	-	-	-
4.7 Do financial intermediaries impose environmental regulations for equipment financing?	No	No	Yes	No	No	Yes	No	Yes
4.8 What was the firm's annual average capital and operation & maintenance expenditures for pollution control in local currency?	-	-	-	-	-	-	-	-
1991	-	2.30 million baht	NA	-	-	14.40 million baht	-	-
1996	-	-	NA	-	-	-	-	-
2000	-	1.50 million baht	3 _ 5 % of sales (capital investment), 40% of capital investment (operation cost), 60% of capital investment (maintenance)	-	-	3.15 million baht	4.30 million baht	-
4.9 List the most important environmental projects that the firm has undertaken since 1991.								

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Project 1	-	CPE	Wastewater treatment system	CPIE	-	CT	Steam stove	-
Year started	-	2001	1986	2001	-	1996	1997	-
Year completed	-	NA	1988	-	-	Present	Present	-
Costs in local currency	-	NA	-	-	-	-	-	-
Total investment	-	NA	14 mill.baht (including O&M costs)	-	-	-	2.50 million baht/year	-
Maintenance/ operational co	-	NA	-	-	-	-	500,000 baht/year	-
Environmental impact	-	Less	Reducing wastewater	-	-	System/water,Air,soil, resource	Air pollution reduction	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	NA	-	-	-	200,000 baht/year	-
Source of project financing (%)								
Company	-	-	Yes	-	-	Yes	-	-
Commercial loan	-	-	-	-	-	-	100	-
Government	-	-	-	-	-	-	-	-
Other (specify)	-	-	-	-	-	Foreiner	-	-
Project 2	-	-	Industrial indicator	-	-	Env. Index	water filter	-
Year started	-	-	2000	-	-	2000	2000	-
Year completed	-	-	2001	-	-	2000	Present	-
Costs in local currency								
Total investment	-	-	NA	-	-	-	475,000 baht/year	-

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Maintenance/ operational co	-	-	NA	-	-	-	7,000 baht/year	-
Environmental impact	-	-	getting information for policy monitoring	-	-	Decrease impact	Water pollution reduction	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	0.5 mill.baht	-	-	not assess	20,800 baht/year	-
Source of project financing (%)								
Company	-	-	NA	-	-	-	100	-
Commercial loan	-	-	NA	-	-	-	-	-
Government	-	-	NA	-	-	-	-	-
Other (specify)	-	-	NA	-	-	-	-	-
Project 3	-	-	ISO 9000	-	-	ISO 14001	-	-
Year started	-	-	1998	-	-	2000	-	-
Year completed	-	-	1999	-	-	Present	-	-
Costs in local currency	-	-	-	-	-	-	-	-
Total investment	-	-	Company investment is 0.1 mill.baht, the remaining is from government subsidy (including O&M costs)	-	-	-	-	-
Maintenance/ operational co	-	-	-	-	-	-	-	-
Environmental impact	-	-	NA	-	-	Decrease cost	-	-

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	0.1 mill.baht	-	-	Not assess	-	-
Source of project financing (%)								
Company	-	-	Yes	-	-	-	-	-
Commercial loan	-	-	-	-	-	-	-	-
Government	-	-	Yes	-	-	Yes	-	-
Other (specify)	-	-	-	-	-	-	-	-
Project 4	-	-	-	-	-	-	-	-
Year started	-	-	-	-	-	-	-	-
Year completed	-	-	-	-	-	-	-	-
Costs in local currency	-	-	-	-	-	-	-	-
Total investment	-	-	-	-	-	-	-	-
Maintenance/ operational co	-	-	-	-	-	-	-	-
Environmental impact	-	-	-	-	-	-	-	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	-	-	-	-	-	-
Source of project financing (%)	-	-	-	-	-	-	-	-
Company	-	-	-	-	-	-	-	-
Commercial loan	-	-	-	-	-	-	-	-
Government	-	-	-	-	-	-	-	-
Other (specify)	-	-	-	-	-	-	-	-

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company: (from 1_5 with 1 denoting not important and 5 denoting very important)								
Regulatory pressure, high pollution charges and fines	3	3	4	1	NA	5	3	5
Environmental norms and standards for selling goods in	_	0	4	3	NA	5	_	4
Requirements of the firm's business partners (suppliers, customers, investors)	_	0	3	4	NA	5	_	5
Environmental requirements imposed by owners and shareholders of the firm	_	1	4	1	NA	5	1	4
Expectations that in the future regulations will be more stringent and charges will be higher	_	4	4	5	NA	5	5	5
The cost of wasteful energy and material input use	_	5	5	3	NA	5	4	4
Public pressure (by local communities, NGOs)	_	1	2	1	NA	5	2	3
Peer pressure (by business associations, other firms)	_	1	2	1	NA	5	_	4
Incentives (loans, grants, tax exemptions,...)	_	3	1	1	NA	3	_	4

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
Goal not to lag behind competitors who have achieved good result in waste reductions	_	5	3	1	NA	5	_	4
Other: (specify)	_	_	_	_	NA	_	_	_
4.11 What is the ratio between pollution prevention and end_of_pipe techniques?	1.00	1.00	1 by 1	Pollution prevention	1	1.00	1	1.00
4.12 How were the changes implemented? On which sources of information did the firm rely when identifying technology?	Supplier	supplier, consultants,DIW	Suppliers, customers, business associations, and academic institutes	Parent company (in India), and abroad site visit	Exhibition, customers	Supplier , Customer information, Business association, Technology, Acedamic journal	Supplier	Business association ,Journal,personel exchange
How would you assess your access to technological What was the source of the technology (in terms of both 'hard' and 'soft' technologies) itself ?	easy _	not so hard _	not so hard _	_ _	not so hard _	not so hard _	not so hard _	not so hard _
Please specify if the provider is located:								

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
within the same state/province as the	–	–	–	–	–	Yes	–	–
...or within the country?	Yes	Yes	Yes	–	Yes	Yes	Yes	–
...or within the region / other developing country?	–	–	–	other developing country	–	Yes	–	Yes
...or in an industrialized cou	–	–	Yes	–	Yes	–	–	–
Did the firm rely on external technical support in assessing, selecting and implementing the technology (i.e. equipment) ? (i.e. firms or agencies not within the company or parent company)	–	Yes	No	–	Yes	–	Yes	–
Did the firm cooperate with other firms in implementing the changes?	Yes	Yes	No	No	Yes	Yes	Yes	Yes
vertical networks:	NA	Yes	–	–	–	Yes	–	Yes
horizontal networks:	–	–	–	–	Yes	–	Yes	–
4.13 What links do you have with technological associations or other producers or disseminators of technology, and how do you use these	No	No	Yes	Cooperating with academic institution on technology change	No	–	No	THTI
4.14 Did you experience problems in implementing the changes? If so, please elaborate.	No	No	Yes, investment cost	–	No	Yes	Yes, lack of tradition/skill about New technology	No
4.15 What resources or personnel do you have within your company to enhance your adoption of environmental technology?	–	2 persons	2 persons	Yes	NA	2 persons	3 persons	–

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
4.16 Does the firm have an environmental policy or strategy? If so,	No	Yes,In 2001	1999	Yes. In 1997	No	Yes,in 2000	Yes. In 1999	No
What are the main objectives and how are they implemented?	–	–	NA	Just implementing draft policy	–	–	–	–
Why does this firm have this kind of policy?	–	C.P.E	Want to have environment management system	Environmental policy from parent company	–	Pollution prevention,to practice regulation	Prepare for stricter environmental Regulation	NA
4.17 Does your company participate in any waste minimization or pollution prevention programme?	No	No	Yes	No	No	Yes	Yes, CT	No
And why?	–	–	CT and other projects in (4.9)	–	–	–	–	–
4.18 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1_5	No	No	–	No	–	Yes	–	No
Lack of information?	–	–	2	–	5	3	5	–
High implementation cost?	–	–	3	–	NA	3	3	–
No alternative chemical/raw material input?	–	–	2	–	NA	3	–	–
No alternative process	–	–	5	–	NA	3	2	–
Uncertainty about performance impact?	–	–	1	–	5	3	1	–
Lack of tradition/skills?	–	–	4	–	3	3	4	–
Other: specify	–	–	–	–	–	–	–	–

Name of the firm	F9	F10	F11	F12	F13	F14	F15	F16
4.19 If your firm has not adopted new EST in recent years, can you explain why not? Rank Importance 1_5	No	Yes	Yes	Yes	_	No	_	No
Lack of information?	_	_	3	3	5	_	_	_
High implementation cost?	_	4	5	5	5	_	_	_
No alternative chemical/raw material input?	_	1	2	3	5	_	_	_
No alternative process	_	1	4	1	5	_	_	_
Uncertainty about performance impact?	_	1	1	5	5	_	_	_
Lack of tradition/skills?	_	1	3	2	5	_	_	_
Other: specify	_	_	_	_	_	_	_	_

Section 1								
Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Address	Nakhompratom	Nakhonpratom	Nakonpathom	Nontaburi	Nonthaburi	Bangkok	Bangkok	Samutsakorn
1.3 Year of establishment:	1988	1986	1975	1995	1989	1971	1964	1973
1.4 Ownership structure:								
private domestic %	100	100	100	100	100	100	100	100
private foreign %	–	–	–	–	–	–	–	–
government %	–	–	–	–	–	–	–	–
1.5 Major lines of business: key products; processes (please, indicate production volume for main products):	Polyester 100%, pretreatment,dyeing,finishing	Dyeing &finishing commision (160 tonnes/month), processes: pretreatment,dyeing, printing,finishing	Woven Fabric: 2.5E5 yard/month	Pretreatment,Dyeing, printing,finishing	: Ribbin 70 million mater/year, Lingerie 10 million mater/year /to weave,to dye	Dyeing : yarn 135,000 kg	Silks and modify product: 200 yard/day	Dyeing &finishing commision (400_600 tonnes/month), processes: dyeing, stenter dye, packing
Briefly describe the firm's key products and processes in relation to its main competitors:	Higher price and higher quality	Quality: service high_end customer price: still competitive	Continuous	–	Quality: medium , Price: cheaper than foreingn 20 %	Dyeing	Printing, Dyeing,weave	Quality: not differnce from competitors , Price: depend on time
Does the firm use international standards / enterprise standards for its main products? (if so, specify):	No	International Standards(ATCC), customer standard	company assignment standard (ISO9002) ,customer standards	customer standards	use enterprise standards for dimension, elastic,color and use customer standards	company assignment standard	company assignment standard ,customer standards	use customer standards
1.6 Plants Nos.	0	1	–	3	–	–	–	3
Locations	–	Nakhonpratom	Nakonpathom	Nontaburi	Nonthaburi	Bangkok	Bangkok	Samutsakorn
divisions within production proces	–	Garment	pretreatment , Dyeing,Finishing	garment	Weave	Dyeing	Pretreatment,Dyeing, Printing,Finishing	fabric commissioning, yarn

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
1.7 Installed capacity (specify unit of measurement):	–	–	Ton/year(million yard/year)	million yard/year	Ton/year(yard/year)	Kg/year(yard/year)	–	Tonnes/yr(million yard/year)
In1991	–	–	880(4.80)	–	115(627,272.70)	NA	NA	–
In 2001	–	–	5,500(30.00)	–	500(2.73 million yard/year)	135,000(736,363.40)	NA	2,200(12.00)
Utilized capacity (at present): %	–	–	–	–	–	–	–	90.91
1.8. Output as a percentage of ?								
1991_%	–	–	75	–	100	NA	NA	–
1996_%.	–	–	69.23	21.9	100	NA	NA	–
2000_%	–	–	64	79	100	NA	NA	95.45
1.9 In what year was most of your plant and equipment built?	–	1989	2001	1997	NA	2001	1994	2000
1.10 Turnover (in domestic currency): million baht/year								
in 1991	–	–	30	–	45	NA	NA	–
in 2000	–	–	148	79	180	NA	NA	130
1.11 Profit ratio (total profits as fraction of sales/turnover):%		–						
In 1991	–	–	4	–	-5	NA	NA	–
In 2000	–	–	5	–	3.5	NA	NA	4.8
1.12 Cost of production from official reports (in local currency): million baht/year								
1991	–	–	NA	–	28.04	NA	NA	–
1996	–	–	NA	–	84.95	NA	NA	–
2000	–	–	NA	–	174.8	NA	NA	114.66
Depreciation and interest payment								

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
1991	_	_	NA	_	5	NA	NA	_
1996	_	_	NA	_	5.65	NA	NA	_
2000	_	14	NA	30	13.43	0.87	NA	4.44
Labour costs								
1991	_	_	NA	_	1.11	NA	NA	_
1996	_	_	NA	_	7.61	NA	NA	_
2000	_	16	NA	2.419	12.61	1.45	NA	9.76
Raw material costs								
1991	_	_	NA	_	1.91	NA	NA	_
1996	_	_	NA	_	68.45	NA	NA	_
2000	_	40	NA	9.497	144.93	1.77	NA	75.19
Energy costs								
1991	_	_	NA	_	2.73	NA	NA	_
1996	_	_	NA	_	3.15	NA	NA	_
2000	_	30	NA	6.37	3.71	0.13	NA	11.44
Water								
1991	_	_	NA	_	0.05	NA	NA	_
1996	_	_	NA	_	0.09	NA	NA	_
2000	_	72	NA	_	0.11	0.02	NA	0.59
Other								
1991	_	_	NA	_	_	NA	NA	_
1996	_	_	NA	_	_	NA	NA	_
2000	_	52	NA	3.057	_	21,129	NA	13.24
1.13 Export orientation: where is the main product of the firm sold?: Domestic market:								
1991_%	_	_	NA	_	89	NA	NA	100

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
2000_%	95	–	NA	–	86	100	NA	100
Exported:								
1991_%	–	–	–	–	11	NA	NA	–
2000_%	5	100	–	100	14	–	NA	–
1.14 Main countries and regions to which the product is exported (if applicable):								
European Union:								
1991_%	NA	–	–	–	–	–	–	–
2000_%	NA	–	–	–	–	–	–	–
Other European								
1991_%	–	–	–	–	–	–	–	–
2000_%	–	–	–	–	–	–	–	–
North America (USA & Canada):	Yes							
1991_%	NA	–	–	–	1	–	NA	–
2000_%	NA	–	–	–	0.5	–	NA	–
Other (please specify):	–	–	–	–	SEA	–	Japan	–
1991_%	–	–	–	–	10	–	NA	–
2000_%	–	–	–	–	15	–	NA	–
1.15 What percentage of revenue did your firm get from exports?								
1991_%	–	–	–	–	12	–	NA	–
2000_%	–	100	–	100	14	–	NA	–
1.16 Total Labor force:								
numbers in production	120	200	380	50	259	18	110	176
R&D	–	2	10	2	10	–	–	15

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
administration	20	50	25	5	25	2	5	10
proportion of labor force	–	148	–	3	–	–	–	–
administration from overseas with international experience (optional):	–	–	–	–	–	1	1	–
1.17 What is the firm's relative size and position?	SME	SME	SME	SME	SME	SME	SME	SME
Its market niche? Would you consider the firm to be a market leader?	No	Yes	Yes	No	–	Yes	Yes	No
Section 2								
(a) Market developments and determinants of profitability:								
2.1 Who are your main customers?								
domestic/foreign?	Domestic	Domestic	Domestic	Domestic	Both	Domestic	Domestic	Domestic
Are you a sub_contractor for larger company?	–	–	–	–	Yes	–	–	–
Is the firm associated with highly visible conglomerates?	–	–	–	–	No	–	–	–
2.2 What are your customers' main requirements?	Quality include process certification, derivery	Quality,delivery	Delivery period,qualit	Price,quality	Price,delivery period	Delivery period,qualit	Quality	Price,quality,delivery
describe the relative importance of price, quality: (incl. product/ process certification)	–	–	–	–	–	–	–	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
does foreign demand differ in any way from domestic demand? (if applicable)	Yes	–	Yes	Yes	To underline use high price of raw material .	NA	Yes	Yes
Could you give a brief summary of what aspects (or types) of product quality different markets require:	–	–	NA	–	NA	NA	specially assignment	–
Please specify which type of product/process certification is required:	Quality	Quality	–	Quality	Changeless	NA	Fix: clothing color	Quality
2.3 Has the demand for your products changed over the last ten years and if so, in which ways?	Yes	Yes	Yes	Yes	–	Yes	Yes	Yes
(is there an environmental dimension?;how important has the environment become in terms of how the firm's products are developed and marketed?)	Products differentiating	Concern more about quality and require ISO,ECOTEX standard	Delivery period,qualit	Lower product quantity, lower price, high quality, shorter derivery	–	–	–	Concern more about quality and environment
2.4 Who are your main competitors? Proportion (%)								
1. mainly domestic	100	100	NA	–	–	NA	NA	100
2. less than 50% abroad	–	–	NA	–	Yes	–	NA	–
3.more than 50% abroad	–	–	NA	–	–	–	NA	–
4. virtually all abroad	–	–	NA	–	–	–	NA	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
2.5 How would you rate the degree of competition on your main sales markets?:								
1. limited	–	–	–	–	–	–	–	–
2. average	–	–	–	–	Yes	Yes	–	–
3. strong	Yes	Yes	Yes	Yes	–	Yes	Yes	Yes
2.6 Have there been changes in the nature and intensity of competition/ market requirements since 1990?	Yes	Yes	–	Yes	–	–	–	–
nature:								
price	harder	harder	harder	harder	–	harder	–	harder
quality	harder	harder	harder	harder	–	harder	–	harder
diversity/uniqueness	harder	harder	stable	stable	–	stable	–	stable
intensity:								
harder	–	–	Yes	–	Yes	Yes	–	–
milder	–	–	–	–	–	–	Yes	–
stable	–	–	–	–	–	–	–	–
market requirements:								
regulatory	–	–	–	–	–	–	–	–
domestic	–	–	–	–	–	–	–	–
foreign	–	–	–	–	–	–	–	–
2.7 What is the firm's strategy for increasing its competitiveness?								
Rank 1_5								
identifying new markets	1	3	2	4	4	2	NA	4
developing new products	3	4	3	1	1	5	NA	3
increasing market share	2	3	4	5	3	5	NA	4
cutting costs	4	4	5	3	2	4	NA	5

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
differentiating the products - i.e. making products unique	5 –	4 –	5 –	2 –	2 –	4 –	NA –	5 –
2.8 What are the main challenges for the firm in improving its competitiveness/implementing its business strategy?	Increasing sales, image	Increasing sales, and increasing employee's quality of life	Increasing sale	Increasing employee's quality of life	Increasing image	Increasing sale,employee quality improved	NA	Increasing sales, image, employee quality improvement
(b) Community / NGO/ business association pressure								
2.9 What are the main topics that community/NGO/ business associations may place pressure on your company	Environmental cost increasing	–	No	–	–	No	No	Enviroment quality, pollution
2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Rank 1_5 (where 1 is not at all; and 5 is very much)								
Noise pollution	1	1	1	1	1	3	1	2
Air pollution	1	2	3	1	2	3	1	2
Water pollution	4	2	2	1	1	3	1	3
river	OmiYai Klong	TaChein	Yes	–	Yes	NA	NA	OmNoi Klong
lake	–	–	–	–	–	NA	NA	–
sea	–	–	–	–	–	NA	NA	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
2.11 During the period 1991 _ 2000, have any of the following groups brought pressure on your company to reduce pollution? Please note the number of times groups have telephoned, faxed, e_mailed or visited your firm. For news media, please note the number of media reports. Please use the following classifications: 0, 1 to 5, 6 – 10, 11 – 20,								
Environmental NGOs								
Objection to issuance of per	_	_	NA	0	_	0	0	_
Pressure to reduce pollution	_	_	NA	0	_	0	0	_
Pollution_related lawsuit	_	_	NA	0	_	0	0	_
Student groups								
Objection to issuance of per	_	_	NA	0	_	0	0	_
Pressure to reduce pollution	_	_	NA	0	_	0	0	_
Pollution_related lawsuit	_	_	NA	0	_	0	0	_
Industry Associations								
Objection to issuance of per	_	_	NA	0	_	0	0	_
Pressure to reduce pollution	_	_	NA	0	_	0	0	_
Pollution_related lawsuit	_	_	NA	0	_	0	0	_
Consumer Groups			NA		_	0	0	
Objection to issuance of per	_	_	NA	0	_	0	0	_
Pressure to reduce pollution	_	_	NA	0	_	0	0	_
Pollution_related lawsuit	_	_	NA	0	_	0	0	_
News media								

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Objection to issuance of per	-	-	NA	0	-	0	0	-
Pressure to reduce pollution	-	-	NA	0	-	0	0	-
Pollution_related lawsuit	-	-	NA	0	-	0	0	-
Citizens or Citizens Groups								
Objection to issuance of per	-	-	NA	0	-	0	0	-
Pressure to reduce pollution	-	-	NA	0	-	0	0	-
Pollution_related lawsuit	-	-	NA	0	-	0	0	-
Other								
Objection to issuance of per	-	-	NA	0	-	0	0	-
Pressure to reduce pollution	-	-	NA	0	-	0	0	-
Pollution_related lawsuit	-	-	NA	0	NA	0	0	-
2.12 Has your company's strategy ever been influenced by the advice or suggestions of business associations?	No	No	No	No	No	No	NA	Yes
If so, how? Which?	-	-	-	-	-	NA	NA	ATDP,THTI
Are the business associations local, national, or international?	-	-	-	No	No	NA	NA	National
How did they contact you?	-	-	-	-	-	NA	NA	Recommendation
Did you consider this a positive development or unpopular and forced?	-	-	-	-	-	NA	NA	Positive development
Explain why	-	-	-	-	-	-	NA	-
2.13 Have you ever been influenced by campaigns from NGOs or community organizations?	No	No	No	No	No	No	No	No

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
If so, how? Which?	–	–	–	–	–	–	–	–
Were the groups local	–	–	–	–	–	–	–	–
national	–	–	–	–	–	–	–	–
international	–	–	–	–	–	–	–	–
How did they campaign?	–	–	–	–	–	–	–	–
Newspapers	–	–	–	–	–	–	–	–
Non_public advice	–	–	–	–	–	–	–	–
Citizen protests	–	–	–	–	–	–	–	–
Did you consider this a positive development or unpopular and forced?	–	–	–	–	–	–	–	–
Explain why	–	–	–	–	–	–	–	–
2.14 During the period 1991 _ 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very important. Write 0 if no pressure was exerted.								
Domestic customers	0	0	0	0	0	0	0	0
Foreign customers	0	0	0	0	0	0	0	0
Suppliers	0	0	0	0	0	0	0	0
(c) Technology infrastructure:								

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
2.15 What does the firm do when it becomes necessary to consider technological change?								
Does the firm rely on institutions and consultancies for technological change? (give examples of such institutions)	–	–	Yes	–	Yes	Yes	Yes	–
international organizations	–	–	Yes	–	Yes	–	–	–
national government	–	Yes	Yes	–		–	–	–
advisory bodies					Yes			
private_sector consultancies	–	–	–	–	–	–	Yes	Yes
Other	–	–	–	–	–	–	–	–
Or from technological resources and advice from within its own company or other companies?	its own company	–	–	other company	–	–	–	–
2.16 How does the firm access information and support on technological change?	Good	Not so good	Good	Good	–	Less	Never	Good
What kind of technological change ('hardware'/processes)	processes	hardware & processes	processes change	processes	hardware change	hardware change	hardware change	hardware & processes
Does the firm rely more on technology providers within its own company (or family of companies) than organizations outside the	Yes	No	Yes	No	–	No	No	No

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
2.17 How would you assess the existing system of technological support services (range of services, quality,	-	-	-	-	NA	-	-	-
In your own firm and parent company?	-	-	-	-	-	-	-	-
In the country or locality as a whole (is more support provided from within the government than from private sector? And is the support better from national or international advisers?) *1= least*	Government = 1, National Private Sector = 1, International Private Sector = 1	Government = 1, National Private Sector = 1, International Private Sector =2	Government = 2, National Private Sector = 1 International Private Sector = 3	Government = 1, National Private Sector = 2, International Private Sector =3	Government = 1 National Private Sector = 2 International Private Sector = 0	Government = 1, National Private Sector = 1 International Private Sector = 0	Government = 2, National Private Sector = 0 International Private Sector = 0	Government = 2, National Private Sector = 2, International Private Sector = 1
Section 3								
3.1 What are the key environmental regulations applicable to the firm? Please list them.	1.Factory Act. 2. Machine Act. 3. Effluent and airpollution standards	Notification of ministry of Industry, mininistry of Interior, ministry of science technology & environment, Thai environment committee	NA	NA	NA	NA	labour regulation	solid waste management
How have they affected the firm?	-	No	Waste management,Dust, exhaust gas,waste discharge	NA	Facilitaty to work ,to decrease problem in the future	NA	NA	No

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
3.2 What are the penalties for compliance failure?	–	–	Yes	–	No	No	No	–
What procedures are involved?	–	–	limited on the regulation	–	–	–	–	–
3.3 Has the firm been penalized for non_compliance?	–	–	no affect	–	–	–	–	No
If so, details	–	–	–	–		–	–	–
3.4 Is their any form of cooperation with regulators?	Yes, about waste treatment of Tachein river	No	No	No	No	Yes	Yes	Yes, company use the enviromental management to help
3.5 How do regulators act in regard to environmental technology?	–	–	No	No	No	Yes	Yes	–
Do they recommend specific environment technology (both process and EoP)?	advice recommendation	–	–	–	No	–	–	Yes
Do they offer incentives, or other support, referrals, and information?	–	–	–	–	–	–	offer incentives,support referrals and information	–
Or do they penalize only?	–	–	–	–	No	–	–	–
3.6 Do you or environmental authorities make information about the emissions of major pollutants by your firm freely available to the public? Yes or No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
3.7 Does the firm see environmental regulations as costs or benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits	Benefits
3.8 Have national environmental regulations reduced or strengthened your competitiveness?	No	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	No	Increasing cost investment
In what ways?	–	–	–	–	Company have complete both of domestic and national in future	NA	–	–
Do the regulations affect the competitiveness of your competitors?	–	–	–	–	No	NA	–	cost per unit increasing
3.9 Are environmental regulations in other countries affecting the firm's competitiveness?	No	Yes	Yes	No	Yes	No	No	Yes
if yes, in what ways?	–	Increasing cost investment and product price still lower	Good credit	–	–	–	–	If as the export company must do the ISO14000 that means trade barrier
3.10 Do you expect stricter environmental regulations in future?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
If yes, how do you plan to respond?	_	Preparing EMS system according ISO 14001	Receive ISO 14001	Try to improve process for reduce pollution and prepare high efficiency management system	Monitoring notice ,improve,accept rugulation	Training with THTI, Technology safety center,FTI etc.	Preparation improving	System improving, resource development, reduce cost production & market expanding
Section 4								
4.1 How would you characterize the level of technology of the firm compared with the sector as a whole (i.e. the								
in terms of process technology:								
Best Available Technology	_	_	_	Yes	_	_	_	_
standard_modern	Yes	Yes	Yes	_	Yes	Yes	Yes	Yes
traditional	_	_	_	_	_	_	_	_
in terms of products:								
high quality	Yes	_	_	Yes		_	_	_
standard	_	Yes	Yes	_	Yes	Yes	Yes	Yes
Low	_	_	_	_		_	_	_
4.2 Do you have a quality management system?	Yes(QSME)	Yes	Yes	No	Yes	Yes	No	No
If so, is it ISO compatible?	_	YES	_	No	_	_	_	_
Are you ISO certified?	_	Yes	Yes	No	_	_	_	No
4.3 What were the major changes in technology over the past ten years?	No	_	Yes	_	Yes	Yes	Yes	process technology improvement & improve machine to more modern

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
4.4 Which were the main objectives behind the technological changes? Please rnk 1_5 (1=not important; 5=very important) and specify:								
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	_	5	5	3	2	4	5	5
Productivity increase (in terms of output volume)	_	5	5	2	1	5	5	5
Quality improvements (product/ process)	_	5	5	1	3	5	5	5
Meeting environmental regulations/standards	_	4	4	4	_	5	4	3
Opening up new markets	_	3	5	5	4	1	_	4
Extend product range	_	3	5	5	5	1	1	5
Other (please specify)		_	_	_	_	_	_	_
4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1_5)								
water	5	3	5	4	4	4	5	5
energy	5	3	5	4	4	4	5	5
raw materials	5	3	5	4	4	4	5	5
4.6 In terms of equipment:	Stenter, Jigger, Dyeing	Dyeing,Finishinng, Lab testing						Dyeing, stenter
Where did the equipment come from (firm/country)?	Japan, Korea, Germany	Taiwan, Hongkong, Germany,America, Switzerland	Japan,Germany	Auatria, Netherland, Germany	Switzerland,Italy	Taiwan,Thai	India	Taiwan Germany Korea Italy

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
How was it financed?								
loan	–	–	–	–	–	–	–	–
subsidy	–	–	–	–	–	–	–	–
Equity	–	–	–	–	–	–	–	–
Other	–		–	–	–	–	–	–
4.7 Do financial intermediaries impose environmental regulations for equipment financing?	No	No	No	No	No	No	Yes	Yes
4.8 What was the firm's annual average capital and operation & maintenance expenditures for pollution control in local currency?	–	–	–	–	–	–	–	–
1991	–	–	–	–	270,000 baht/year	NA	–	–
1996	–	–	–	–	–	NA	–	–
2000	–	–	10.20 million baht	–	550,000 baht/year	2.04 million baht	5,000 Baht/month	–
4.9 List the most important environmental projects that the firm has undertaken since 1991.								

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Project 1	–	–	EOP	–	land dry	Water treatment plant	–	Energy conservation
Year started	–	–	1997	–	1993	2000	–	2000
Year completed	–	–	2000	–	2001	2002	–	2001
Costs in local currency	–	–	NA		–	–	–	–
Total investment	–	–	NA	–	200,000 baht/year	600,000 baht/year	–	–
Maintenance/ operational co	–	–	–	–	–	–	–	–
Environmental impact	–	–	Save water	–	Save water	Less	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	NA	–	–	–	–	–
Source of project financing (%)								
Company	–	–	NA	–	–	–	–	–
Commercial loan	–	–	NA	–	–	–	–	–
Government	–	–	NA	–	–	–	–	–
Other (specify)	–	–	–	–	–	–	–	–
Project 2	–	–	CT	–	Waste water test	–	–	Efficiency water Using
Year started	–	–	–	–	2001	–	–	2001
Year completed	–	–	–	–	–	–	–	2002
Costs in local currency								
Total investment	–	–	–	–	50,000	–	–	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Maintenance/ operational co	–	–	–	–	–	–	–	–
Environmental impact	–	–	–	–	Save water	–	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	–	–	–	–	–
Source of project financing (%)								
Company	–	–	–	–	–	–	–	–
Commercial loan	–	–	–	–	–	–	–	–
Government	–	–	–	–	–	–	–	–
Other (specify)	–	–	–	–	–	–	–	–
Project 3	–	–	–	–	–	–	–	Value engineering
Year started	–	–	–	–	–	–	–	2000
Year completed	–	–	–	–	–	–	–	–
Costs in local currency	–	–	–		–	–	–	–
Total investment	–	–	–	–	–	–	–	–
Maintenance/ operational co	–	–	–	–	–	–	–	–
Environmental impact	–	–	–	–	–	–	–	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	–	–	–	–	–
Source of project financing (%)								
Company	–	–	–	–	–	–	–	–
Commercial loan	–	–	–	–	–	–	–	–
Government	–	–	–	–	–	–	–	–
Other (specify)	–	–	–	–	–	–	–	–
Project 4	–	–	–	–	–	–	–	–
Year started	–	–	–	–	–	–	–	–
Year completed	–	–	–	–	–	–	–	–
Costs in local currency	–	–	–		–	–	–	–
Total investment	–	–	–	–	–	–	–	–
Maintenance/ operational co	–	–	–	–	–	–	–	–
Environmental impact	–	–	–	–	–	–	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	–	–	–	–	–	–	–	–
Source of project financing (%)	–	–	–	–	–	–	–	–
Company	–	–	–	–	–	–	–	–
Commercial loan	–	–	–	–	–	–	–	–
Government	–	–	–	–	–	–	–	–
Other (specify)	–	–	–	–	–	–	–	–

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company: (from 1_5 with 1 denoting not important and 5 denoting very important)								
Regulatory pressure, high pollution charges and fines	5	NA	3	3	2	5	-	5
Environmental norms and standards for selling goods in	5	NA	1	4	-	1	-	5
Requirements of the firm's business partners (suppliers, customers, investors)	5	NA	1	2	-	1	-	5
Environmental requirements imposed by owners and shareholders of the firm	5	NA	1	4	3	5	-	3
Expectations that in the future regulations will be more stringent and charges will be higher	5	NA	5	5	4	5	-	3
The cost of wasteful energy and material input use	5	NA	5	5	5	3	-	5
Public pressure (by local communities, NGOs)	5	NA	1	4	-	1	-	4
Peer pressure (by business associations, other firms)	5	NA	1	4	1	1	-	4
Incentives (loans, grants, tax exemptions,...)	-	NA	1	1	-	1	-	-

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
Goal not to lag behind competitors who have achieved good result in waste reductions	_	NA	5	4	_	1	_	_
Other: (specify)	_	NA	_	_	_	_	_	_
4.11 What is the ratio between pollution prevention and end_of_pipe techniques?	End_of_pipe	1	1.00	Pollution prevention	1.00	1.00	1.00	Both
4.12 How were the changes implemented? On which sources of information did the firm rely when identifying technology?	Suplier, consultants	Exhibition, customers Supller, Associate, Technology Center, journal	Exhibition ,Business associationr, Technology center	Supplier, other company	Exhibition,Supplier, Technology center	Journal , Supplier, Data from customer	_	Trade fairs, suppliers of machinery and equipment, suppliers of raw materials and components/interme diate products, customer, association, consultant, educational institutute, journal/publications
How would you assess your access to technological What was the source of the technology (in terms of both 'hard' and 'soft' technologies) itself ?	easy _	not so hard _	hard _	not so hard _	hard _	not so hard _	not so hard _	hard _
Please specify if the provider is located:								

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
within the same state/province as the	–	–	–	–	–	–	–	–
...or within the country?	–	–	Yes	–	Yes	Yes	Yes	Yes
...or within the region / other developing country?	–	–	Yes	–	–	–	–	Yes
...or in an industrialized cou	Yes	Yes	–	Yes	–	–	–	Yes
Did the firm rely on external technical support in assessing, selecting and implementing the technology (i.e. equipment) ? (i.e. firms or agencies not within the company or parent company)	Yes	Yes	–	Yes	No	–	–	–
Did the firm cooperate with other firms in implementing the changes?	No	Yes	Yes	Yes	No	Yes	Yes	Yes
vertical networks:	–	Yes	–	–	–	NA	–	Yes
horizontal networks:	–	–	Yes	Yes	–	–	–	–
4.13 What links do you have with technological associations or other producers or disseminators of technology, and how do you use these	No	No	THTI,ATDP	No	–	No	Thai silk association	No
4.14 Did you experience problems in implementing the changes? If so, please elaborate.	Yes, have not enough water in the process	Yes, lack of tradition/skill	Yes, high cost	Yes	Yes. Confident in expected result.	No	Yes	Yes, not understanding employment
4.15 What resources or personnel do you have within your company to enhance your adoption of environmental technology?	NA	NA	3 persons	leader of each department	3 persons	–	2 persons	Yes, engineering department & LAB

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
4.16 Does the firm have an environmental policy or strategy? If so,	No	Yes, In 2002	Yes,In 2000	Yes,In 1997	1995	2000	-	Yes, in 2001
What are the main objectives and how are they implemented?	-	-	-	-	-	-	-	-
Why does this firm have this kind of policy?	-	Meet customers requirment	Good credit	Prepare for environmental Regulation in the future	Decrease problem with people	Incrase standard	-	Improve environmental management
4.17 Does your company participate in any waste minimization or pollution prevention programme?	-	Yes(EMS)	Yes,CT (NEDO)	No	No	No	No	Yes
And why?	-	-	NA	Do not have any reccommand from national government	NA	NA	-	Cleaner technology in cooperation with DIW
4.18 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1_5	-	-	Yes	-	Yes	No	No	Yes
Lack of information?	-	2	2	-	3	-	-	5
High implementation cost?	-	3	5	-	2	-	-	4
No alternative chemical/raw material input?	-	4	5	-	-	-	-	5
No alternative process	-	2	3	-	1	-	-	4
Uncertainty about performance impact?	-	4	2	-	5	-	-	2
Lack of tradition/skills?	-	4	3	-	4	-	-	5
Other: specify	-	-	-	-	-	-	-	-

Name of the firm	F17	F18	F19	F20	F21	F22	F23	F24
4.19 If your firm has not adopted new EST in recent years, can you explain why not? Rank Importance 1_5	–	–	Yes	–	–	No	Yes	Yes
Lack of information?	–	5	5	–	–	–	–	5
High implementation cost?	–	5	3	–	–	–	–	5
No alternative chemical/raw material input?	–	5	5	–	–	–	–	5
No alternative process	–	5	4	–	–	–	–	5
Uncertainty about performance impact?	–	5	4	–	–	–	–	4
Lack of tradition/skills?	–	5	5	–	–	–	–	5
Other: specify	–	–	–	–	–	–	reduce environmental impact	–

Section 1				
Name of the firm	F25	F26	F27	F28
Address	Samutsakorn	Samutsakorn	Samutsakorn	Kanchanaburi
1.3 Year of establishment:	1988	1990	1972	1991
1.4 Ownership structure:				
private domestic %	100	100	100	100
private foreign %	-	-	-	-
government %	-	-	-	-
1.5 Major lines of business: key products; processes (please, indicate production volume for main products):	Woven fabric	Pretreatment, dyeing, and finishing	100% cotton , polyester/cotton blend (TC) , polyester texture	Pretreatment, dyeing, and finishing
Briefly describe the firm's key products and processes in relation to its main competitors:	Bleaching, Dyeing_finishing	Quality: medium, Price: medium	Dyeing	Quality: high, Price: more expensive than competitors
Does the firm use international standards / enterprise standards for its main products? (if so, specify):	customer standards and company standards	use customer standards and enterprise standards	customer standards ,international standards	use international standard , DIN, ATCC and use customer standards
1.6 Plants Nos.	-	1 plant :	3	1
Locations	-	Bangkok	Samutsakorn	-
divisions within production proces	-	-	pretreatment , Dyeing,Finishing	-

Name of the firm	F25	F26	F27	F28
1.7 Installed capacity (specify unit of measurement):	–	Tonnes/yr(yard/year)	Ton/year(million yard/year)	million metre/ year (million yard/year)
In1991	NA	–	NA	–
In 2001	NA	7,200(39.27)	18,000(98.18)	30(32.80)
Utilized capacity (at present): %	–	–	–	–
1.8. Output as a percentage of ?	increasing 20 - 30% every year			
1991_%	NA	–	NA	–
1996_%.	NA	–	NA	33.50
2000_%	NA	100 (in 2001)	83.3	29.49
1.9 In what year was most of your plant and equipment built?	1993 - 1994	2001	NA	–
1.10 Turnover (in domestic currency): million baht/year	quite stable			
in 1991	NA	–	NA	–
in 2000	NA	–	NA	182
1.11 Profit ratio (total profits as fraction of sales/turnover):%		%		
In 1991	NA	–	NA	–
In 2000	NA	20	NA	–
1.12 Cost of production from official reports (in local currency): million baht/year				
1991	NA	–	NA	–
1996	NA	–	NA	170.33
2000	NA	168.20	NA	186.22
Depreciation and interest payment				

Name of the firm	F25	F26	F27	F28
1991	NA	–	NA	–
1996	NA	–	NA	107.00
2000	NA	20.00	NA	104.00
Labour costs				
1991	NA	–	NA	–
1996	NA	–	NA	6.50
2000	NA	30.00	NA	7.90
Raw material costs				
1991	NA	–	NA	–
1996	NA	–	NA	28.00
2000	NA	50.00	NA	31.13
Energy costs				
1991	NA	–	NA	–
1996	NA	–	NA	20.19
2000	NA	65.00	NA	30.60
Water				
1991	NA	–	NA	–
1996	NA	–	NA	0.64
2000	NA	3.20	NA	0.31
Other				
1991	NA	–	NA	–
1996	NA	–	NA	8.00
2000	NA	–	NA	12.28
1.13 Export orientation: where is the main product of the firm sold?: Domestic market:				
1991_%	100	100	100	–

Name of the firm	F25	F26	F27	F28
2000_%	100	100 (including indirect export 20%)	100	90
Exported:				
1991_%	-	-	NA	-
2000_%	-	-	NA	10
1.14 Main countries and regions to which the product is exported (if applicable):				
European Union:				Italy
1991_%	-	-	-	-
2000_%	-	-	-	-
Other European				
1991_%	-	-	-	-
2000_%	-	-	-	-
North America (USA & Canada):				
1991_%	-	-	-	-
2000_%	-	-		-
Other (please specify):	-	-	-	Srilanka, Laos, Vietnam
1991_%	-	-	-	-
2000_%	-	-	-	-
1.15 What percentage of revenue did your firm get from exports?				
1991_%	-	-	<50	-
2000_%	-	-	>80	80
1.16 Total Labor force:				
numbers in production	190	250	350	130
R&D	160	10	36	2

Name of the firm	F25	F26	F27	F28
administration	2	30	14	10
proportion of labor force	10 (excluding in other department 10 persons)	26	–	–
administration from overseas with international experience (optional):	–	No	7	1
1.17 What is the firm's relative size and position?	SME	Large	Big	Medium - Large
Its market niche? Would you consider the firm to be a market leader?	No	Yes	Yes	Yes
Section 2				
(a) Market developments and determinants of profitability:				
2.1 Who are your main customers? domestic/foreign?	Domestic	Domestic	Domestic	Domestic
Are you a sub_contractor for larger company?	No	–	–	–
Is the firm associated with highly visible conglomerates?	No	–	–	–
2.2 What are your customers' main requirements?	Price, delivery period	–	Delivery period,quality	Product quality
describe the relative importance of price, quality: (incl. product/ process certification)	–	Quality, price, delivery, environmental impact	–	–

Name of the firm	F25	F26	F27	F28
does foreign demand differ in any way from domestic demand? (if applicable)	-	-	Yes	-
Could you give a brief summary of what aspects (or types) of product quality different markets require:	-	-	Delivery period , environment	-
Please specify which type of product/process certification is required:	-	-	NA	ISO certification requirement
2.3 Has the demand for your products changed over the last ten years and if so, in which ways?	No	Concern more about quality	Yes	Yes
(is there an environmental dimension?;how important has the environment become in terms of how the firm's products are developed and marketed?)	-	Yes	Customer want new market	Higher quality of product, shorter delivery period
2.4 Who are your main competitors? Proportion (%)				
1. mainly domestic	100	-	-	90
2. less than 50% abroad	-	-	-	10
3.more than 50% abroad	-	-	-	-
4. virtually all abroad	-	-	China,Taiwan(100%)	-

Name of the firm	F25	F26	F27	F28
2.5 How would you rate the degree of competition on your main sales markets?:				
1. limited	-	-	-	-
2. average	-	-	-	-
3. strong	Yes	medium	Yes	Yes
2.6 Have there been changes in the nature and intensity of competition/ market requirements since 1990?	-	-	-	Yes
nature:				
price	harder	midder	few	harder
quality	harder	harder	harder	harder
diversity/uniqueness	stable	-	stable	harder
intensity:				
harder	-	-	Yes	-
milder	-	-	-	-
stable	-	-	-	-
market requirements:				
regulatory		-	-	-
domestic	NA	-	-	-
foreign	NA	-	-	-
2.7 What is the firm's strategy for increasing its competitiveness?				
Rank 1_5				
identifying new markets	2	-	3	3
developing new products	3	-	4	5
increasing market share	1	-	4	2
cutting costs	5	-	5	4

Name of the firm	F25	F26	F27	F28
differentiating the products – i.e. making products unique	4 –	– –	4 –	1 –
2.8 What are the main challenges for the firm in improving its competitiveness/implementing its business strategy?	Increasing : sales, company's image, employee's quality of life and capability, and profit	–	Potential increasing employee	Increasing quality product service (QPS _ increasing product's quality, price and delivery period)
(b) Community / NGO/ business association pressure				
2.9 What are the main topics that community/NGO/ business associations may place pressure on your company	No	No	No	Effluent
2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Rank 1_5 (where 1 is not at all; and 5 is very much)				
Noise pollution	2	–	1	1
Air pollution	2	–	2	1
Water pollution	2	–	3	1
river	Nakhonchaisri River	–	NA	–
lake	–	–	NA	–
sea	–	–	NA	–

Name of the firm	F25	F26	F27	F28
2.11 During the period 1991 _ 2000, have any of the following groups brought pressure on your company to reduce pollution? Please note the number of times groups have telephoned, faxed, e_mailed or visited your firm. For news media, please note the number of media reports. Please use the following classifications: 0, 1 to 5, 6 - 10, 11 - 20,				
Environmental NGOs				
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
Student groups				
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
Industry Associations				
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
Consumer Groups		_	NA	
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
News media				

Name of the firm	F25	F26	F27	F28
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
Citizens or Citizens Groups				
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	1_5
Pollution_related lawsuit	0	_	NA	0
Other				
Objection to issuance of per	0	_	NA	0
Pressure to reduce pollution	0	_	NA	0
Pollution_related lawsuit	0	_	NA	0
2.12 Has your company's strategy ever been influenced by the advice or suggestions of business associations?	No	Yes	Yes	No
If so, how? Which?	_	_	FTI,WTO	_
Are the business associations local, national, or international?	_	_	NA	_
How did they contact you?	_	_	NA	_
Did you consider this a positive development or unpopular and forced?	_	_	NA	_
Explain why	_	_	NA	_
2.13 Have you ever been influenced by campaigns from NGOs or community organizations?	No	No	No	No

Name of the firm	F25	F26	F27	F28
If so, how? Which?	–	–	–	–
Were the groups local	–	–	–	–
national	–	–	–	–
international	–	–	–	–
How did they campaign?	–	–	–	–
Newspapers	–	–	–	–
Non_public advice	–	–	–	–
Citizen protests	–	–	–	–
Did you consider this a positive development or unpopular and forced?	–	–	–	–
Explain why	–	–	–	–
2.14 During the period 1991 _ 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very important. Write 0 if no pressure was exerted.				
Domestic customers	0	0	0	1
Foreign customers	0	0	0	1
Suppliers	0	0	0	1
(c) Technology infrastructure:				

Name of the firm	F25	F26	F27	F28
2.15 What does the firm do when it becomes necessary to consider technological change?				
Does the firm rely on institutions and consultancies for technological change? (give examples of such institutions)	-	-	Yes	-
international organizations	-	No	Yes	-
national government	-	-	Yes	Yes
advisory bodies				
private_sector consultancies	-	-	-	-
Other	Yes (Suppliers)	-	-	-
Or from technological resources and advice from within its own company or other companies?	-	from suppliers	-	its own company
2.16 How does the firm access information and support on technological change?	Good	-	Good	Few
What kind of technological change ('hardware'/processes)	processes	hardware	hardware and processes	processes
Does the firm rely more on technology providers within its own company (or family of companies) than organizations outside the	No	No	No	No

Name of the firm	F25	F26	F27	F28
2.17 How would you assess the existing system of technological support services (range of services, quality,	-	-	-	-
In your own firm and parent company?	No	-	-	-
In the country or locality as a whole (is more support provided from within the government than from private sector? And is the support better from national or international advisers?) *1= least*	Government = 1, National Private sector = 3, International Organization = 1	Government = 1, national private sector = 3, international organizations = 1	Government = 2, National Private Sector = 2 International Private Sector = 2	Government = 2, National Private Sector = 1, International Private Sector = 3
Section 3				
3.1 What are the key environmental regulations applicable to the firm? Please list them.	Industrial Effluent Standards by Ministry, Air standrad, Waste treatment and dangerous chemical substances by DIW	-	NA	1. Factory Act B.E.2535 (1992) 2. Effluent Standard 3. Emission Standard 4. Machinery Act
How have they affected the firm?	Yes	-	effect to cost	No

Name of the firm	F25	F26	F27	F28
3.2 What are the penalties for compliance failure?	NA	–	Yes	–
What procedures are involved?	NA	–	wastewater management	–
3.3 Has the firm been penalized for non_compliance?	No	–	penalized	No
If so, details	No	–	–	–
3.4 Is their any form of cooperation with regulators?	No	No	Yes	No
3.5 How do regulators act in regard to environmental technology?	–	–	Yes	–
Do they recommend specific environment technology (both process and EoP)?	No	No	–	No
Do they offer incentives, or other support, referrals, and information?	No	No	Offer incentives	No
Or do they penalize only?	Yes	Yes	–	–
3.6 Do you or environmental authorities make information about the emissions of major pollutants by your firm freely available to the public? Yes or No	Yes	Yes	Yes	Yes

Name of the firm	F25	F26	F27	F28
3.7 Does the firm see environmental regulations as costs or benefits	Benefits	Benefits	Benefits	Cost
3.8 Have national environmental regulations reduced or strengthened your competitiveness?	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness	strengthened competitiveness
In what ways?	NA	-	-	Increasing opportunity to get international customers
Do the regulations affect the competitiveness of your competitors?	No	No	Cost	Yes
3.9 Are environmental regulations in other countries affecting the firm's competitiveness?	No	No	Yes	Yes
if yes, in what ways?	-	-	Environmental	-
3.10 Do you expect stricter environmental regulations in future?	Yes	Yes	Yes	Yes

Name of the firm	F25	F26	F27	F28
If yes, how do you plan to respond?	NA	-	Reduce : water/oil/elec/color	-
Section 4				
4.1 How would you characterize the level of technology of the firm compared with the sector as a whole (i.e. the				
in terms of process technology:				
Best Available Technology	-	-	Yes	Yes
standard_modern	Yes	standard	-	-
traditional	-	-	-	-
in terms of products:				
high quality	-	-	-	Yes
standard	Yes	standard	Yes	-
Low	-	-	-	-
4.2 Do you have a quality management system?	Yes	No	Yes	No
If so, is it ISO compatible?	NA	-	ISO 9001,begining ISO 14001	-
Are you ISO certified?	No	No	-	No
4.3 What were the major changes in technology over the past ten years?	Yes	-	Yes	-

Name of the firm	F25	F26	F27	F28
4.4 Which were the main objectives behind the technological changes? Please rnk 1_5 (1=not important; 5=very important) and specify:				
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	5	3	5	1
Productivity increase (in terms of output volume)	4	_	4	2
Quality improvements (product/ process)	3	5	5	3
Meeting environmental regulations/standards	2	_	3	0
Opening up new markets	2	_	3	5
Extend product range	3	_	3	4
Other (please specify)	_	(Quick delivery) 4	_	_
4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1_5)				
water	4	_	4	5
energy	4	_	4	5
raw materials	4	_	4	5
4.6 In terms of equipment:				
Where did the equipment come from (firm/country)?	_	_	German,Switzerland	Switzerland

Name of the firm	F25	F26	F27	F28
How was it financed?				
loan	No	–	–	–
subsidy	No	–	–	–
Equity	No	–	–	–
Other	No	–	–	–
4.7 Do financial intermediaries impose environmental regulations for equipment financing?	No	No	Yes	No
4.8 What was the firm's annual average capital and operation & maintenance expenditures for pollution control in local currency?	–	–	–	–
1991	7_8 mill.baht (capital investment), 100,000 baht/month (O&M costs)	10 mil.baht (capital),	NA	–
1996	NA	–	NA	–
2000	O&M costs increase 20% (comparing with 1991)	10,000 baht/month (chemical), 1,400 baht/month (Energy)	NA	–
4.9 List the most important environmental projects that the firm has undertaken since 1991.				

Name of the firm	F25	F26	F27	F28
Project 1	Energy and water saving project	Energy conservation	EMS	Wastewater treatment system
Year started	1988	1995	2001	1993
Year completed	present	present	2002	Present
Costs in local currency		-	-	-
Total investment	NA	-	10.00 million baht/year	30 million baht/year
Maintenance/ operational co	NA	-	-	900,000 baht/year
Environmental impact	Save energy and water	-	Better improve in 24 month	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	NA	-	-	-
Source of project financing (%)				
Company	NA	-	Yes	-
Commercial loan	NA	-	-	-
Government	NA	-	Yes	-
Other (specify)	NA	-	-	-
Project 2	Wastewater treatment system	-	-	Cavetic recovery
Year started	1988	-	-	1983
Year completed	present	-	-	Present
Costs in local currency				
Total investment	7_8 mill.baht (capital investment)	-	-	7 million baht/year

Name of the firm	F25	F26	F27	F28
Maintenance/ operational co	120,000 baht/month	–	–	–
Environmental impact	Effluent discharge is better	–	–	–
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	NA	–	–	–
Source of project financing (%)				
Company	NA	–	–	–
Commercial loan	NA	–	–	–
Government	NA	–	–	–
Other (specify)	NA	–	–	–
Project 3	–	–	–	Condensate recovery
Year started	–	–	–	1983
Year completed	–	–	–	Present
Costs in local currency	–	–	–	–
Total investment	–	–	–	–
Maintenance/ operational co	–	–	–	–
Environmental impact	–	–	–	–

Name of the firm	F25	F26	F27	F28
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	-	-
Source of project financing (%)				
Company	-	-	-	-
Commercial loan	-	-	-	-
Government	-	-	-	-
Other (specify)	-	-	-	-
Project 4	-	-	-	-
Year started	-	-	-	-
Year completed	-	-	-	-
Costs in local currency	-	-	-	-
Total investment	-	-	-	-
Maintenance/ operational co	-	-	-	-
Environmental impact	-	-	-	-
Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	-	-	-	-
Source of project financing (%)	-	-	-	-
Company	-	-	-	-
Commercial loan	-	-	-	-
Government	-	-	-	-
Other (specify)	-	-	-	-

Name of the firm	F25	F26	F27	F28
4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company: (from 1_5 with 1 denoting not important and 5 denoting very important)				
Regulatory pressure, high pollution charges and fines	5	_	2	5
Environmental norms and standards for selling goods in	1	5	3	4
Requirements of the firm's business partners (suppliers, customers, investors)	2	4	3	3
Environmental requirements imposed by owners and shareholders of the firm	4	3	1	1
Expectations that in the future regulations will be more stringent and charges will be higher	3	2	4	2
The cost of wasteful energy and material input use	3	1	5	1
Public pressure (by local communities, NGOs)	2	_	1	1
Peer pressure (by business associations, other firms)	1	_	1	1
Incentives (loans, grants, tax exemptions,...)	1	_	5	1

Name of the firm	F25	F26	F27	F28
Goal not to lag behind competitors who have achieved good result in waste reductions	1	–	4	1
Other: (specify)	–	–	–	–
4.11 What is the ratio between pollution prevention and end_of_pipe techniques?	Pollution Prevention	1 : 1	1.00	Pollution prevention
4.12 How were the changes implemented? On which sources of information did the firm rely when identifying technology?	Trade shows, suppliers, journals	Supplier, journal	Business association , Journal,personel exchange,information from customer, consultants company	Trade fairs, suppliers of machinery and equipment, suppliers of raw materials and components/intermediate products, journal/publications
How would you assess your access to technological What was the source of the technology (in terms of both 'hard' and 'soft' technologies) itself ?	not so hard –	not so hard –	not so hard –	not so hard –
Please specify if the provider is located:				

Name of the firm	F25	F26	F27	F28
within the same state/province as the	–	–	Yes	–
...or within the country?	Yes	–	Yes	–
...or within the region / other developing country?	–	–	–	Yes
...or in an industrialized cou	–	Yes	–	Yes
Did the firm rely on external technical support in assessing, selecting and implementing the technology (i.e. equipment) ? (i.e. firms or agencies not within the company or parent company)	No	No	–	–
Did the firm cooperate with other firms in implementing the changes?	No	No	Yes	No
vertical networks:	–	–	–	–
horizontal networks:	–	–	Yes	–
4.13 What links do you have with technological associations or other producers or disseminators of technology, and how do you use these	Yes. (ATDP)	No	No	No
4.14 Did you experience problems in implementing the changes? If so, please elaborate.	Yes. Staff's responsibilities	No	Yes,process implementing changes	Yes
4.15 What resources or personnel do you have within your company to enhance your adoption of environmental technology?	3 persons	1 person	3 persons	Yes

Name of the firm	F25	F26	F27	F28
4.16 Does the firm have an environmental policy or strategy? If so,	No	Yes	Yes,In 2001	No
What are the main objectives and how are they implemented?	-	-	-	-
Why does this firm have this kind of policy?	-	To reduce cost	EMS	-
4.17 Does your company participate in any waste minimization or pollution prevention programme?	No	No	Yes	No
And why?	-	-	NA	-
4.18 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1_5	-	-	Yes	-
Lack of information?	NA	-	4	-
High implementation cost?	NA	-	3	-
No alternative chemical/raw material input?	NA	-	3	-
No alternative process	NA	-	4	-
Uncertainty about performance impact?	NA	-	5	-
Lack of tradition/skills?	NA	-	5	-
Other: specify	NA	-	-	-

Name of the firm	F25	F26	F27	F28
4.19 If your firm has not adopted new EST in recent years, can you explain why not? Rank Importance 1_5	Yes.	–	Yes	–
Lack of information?	1	–	5	–
High implementation cost?	5	–	5	–
No alternative chemical/raw material input?	1	–	5	–
No alternative process	1	–	5	–
Uncertainty about performance impact?	1	–	5	–
Lack of tradition/skills?	1	–	5	–
Other: specify	–	–	–	–

(1 TON=5454.545 YARD)

Annex 2

Operational Performance Indicators

Significant Operational Performance Indicators (OPIs) for the textile industry are total water consumption (in scouring, dyeing and mercerize procedures), percentage of reprocessing, water recycling ratio, total electricity consumption, total energy consumption, chemical usage, amount of dyes, quality of influent and effluent wastewater (pH, BOD, COD, SS, TDS, colour and turbidity); effluent load and atmospheric emission from boiler stack. Table 2.1 and Table 2.2 summarise OPIs for the textile industry.

Table 2.1: Environmental Performance of the Textile Industry (input)

Indicator	Unit of Measurement	Type of product	Number of Factory	Range	Average
1. Total water consumption	m^3/ton of product	Yarn	2	236-610	423
		Fabric	12	47-709	204
		Fabric and Yarn	1	-	87.6
2. Desizing unit water consumption	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	2	9.5-26.4	17.9
		Fabric and Yarn	1	-	10.5
3. Scouring unit water consumption	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	4	2.8-93.6	34
		Fabric and Yarn	1	-	21.9
4. Dying unit water consumption	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	3	17.3-187.2	85.8
		Fabric and Yarn	1	-	48.2
5. Mercerizing unit water consumption	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	3	13.5-15.9	15.1
		Fabric and Yarn	1	-	2.6
6. Percentage of Recycling	%	Yarn	1	-	13.7
		Fabric	8	2.5-18.3	10.7
		Fabric and Yarn	1	-	1.9
7. Recycling water rate	%	Yarn	N/A	N/A	N/A
		Fabric	5	0-50	12.5
		Fabric and Yarn	1	-	9
8. Electricity consumption	kWh/ton of product	Yarn	1	-	2,866
		Fabric	8	734-2,954	1,345
		Fabric and Yarn	1	-	484
9. Total energy consumption	Mg./ton of product	Yarn	1	-	103,900
		Fabric	10	8,700-75,300	41,115
		Fabric and Yarn	1	-	40,815
10. Natural gas usage	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	1	-	1,464
		Fabric and Yarn	N/A	N/A	N/A
11. Heavy oil usage	litre/ton of product	Yarn	1	-	613
		Fabric	7	417-4,118	1,182
		Fabric and Yarn	1	-	982
12. Sawdust usage	m^3/ton of product	Yarn	N/A	N/A	N/A
		Fabric	1	-	10.2
		Fabric and Yarn	N/A	N/A	N/A
13. Chemical usage	kg/ton of product	Yarn	1	-	1,319
		Fabric	7	58.2-1,266	657
		Fabric and Yarn	1	-	607
14. Dyestuff usage	kg/ton of product	Yarn	1	-	22.4
		Fabric	6	8.6-190	45.1
		Fabric and Yarn	1	-	14.4

Source : Developing Environmental Performance Indicators for Increased Conpetitiveness for Thai Industry, Thailand Environment Institute & Thailand Research Fund (2001).

Table 2.2: Environmental Performance of the Textile Industry (Output)

Indicator	Unit of Measurement	Number of Factory	Range	Average
1.Wastewater discharge	m^3/ton of product	12	28.9-488	202.6
2.BOD-influent	mg/l	36	24-1,630	269
3.BOD-effluent	mg/l	64	1-474	30
4.COD-influent	mg/l	21	86-3,110	629
5 COD-effluent	mg/l	47	23-1,200	205
6. pH-influent	-	44	4.9-12.4	8.6
7. pH-effluent	-	65	6-10.7	8.0
8. SS-influent	mg/l	38	19-1,200	161
9. SS-effluent	mg/l	61	2-672	35
10. TDS-influent	mg/l	34	700-11,130	3,215
11.TDS-effluent	mg/l	41	23-7,170	2,540
12.Heavy Metal (effluent)				
- Ni	mg/l	3	0.01-0.03	0.017
- Cu	mg/l	3	0.01-0.06	0.03
- Mn	mg/l	2	0.04-0.21	0.12
- Zn	mg/l	4	0.03-1.53	0.57
- Pb	mg/l	2	0.01-0.19	0.10
13.Color (influent)	- (Compare with Gray Scale)	N/A	N/A	N/A
14.Color (effluent)	- (Compare with Gray Scale)	N/A	N/A	N/A
15.Particulate (Boiler)	ppm	3	91-196	143
16.SO_2 (Boiler)	ppm	3	458-954	708
17.NO_x (Boiler)	ppm	N/A	N/A	N/A
18.Heavy Metal in sludge	ppm			
- Cr	ppm	2	0.1-1.54	0.82
- Pb	ppm	3	0.01-0.05	0.03
- Cd	ppm	2	0.002-0.003	0.002
- Hg	ppm	1	-	0.004
19.Public complaints on odor	times per year	N/A	N/A	N/A
20.Employee complaints on odor	times per year	N/A	N/A	N/A
21.Noise level at boiler	dBA	6	80-85.3	83.9
22.Noise level at dying unit	dBA	6	80-92.8	84.5
23.Noise level at fence	dBA	6	61-65.1	63.1

Source : Developing Environmental Performance Indicators for Increased Competitiveness for Thai Industry, Thailand Environment Institute & Thailand Research Fund (2001).

Total water consumption indicator (WCI) for the yarn production process ranges between 236 – 610 m^3 per ton product with an average of 423 m^3 per ton product, whereas in the fabric production process, it ranges from 47 to 709 m^3 per ton product (av. 204 m^3 per ton product). The average total water consumption in the factory that produces both products is 87.5 m^3 per ton product.

The average total electricity consumption for the yarn production process is 2,866 kWh per ton product. The indicator for the fabric production process ranges between 734 - 2,954 kWh per ton product with an average of 1,345 kWh per ton product. The average total electricity consumption in the factory that produces both products is 484 kWh per ton product.

The average total energy usage for the yarn production process is 103,900 MJ per ton product. The indicator ranges from 8,700 to 75,300 MJ per ton product in the fabric production process.

The average total energy usage in the factory that produces both products is 40,815 MJ per ton product.

Chemical Usage Indicator (CUI) averages 1,319 kg per ton-product in the yarn production process, but ranges from 58.2 to 1,266 kg per ton-product in the fabric production process. The average chemical usage in the factory that produces both products is 607 kg per ton- product.

The average amount of dye in the yarn production process is 22.4 kg per ton-product. Ranges and averages of the indicator are 8.6 – 190 and 45.1 kg per ton-product respectively in the fabric production process. The average dye usage in the factory that produces both products is 14.4 kg per ton-product.

The quality of influent wastewater was considered in terms of concentration in each parameter with the ranges and average of measured value being, 4.9–12.4 (av. 8.6) for pH, 24 – 1,630 mg/l (av. 269 mg/l) for BOD, 86 – 3,110 mg/l (av. 629 mg/l) for COD, 19 – 1,200 mg/l (av. 161 mg/l) for SS and 700 – 11,130 mg/l (av. 3,215 mg/l) for TDS.

The ranges and average values of effluent wastewater concentration are 6 10.7 (av. 8.0) for pH, 1 – 474 mg/l (av. 30 mg/l) for BOD, 23 – 1,200 mg/l (av. 205 mg/l) for COD, 2 - 672 mg/l (av. 35 mg/l) for SS and 23 – 7,170 mg/l (av. 2,540 mg/l) for TDS.

The air emission quality indicator was measured from boiler stack and the averages of particulate matter and SO_2 concentration were 143 ppm and 708 ppm respectively.

The average noise level indicator measured at steam boiler and fence were 83.9 dBA and 63 dBA respectively.

Annex 3

Effluent Standard

3.1 Industrial Effluent Standard (PCD/MOSTE)

Items	Unit	Standard values
1. pH	-	5.5-9.9
2. Total Dissolved Solid(TDS)	mg/l	- Not more than 3,000 mg/l depending on receiving water or type of industry under consideration of PCC but not to exceed 5,000 mg/l - Not more than 5,000 mg/l exceeding TDS of receiving water having salinity of more than 2,000 mg/l or TDS of sea if discharge to sea
3. Suspended Solid(SS)	mg/l	Not more than 50 mg/l depending on receiving water or type of industry or type of wastewater treatment system under consideration of PCC but not to exceed 150 mg/l
4. Temperature	^{0}C	Not mere than 40
5. Colour and Odor	-	Not objectionable
6. Sulfide (as H_2S)	mg/l	Not more than 1.0
7. Cyanide as (HCN)	"	Not more than 0.2
8. Fat, Oil and Grease (FOG)	"	Not more than 5 mg/l depending on receiving water or type of industry under consideration of PCC but not to exceed 15 mg/l
9. Formaldehyde	"	Not more than 1.0
10. Phenol	"	Not more than 1.0
11. Free Chlorine	"	Not more than 1.0
12. Pesticides	"	Not detectable
13. Biochemical Oxygen Demand (BOD)	"	Not more than 20 mg/l depending on receiving water or type of industry under consideration of PCC but not to exceed 60 mg/l
14. Total Kjeldaht Nitrogen (TKN)	"	Not more than 100 mg/l depending on receiving water or type of industry under consideration of PCC but not to exceed 200 mg/l
15. Chemical Oxygen Demand (COD)	"	Not more than 120 mg/l depending on receiving water or type of industry under consideration of PCC but not to exceed 400 mg/l
16. Heavy Metals	"	
1. Zinc	"	Not more than 5.0
2. Chromium (Hexavalent)		
3. Chromium (Trivalent)	"	Not more than 0.25
4. Arsenic	"	Not more than 0.75
5. Copper	"	Not more than 0.25
6. Mercury	"	Not more than 2.0
7. Cadmium	"	Not more than 0.005
8. Barium	"	Not more than 0.03
9. Selenium	"	Not more than 1.0
10. Lead	"	Not more than 0.02
11. Nickel	"	Not more than 0.2
12. Manganese	"	Not more than 1.0
	"	Not more than 5.0

Remarks:

1. PCC = Pollution Control Committee
2. The standards were summarized from the Notification of the Ministry of Science, Technology and environment, No.3, B.E. 2539 (1996) issued under the Enhancement and Conservation of the

National Environmental Quality Act. B.E. 2535(1992). The Notification was published in the Royal Government Gazette, Vol.113, Part 13 D, dated February 13, B.E. 2539(1996).
3. Notification of the Ministry of Science, Technology and Environment, No. 4, B.E. 2539(1996) issue under the Enhancement and Conservation of the National Environment Quality Act. B.E. 2535 (1992) and published in the Royal Government Gazette, Vol.113, Part 13 D, dated February 13, B.E.2539(1996) specifies that pollution sources that the above standard are to be applied are factories group II and III issued under the Factory Act B.E. 2535 (1992) and every kind of industrial estates
4. Notification of the Pollution Control Committee, No. 3, B.E. 2539(1996) dated August 20, B.E. 2539(1996) has issued type of factories(category of factories issued under the Factory Act B.E.2535(1992) that are allowed to discharge effluent having different standards from the Ministerial Notification No.3 above as follows:

4.1 BOD up to 60 mg/l
1) animal furnishing factories (category 4(1))
2) starch factories (category 9(2))
3) food from starch factories (category 10)
4) animal food factories(category 15)
5) **textile factories(category 22)**
6) tanning factories (category 29)
7) pulp and paper factories (category 38)
8) chemical factories (category 42)
9) pharmaceutical factories(category 46)
10) frozen food factories(category 92)

4.2 COD up to 400 mg/l
1) food furnishing factories(category 13(2))
2) animal food factories(category 15(11))
3) **textile factories(category 22)**
4) tanning factories (category 29)
5) pulp and paper factories (category 38)

4.3 TKN
1) 100 mg/l-effective after 1 year from the date published in the royal government Gazette of the Ministerial Notification No.4
2) 200 mg/l-effective after 1 year from the date published in the royal government Gazette of the Ministerial Notification No.4 for the following factor
- food furnishing factories(category 13(2))
- animal food factories(category 15(11))

3.2 Standards by Ministry of Industry for occupational health and safety

- Ear plugs or car muffs shall be provided to a worker who works in the factory with noise level exceeding 80 dBA.
- Ear guards shell be provided to a worker who works in the workplace that may be dangerous to pinna and ear canal
- The Factory shall control or eliminate odor, noise, vibration, dust, soot and smoke to the level that do not cause any nuisance, trouble, damage or health problems to the nearby community.
- Penalty: According to factory Act No.2, B.E. 2518 (1975) which rules that violators are subjected up to one month imprisonment or fined not more than ten thousand baht or both.

Source: Notification of the ministry of industry No.4, B.E.2514 (1971) issued under the Factory Act B.E.2512(1969), dated August 11, B.E.2514(1971) published in the Royal Government Gazette, Vol.88.(special issue) dated August 14, B.E.2514(1971)

3.3 Effluent Standards for Textile – Department of Industrial Works

Table 1 Effluent standards for Textile factories in Thailand

Parameters	Standard values			
	DIW1	PCD2	RID3	HD4
pH	5.5-9.0	5.5-9.0	6.5-8.5	5-9
BOD(mg/l)	≤60	≤60	≤20	≤ 20-60
COD(mg/l)	≤400	≤ 400	-	-
Suspended Solids(mg/l)	≤50	≤ 50	≤ 30	-
TKN(mg/l)	≤100	≤100	-	-
Fat, oil and grease(mg/l)	≤ 5	≤ 5	≤ 5	-
Color	Not objectionable	Not objectionable	Not objectionable	-

Remarks: Source

"1" Notification of the ministry of Industry, No.2 B.E. 2539(1996) issued under the factory Act B.E. 2535(1992)

"2" Notification of the Pollution Control Committee, dated August 20, B.E. 2539 (1996) and Notification of Ministry of Science, Technology and Environment, No. 3 B.E. 2539(1996)

"3" The Royal Irrigation Department (RID)

"4" The Harbor Department (HD)

Table 2 Number of Textile factories categorize by range of BOD values

Range of BOD(mg/l)	Number of factories	Percentage	Total Percentage
Less than 10	28	28.0	28.0
11 – 20	32	32.0	60.0
21 – 30	10	10.0	70.0
31 – 40	5	5.0	75.0
41 – 50	7	7.0	82.0
51 – 60	1	1.0	83.0
More than 60	10	10.0	93.0
During system improving	7	7.0	100.0

Table 3 Number of Textile factories categorize by range of COD values

Range of COD(mg/l)	Number of factories	Percentage	Total Percentage
Less than 50	6	6.0	6.0
51 – 100	15	15.0	21.0
101 – 150	19	19.0	40.0
151 – 200	11	11.0	51.0
201 – 250	11	11.0	62.0
251 – 300	13	13.0	75.0
301 – 350	4	4.0	79.0
351 - 400	6	6.0	85.0
More than 400	8	8.0	93.0
During system improving	7	7.0	100.0

Table 4 Number of Textile factories categorize by range of SS values

Range of SS (mg/l)	Number of factories	Percentage	Total Percentage
Less than 10	8	8.0	8.0
11 – 20	19	19.0	27.0
21 – 30	22	22.0	49.0
31 – 40	18	18.0	67.0
41 – 50	10	10.0	77.0
More than 50	16	16.0	93.0
During system improving	7	7.0	100.0

Table 5 Number of Textile factories categorize by range of Color values

Range of Color (PtCo)	Number of factories	Percentage	Total Percentage
Less than 100	21	21.0	21.0
101 – 200	30	30.0	51.0
201 – 300	24	24.0	75.0
301 – 400	10	10.0	85.0
401 – 500	4	4.0	89.0
More than 500	4	4.0	93.0
During system improving	7	7.0	100.0

Table 6 Recommended standards for Effluent from textile factories

Parameters	Recommended standards	Present standards
BOD(mg/l)	≤ 40	≤60
COD(mg/l)	≤300	≤ 400
SS(mg/l)	≤ 50	≤ 50
PH	6.5 – 9.0	6.5-9.0
Color(PtCo)	not specific	not specific

3.4 Notification of the ministry of Industry No.10, B.E.2537 (1994)

The Notification issued under the Factory Act B.E.2535(1992) has issued "Do not situate or expand productive factory and banned Benzidine based Dyes and Chromic Compounds based Dyes in Textile industries"

Bleaching and dyeing colors that are not able to dispose and disintegrate in cancerous substance and heavy metals forms are Benzidine based Dyes and Chromic Compounds based Dyes. Permission for situation or factory expansion of 2 hazardous groups may be caused environment and health problems to nearly community who used the contaminated water sources from Bleaching and dyeing Industrial Effluent.

Therefore, to control and prevention for contaminated water sources, issued under the Announcement of the Revolutionary Party by virtue of section 32(1)(2) of Act B.E.2535 (1992) as follow:

1. Do not situate or expand productive factory and banned Benzidine based Dyes and Chromic Compounds based Dyes in Textile industries in Thailand.

For Thailand' s dyestuff factories are not allowed to use the raw materials that come from Benzidine, Benzidine Compounds, Chromium and Chromium Compounds substances

For blenching-dyeing factories must not use Benzidine, Benzidine Compounds, Chromium and Chromium Compounds substances in the process

All this, (1) upon publication in the Government Gazette, shall become enforceable. (2), (3) are effective on January 1, B.E. 2538(1995)

Notified on June, 29 B.E. 2537(1994)

The Minister of Industry

Annex 4
Raw Material/Technology suppliers Questionnaires

Name of organization	S1	S2	S3	S4	S5
1.2 Year established in Thailand	1997	1973	1991	1991	1998
1.3 Main products	Industrial chemical product	Dyestuff & pigment, chemical & auxiliary	Yarn:Micromodal & tencel	Industrial chemical & additive substance that increase quality	Chemical& auxiliary,dyeing
1.4 What resources are available in Thailand?					
Budget	NA	Yes	Yes	Yes	Yes
Personnel / labor force	Yes	Yes	No	Yes	Yes
Do they have any links to international organizations or personnel?	No	Yes	Yes	Yes	Yes
1.5 How is the supplier organized?					
	5 business segments i.e. chemicals for - Polymer Additives - Coating Industry - Textile Industry - Water Treatment & Paper Industry - Home & Personal Care Industry	12 segments	6 Segments: Administration Sale Spection etc.	4 Segments: Administration Sale Spection etc.	4 Segments: Administration Sale Spection, relationship customer
Vertically integrated subsidiary of paren company?	Yes	No	Yes	Yes	Yes
1.6 Ownership:	Swiss				
National %	-	100	51	100	-

Name of organization	S1	S2	S3	S4	S5
International %	-	-	49	-	100

Section 2: Market trends

Question	Raw Material/ Technology Suppliers				
2.1 Who are your main customers, market? Please elaborate on the profile of your customers. Are they	Processing mills/factories in the industries mentioned under section 1				
National (proportion of sales)	They are National, Regional and International companies; the proportion differs from industry segment to segment.				
	90%	60%	100%	100%	Absolute National.
International (proportion of sales)	-	10%	40%	-	-
Small scale firms (proportion of sales)	They are small/medium and large firms; the proportion of sales differs very much from segment to segment.	-	Yes	Yes	Yes
Medium scale firms (proportion of sales)	-	-	Yes	Yes	Yes
large scale firms (proportion of sales)	-	-	-	-	-
Do you have large trading contracts with specific well-known firms?	Yes, we do conclude contracts with some major well-known firms in particular segments. These are National, Regional and International companies, generally of medium to a larger size.				
	Yes	No	Yes	Yes	Yes.
2.2 What the main factors underlying your market?	Some industries are very export-oriented, i.e. the Textile Industry;	Can compete in quality, price and services	Quality goods : environmental friendly	Need goods end of a journey that quality above reval	Textile industy in nation and international

Name of organization	S1	S2	S3	S4	S5
	Some are mainly local players, such as the Petrochemical Industry, which depends very much on the local market environment				
What is the niche it occupies?	Being a specialty chemicals company, our products typically cater to the higher value-added niches.	Services, Quality	NA	increase efficiency in addition substance market	emphasis of dyeing
2.3 What factors challenge your profitability?	Competition	market share, profit ratio	Exchange rate,	Money exchange rate	Imitate goods and high competetive state in market
	Innovation (new products/processes)	raw material	Uncertainly of economic state	Demand supply of world market state	
	Doubtful debts	energy cost		Totally of Economic state	
	Continuous improvements in productivity				
	Exchange rates				
2.4 How has the underlying demand for its services changed over the last ten years?	Overall positively, with the exception of the 1997/98 period of economic crisis. 2001 has also been difficult year.	Increasing technical service demand	Have just established for 6 years so the company have not changed	Uncertainly requirement	Customer have more choice so that production must have good quality and moderate price
				Quality goods are acceptability but cheap price	

Name of organization	S1	S2	S3	S4	S5
Section 3:	Environmental issues, objectives, and technology				
Question	Raw Material/ Technology Suppliers				
3.1 Do you supply services to firms?	Yes, with an increasing importance.	Yes.	Yes	Yes	Yes
Do you offer advice on raw material and equipment selection to firms?	Yes, mainly in the use of more environmental friendly chemical raw material.	Yes.	Yes	Yes	Yes
Or provide engineering advice in terms of equipment installation and operation?	More on the operational side than on the initial installation of equipment.	Yes, and also technical support.	Yes	Yes	Yes
3.2 Do environmental issues play a role in your market? If so, how important is it and does it vary according to the profile of enterprises in the sector?	There is definitely increasing awareness, especially amongst the larger to medium firms. There is much room for improvement in attitude towards the environment of smaller to medium	Yes, but they are not the main issues, they	Yes, environmental & natural friendly	Yes,is trade barrier and specific international company has carefully more than national company	Yes, The company have policy by decrease chemical substance that it make dangerous to environment
3.3 In your view, what are the reasons that firms implemented technology changes? Please elaborate (and rank in importance: 1=not important, 5=very important):					

Name of organization	S1	S2	S3	S4	S5
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	4 (reduce use of water, shorten processing time, increase RFT)	5 (raw material)	3	5	4
productivity increase (in terms of increased volume of output)	4 (speed of response is the key)	2	NA	4	5
Quality improvements (specify whether process / product quality)	5 (better appearance, handling and end-use quality)	5(product quality)	5	5	5
meeting environmental regulations /standards	3 (treatment of waste water becomes increasingly important. Control of air pollution and solid waste is also coming more and more.)	1	4	3	4
opening up new markets	5	4	1	4	4
extending the product range	5	4	2	3	5
environmental pressure from NGOs, local community, business associations/other firms	1	2	NA	4	4
Other (specify) customer requirements	5	-	NA	4	NA
3.4 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes?	Water, oil and electricity prices have tripled over the last 10 years, putting Thailand at a relative disadvantage vis-à-vis other Asian countries with lower utility costs.Prices of raw material have com	The prices of raw materials and water have not influenced but the Energy cost became the cause that increase investment cost , so many firms must concern about how to reduce energy cost by process/hardware improving	Water:High costs, stable prices Energy:High costs, stable prices	Raw materials: extreamly decreasing Water: moderately incrasing Energy : very increasing	Raw materials: extreamly increasing Water: moderately incrasing Energy : up-down vary curde oil in world market

Name of organization	S1	S2	S3	S4	S5
3.5 What is restricting (if anything) the adoption or development of cleaner technologies? (please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion. Rank Importance 1-5			Little impact and environmental friendly	Regulation of each country	high investment by not increasing product and control
				investment	lax rule
				bulit realize	
Lack of information?	1	4	3	4	4
High implementation cost?	3	5	5	5	5
No alternative chemical/raw material input?	1	5	4	3	4
No alternative process technology?	1	4	NA	3	5
Uncertainty about performance impact?	2	5	NA	4	4
Lack of tradition/skills?	5	4	2	3	4
Other: specify: -Stricter implementation	4	_	NA	NA	Lack of regulation
of legislation					
Fines are too low for	5				
wrong-doers					
3.6 What changes in services, regulation, or other market characteristics would you like to see in order to assure greater adoption of environmental technology?	Stricter implementation of environmental, health and safety laws and regulations. Punish the wrongdoers and give incentive (e.g. tax reduction, lower interest rates)	Reliable Services	Regulations	Regulations,	Regulations
	to those who perform or show the way.	Stricter Regulations		marketing character ,	

Name of organization	S1	S2	S3	S4	S5
	More focused studies in environmental technology in uni	Market characteristics		show plnalty of destruction environmental	
3.7 Is it helpful, actually, to refer to your technology as 'environmental' or would you prefer it presented in different terms, such as 'more competitive'?	Our technologies can be referred to as both environmental and competitive. We want to clearly show that environmental protection does not necessarily mean more costs.	Yes.	Yes	Yes	No,want to good environtment for every body
3.8 In what ways do you interrelate with the specific firms in our sample?					
Sinsaenee Co., Ltd.	Actively	Customer	-	-	-
Thanapaisal R.O.P.	Actively	Customer	-	-	-
United Textile Mills Co., Ltd.	Actively	Customer	Customer	-	Customer
Siam Polytext Industry Co., Ltd.	Not actively	Customer	-	-	Customer
Chieng Sang Textile Industries Ltd.	Not actively	Customer	-	-	Customer
Pattaya Printing & Dyeing Co., Ltd.	Not actively	Customer	-	-	Customer
Santavee Textiles Co., Ltd.	Not actively	Customer	-	-	Customer
Porjai Thai Printer Co., Ltd.	Actively	Customer	-	-	Customer
Thai Eastern Industry Co., Ltd.	Actively	Customer	Customer	-	Customer

Name of organization	S1	S2	S3	S4	S5
Thai Textile Printing (1980) Co., Ltd.	Actively	Customer	Customer	Customer	Customer
3.9 Do you have any specific comments about the firms in the sample?	We do, as a policy, not comment on other companies' actions.	No.	No	Yes, maybe give incentive such as tax reduction so that they give important environment .	NA

Section 4: Future directions: changes in market and expectations

Question	Raw Material/ Technology Suppliers				
4.1 What future changes and challenges do you expect over the next few years?	Thai industries have to become more competitive in the global market, cost and quality-wise. The global market is here, whether we like it or not. We have to adopt environmentally and socially accepted international standards if we want to be taken as a serious export-oriented country or candidate for Foreign Direct Investment. Up-grade from simple import-substitution, labor/intensive economy to a more value added, technology-driven economy. Concentrate more on industries with high local raw material content (i.e. agricultural rather than high technology computer chips where we have little know-how).Most importantly, improve quality of our teaching institutions, particularly in science and technology. The MBA-mentality (material greed) is much too entrenched in our society.	NA	Expand: Increase productivity	Technology	Concentrate industry project for control waste water treatment

Name of organization	S1	S2	S3	S4	S5
4.2 Do you see environmental issues as a key part of your market planning? How and why.	Yes, definitely. We, however have to be realistic and appreciate that there must be a balance between environmental issues and economics. The western world embarked onto the environmental path on a good economic background. Thai companies do not have that comfort of time but have to adapt much faster to satisfy international acceptable norms. Most companies main concern today is to reduce/lower production costs. We therefore put more of our efforts to focus on offering more competitive products/processes. As an international company, we have the advantage that our product/process innovation is automatically driven by continuous improvements in environmental norms, such as to save chemical load (BOD), reduce use of water, energy and processing time, thus increasing productivity.	Yes, to meet customer requirements.	Yes,emphasis product that not impact environment	Yes,is trade barrier and extreamly consider if the company want export business	Yes,is chemical producer that it has responsible to customer and society

Name of organization	S1	S2	S3	S4	S5
4.3 How will your services change to accommodate expected changes in market and demand	Environment friendly products and processes have always been at the heart of our innovation process (R&D). Such products and processes sometimes require more technical know-how to appreciate their value and a will to do something positive for the environment – be a trendsetter, rather than to only think about economics (MBA-mentality). We have to be realistic that we cannot change a mentality from one year to another but have to contribute to a continuous process of awareness that finally leads to action. The basis for this process has to be laid early in the childhood, in our teaching institutions and tighter implementation of law and guidelines would definitely accelerate the process.	It depends on customer requirements, however we will always prepare for the changes	Have a new product that consistence with need of market	Give information : employment chemical substance that it environmental friendly	Search new chemical test by not impact to investment and safety to environment

Name of organization	S6	S7	S8	S9	S10
1.2 Year established in Thailand	1992	1989	NA	1958	1997
1.3 Main products	Drying color.	Chemical & Auxillary	Carbondioxide, Oxigen,Nitrogen, Argon	Generator, Boiler, equipment & machinery	Textile Testing Instrument
1.4 What resources are available in Thailand?					
Budget	Yes.	No, Because of area is not enough for production.	Yes	Yes	Yes
Personnel / labor force	Yes.	Yes.	Yes	Yes	Yes
Do they have any links to international organizations or personnel?	Yes.	No.	Yes	Yes	Yes
1.5 How is the supplier organized?					
	There are 8 employees totally including: 2 persons for manage ment division 2 persons for sale division 4 person for other division	11 business division including: 3 person for research and development division. 14 person for management division 5 persons for sale division , 3 persons for quality control , 67 person	10 segments i.e. R&D Administration Sales Inspect	5 segments R&D Administration Sales others	4 Segments Administration Sales Inspect or others
Vertically integrated subsidiary of parent company?	No.	N/A	Yes	-	-
1.6 Ownership:	Thai.	Thai	-	-	-
National %	100%.	100%	-	100	100

Name of organization	S6	S7	S8	S9	S10
International %	-	-	100	-	-
Section 2:					
Question					
2.1 Who are your main customers, market? Please elaborate on the profile of your customers. Are they					
National (proportion of sales)					
	99.90%	100	100	100	_
International (proportion of sales)	-	_	-	-	-
Small scale firms (proportion of sales)	Yes.	0.001	-	Yes.	Yes.
Medium scale firms (proportion of sales)	Yes.	Yes.	-	Yes.	Yes.
large scale firms (proportion of sales)	-	-	Yes	-	-
Do you have large trading contracts with specific well-known firms?					
	No.	Yes	No.	No.	_
2.2 What the main factors underlying your market?	Service	Excellent service.	Product, Technology and new service	Services, Quality	Good Services, Quality

Name of organization	S6	S7	S8	S9	S10
What is the niche it occupies?	The textile.	N/A	NA	Heat Energy equipment	Textile Industry
2.3 What factors challenge your profitability?	Quality product, transportation including beware fragile, and the Goods have a little competitor company.	Foreign exchange rate and business competitor.	Economic's extension	NA	sales
					investment cost
2.4 How has the underlying demand for its services changed over the last ten years?	unchange. To decrease cost, the process change effected to rejecting some goods	To the world market competition, The quality of product changes in positive direction slightly	Customer need for low price product and increase service	Strengthen competitiveness, choosing the low price product before quality consideration	Higher quality requirement
					Good customer services Delivery on time

Name of organization	S6	S7	S8	S9	S10
Section 3:					
Question					
3.1 Do you supply services to firms?	Yes.	Yes.	Yes	Yes.	Yes.
Do you offer advice on raw material and equipment selection to firms?	Yes.	Yes.	Yes	Yes.	Yes.
Or provide engineering advice in terms of equipment installation and operation?	-	-	Yes	Yes.	Yes.
3.2 Do environmental issues play a role in your market? If so, how important is it and does it vary according to the profile of enterprises in the sector?	Yes. The friendly environment sustains employee to have a happiness in their working time.	Yes, to adapt their quality of product, the textile companies alert in environmental concern essentially.	Yes, Product made by Cleaner Technology	Yes, because we mainly sale Environmental friendly system.	No.
	Yes, The large company can manage the environment equipment and safety efficiently because they have investment cost very much.	No.			
3.3 In your view, what are the reasons that firms implemented technology changes? Please elaborate (and rank in importance: 1=not important, 5=very important):					

Name of organization	S6	S7	S8	S9	S10
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	5	5	5	2	3 (raw material)
productivity increase (in terms of increased volume of output)	4	2	4	3	3
Quality improvements (specify whether process / product quality)	4	3	3	1	5(product quality)
meeting environmental regulations /standards	4	3	2	-	3
opening up new markets	2	4	3	4	3
extending the product range	5	2	2	-	4
environmental pressure from NGOs, local community, business associations/other firms	5	4	3	5	3
Other (specify) customer requirements	-	-		-	-
3.4 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes?	N/A	Raw material and water price have high cost because the raw material depend strongly on cost.	The prices of raw materials, water and energy are not influence	NA	The prices of raw materials has become increasingly cost.

Name of organization	S6	S7	S8	S9	S10
3.5 What is restricting (if anything) the adoption or development of cleaner technologies? (please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion. Rank Importance 1-5	N/A	The development and improvement in the clear boundary can decrease the effect to environment	New technology has higher cost to invest	NA	NA
Lack of information?	N/A	2	4	2	4
High implementation cost?	N/A	5	5	5	3
No alternative chemical/raw material input?	N/A	4	2	-	3
No alternative process technology?	N/A	3	2	4	4
Uncertainty about performance impact?	N/A	4	2	3	3
Lack of tradition/skills?	N/A	4	2	1	5
Other: specify: -Stricter implementation	N/A	-	-	-	_
of legislation					
Fines are too low for					
wrong-doers					
3.6 What changes in services, regulation, or other market characteristics would you like to see in order to assure greater adoption of environmental technology?	N/A	Service law and characteristic of marketing	7 Law /strict regulation.	Providing knowledge or information	Reliable services
					Stricter Regulations

Name of organization	S6	S7	S8	S9	S10
					Market characteristics
3.7 Is it helpful, actually, to refer to your technology as 'environmental' or would you prefer it presented in different terms, such as 'more competitive'?	N/A	Yes, However the production process be too least effect to environment.	Yes	Yes.	No.
3.8 In what ways do you interrelate with the specific firms in our sample?					
Sinsaenee Co., Ltd.	Actively but no as customer	customer	-	Customer	Customer
Thanapaisal R.O.P.	Actively but no customer	customer	customer	-	Customer
United Textile Mills Co., Ltd.	Actively but no as customer	customer	-	-	Customer
Siam Polytext Industry Co., Ltd.	Actively but no as customer	customer	-	-	Customer
Chieng Sang Textile Industries Ltd.	Actively but no as customer	customer	-	-	Customer
Pattaya Printing & Dyeing Co., Ltd.	customer	customer	-	-	Customer
Santavee Textiles Co., Ltd.	Actively but no as customer	customer	-	-	Customer
Porjai Thai Printer Co., Ltd.	Actively but no as customer	customer	Customer	Customer	Customer
Thai Eastern Industry Co., Ltd.	Actively but no as customer	customer	-	-	Customer

Name of organization	S6	S7	S8	S9	S10
Thai Textile Printing (1980) Co., Ltd.	Actively but no as customer	customer	-	Customer	Customer
3.9 Do you have any specific comments about the firms in the sample?	N/A	No.	NA	No.	No.

Section 4:

Question					
4.1 What future changes and challenges do you expect over the next few years?	N/A	All things in company have excellent quality.	The company should has realize to waste discharge out of company	NA	Exportation will increase more and more

Name of organization	S6	S7	S8	S9	S10 .
4.2 Do you see environmental issues as a key part of your market planning? How and why.	N/A	Yes, the most customer always interested in environmental concern.	Yes,because goods of company is waste treatment technology	No.	Yes, they make reliable for the customers.

Name of organization	S6	S7	S8	S9	S10
4.3 How will your services change to accommodate expected changes in market and demand	N/A	Excellent quality of product, good service and customer confidence	Goods of company is environment friendly	Procuring many expert representatives for opening up new markets	Reliable servicesCost-efficiencySh orten delivery time

Annex 5

Technology Centers Questionnaires

Technology Centers	
1	Textile Industry Division (TID), Department of Industrial Promotion (DIP)
2	Thailand Textile Institute - THTI
3	Chulalongkorn University – Training and Education
4	Srinakarinviroj University – Training and Education

Section 1: Basic data

Question	Technology Centers			
1.1 Name of organization	TDI,DIP	THTI	Chulalongkorn University	Srinakarinviroj University
1.2 Year established	1973	1996	NA	1949
1.3 Objectives of organization	To provide technical support, upgrade knowledge through meeting, seminars, and training course of textile industry' s technology		To develope research and education	To develope research and education
1.4 What resources are available to you?				
Budget	Yes	Yes	-	-
Personnel / labor force	Yes		Yes	-
Number of offices	-		-	-
Do you have any links to international organizations or personnel?	Green Aid Plan, Japan	Japan	Education institude of Korea, French, Garman	England, Austraria etc.

Question	Technology Centers			
1.5 How is the center organized?	The public service			
How many divisions, and what are the divisions	There are 2 divisions as following 1. R&D 2. Analysis and Test	R&D	There are 2 divisions as following 1. R&D 2. Teach by minor subject :- solid waste,Air pollution	There are 2 divisions as following 1. R&D 2. Propagandize 3. other
Does it include some or all of: R&D; manufacturing; marketing; dissemination	-	-	-	-
1.6 Is the centre government owned or private	center government owned	Center government owned	Center government owned	Center government owned
domestic / international?	domestic	Domestic	Domestic	domestic

Section 2: Market trends and niche

Question	Technology Centers			
2.1 Who are your main customers, market?				
National / international (what proportion each)	National 100%	100	90	NA
Small/medium/large enterprises (what proportion each)	-	-	10	NA
2.2 Is the center government subsidized, or required to make profit?	It is center government subsidized	Yes	The budget of Reign is subidized	NA
2.3 What are the main factors underlying your market?	It is center government owned	Awareness of subject	It is center government subsidized	NA
What is the niche you occupy?	-	Training make knowledge, direct cost		NA
How does the center become profitable?	-	Practical hand ordit		NA

Question	Technology Centers			
2.4 How does the center develop technology? (please rank: 1=not important, 5=very important). Details (e.g. which technology? Which organization?)				
By disseminating existing technology from elsewhere?	-	-	-	-
Rank	4	NA	3	NA
Details	Dyeing technology from Japan	NA	Environmental engineering	NA
By researching and developing its own technology?		NA		NA
Rank	2	NA	5	NA
Details	Dyeing technology	NA	Environmental engineering	NA
Through negotiation with other centers?			WB,ADB,JICA	NA
Rank	1	NA	3	NA
Details	-	NA	Environmental engineering	NA
Through negotiation with third party or private-sector companies NGOs?		NA		NA
Rank	2	NA	1	NA
Details	Suppliers	NA	Environmental engineering	NA
Other (specify)	-	NA	NA	NA
Rank	-	NA	NA	NA
Details	-	NA	NA	NA
2.5 What type of services do you offer?				

Question	Technology Centers			
design services	No	NA	Yes	Yes
information on new production technologies	Yes	NA	Yes	-
evaluation and selection of production technologies	No	NA	Yes	-
implementation of new production technologies	No	NA	Yes	-
testing and analysis services	Yes	NA	Yes	Yes
solutions to environmental problems	Yes	NA	Yes	-
assistance in quality management systems	No	NA	Yes	-
Other (specify)	-	NA	-	Consultant
2.6 Do environmental issues play a role in the range of services that you offer? If so, how important is it and does it vary according to the profile of enterprises in the sector?	Yes, they are very important issues.	Yes, they are very important issues and depend on customer	Yes, because environmental engineer research that are very important issues.	NA
2.7 How has the underlying demand for your services changed over the last ten years?	More services and modern equipment	NA	Not change	NA

Section 3: Environmental issues, objectives, and technology

Question	Technology Centers			
3.1 Do you try to encourage firms to adopt new forms of technology, or technology standards (such as ISO 9000, 14000)? Or do you simply provide information if they are interested?	Yes	Yes	Yes	Yes

Question	Technology Centers			
If yes, then please explain how you encourage the adoption of ESTs	Promote and upgrade knowledge that how to apply CT concept in the process to saving cost and pollution reduction	Indirect encourage about research	Monitoring and introduce research or teach so that suggest appropriate tendency for Thailand.	Indirect encourage about environment friendly
3.2 How do you relate with individual companies:				
How is your service delivered	-	-	NA	NA
what cost	-	-	NA	NA
Do the costs vary	-	-	NA	No
3.3 What are –in your view- the main reasons why firms (in the industry sector) implement technology changes? Please elaborate (and rank in importance: 1=not important, 5=very important)				
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	5	2	5	4
productivity increase (in terms of increased volume of output)	3	1	5	5
Quality improvements (specify whether process / product quality)	4	1	4	5
meeting environmental regulations /standards	3	3-4	3	5
opening up new markets	2	3-4	3	5
extending the product range	3	3-4	3	4
environmental pressure from NGOs, local community, business associations/other firms	4	2	3	5
Other (specify)	-	_	NA	NA

Question	Technology Centers			
3.4 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes?	Water, energy and raw materials prices trends were increased so they also had high investment	NA	prices for water is 50 % prices for energy is 30% prices for raw materials is 30%	NA
3.5 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)				
Noise pollution	1	2	1	4
Air pollution	3	4	3	4
Water pollution	5	5	5	4
river	Yes	NA	NA	Yes
lake	No	NA	NA	-
sea	No	NA	NA	Yes
3.6 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1-5				
Lack of information?	4	NA	5	4
High implementation cost?	4	NA	3	4
No alternative chemical/raw material input?	5	NA	5	3
No alternative process technology?	2	NA	3	3
Uncertainty about performance impact?	2	NA	5	4
Lack of tradition/skills?	4	NA	5	5
Other: specify	-	NA	3	NA

Question	Technology Centers			
3.7 What changes would like to occur in order to enhance technology change, and where do these lie				
with government (e.g. regulators)	-	with government must to relize	with government must to relize	-
(with companies)	-	-	-	Individual companies
3.8 In what ways do you interrelate with the specific firms in our sample?				
List firms	-	NA	WB,ADB,JIBA	ATDP, THTI, Chulalongkorn University, textile industry,supplier ,FTI
list interactions	-	NA	Buy implementation, research about hazardous waste, share developing research	Share laboratory, accept chemical substance data, site visit textile factory, membership of textile so that knowledge textile business movement.
3.9 Do you have any specific comments about the firms in the sample?	-	NA	Yes, the goverment must research until sucess comes	No

Section 4: Future directions: changes in market and expectations

Question	Technology Centers			
4.1 What future changes and challenges do you expect over the next few years for the firms in the sector?	Product/process improvements	NA	- Textile have cheap price and not endure will cover market and have increase problem : - - waste water - hazardous waste form factory	make band . name ourself in business of clothing to confer acceptant of world market and make confidence in product quality in domestic
4.2 How important do you see 'environmental' issues in years to come?	Environmental issues will be key word that every country must concern and realize	NA	It is not important issue	Very important because environmental issues like trade barrier
4.3 How will your services change to accommodate expected changes in market and demand?	Quick responses, high effective services	NA	Suggest good practice or good concept	Monitoring requirement market change and overhaul course of study that confer consistently of requirement market change

Annex 6

Regulators Questionnaires

Regulators	
1	Department of Industrial Works - DIW
2	**Regional Environmental Office 1** (Samutprakarn Environmental Authority and Nakornpathom Environmental Authority)

Section 1: Basic data

Question	Regulator	
1.1 Name of organization	DIW	Regional Environmental Office 1
1.2 Year established	1943	1998
1.3 Position and rank in government hierarchy, which department;		
whether at the state or provincial level	State level	State Level
Who (which office, ministry) do you report to?	Ministry of Industry	Ministry of Science Technology and Environment
1.4 Objectives of organization regarding environmental performance	Controlling and checking industrial works according to the Factory Acts.	Assisting/Coordinating Provincial Administration offices in development of Provincial Environmental Management plans
1.5 What resources are available to you?		
Budget	Yes	No
Personnel	Yes	No

Question	Regulator	
Do you have any links to international organizations or personnel?	Yes	Yes
1.6 How is the regulator organized?		
How many divisions, and what are the divisions (e.g. inspection, legal)	There are 15 divisions, Total labors = 1,026 and Numbers in 1. R&D = 128 2. Administration = 133 3. Legal = 21 4. Inspection = 624 5. Other = 120	There are 3 divisions, Total labors = 10 and Numbers in 1. R&D = 0 2. Administration = 2 3. Legal = 0 4. Inspection = 3 5. Other = 5
1.7 How does the organization report findings?		
Publication of information, reporting, etc.	Journal, Web-site, Newspaper	Journal, Web-site

Section 2: Environmental issues: problems, objectives, statements, policies, regulations

Question	Regulator	
2.1 What are the key objectives of the regulator?		
Legislation?	Yes	No
Alternative (non-command and control) forms of regulation?	No	No
Information and support?	Yes	Yes
2.2 What forms of regulation exist, or are planned for?	Controlling, checking and developing industrial works according to the factory Acts (B.E.2535), Dangerous Substance Acts (B.E.2535), Registration of Machinery Acts (B.E.2514).	Enhancement and Conservation of National Environmental Quality Act. 2535 (1992) and other relative regulations
Is regulation restricted to legislation, or are there alternative forms?	There are alternative forms.	restricted to legislation

Question	Regulator	
Are these changing/ evolving?	There are changing Ministry' s laws and Notification of Ministry of Industry.	Effective implementation of Enhancement and Conservation of National Environmental Quality Act. 2535 (1992)
2.3 How is legislation/ regulation established?	Environmental conditions (quality of sources, none- standard wastewater)	-
Are private-sector companies involved?	No	Yes
Are international organizations consulted, e.g. ISO?	No	No
2.4 What are the key areas of environmental concern, at the levels of:		
Local?	Level = hard	Level = hard
Province?	Level = hard	Level = hard
Federal level?	Level = hard	Level = hard
2.5 What are the key industrial sectors of concern?		
Why?	1. Water pollution because many of sources that get effect from the discharge of waste are very poor. 2. workers' safety because the accident is often occur caused property and life loss 3. Air pollution because it cause the community ' s health problem especially industrial district	Water pollution and waste disposal
What are the areas of concern		
air pollution		
Water pollution		
workers' safety		
consumers' safety?		
other		
2.6 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)		

Question		Regulator	
	Noise pollution	3	1
	Air pollution	4	3
	Water pollution	5	5
	river	Yes	Yes
	lake	No	No
	sea	No	No
2.7	What environmental standards (limits to discharge, effluents and disposal of solid waste) apply to the sector as per law and regulations? Please specify the environmental standards that the sampled firms have to meet.	There are Industrial Effluent Standards, Air pollution, and disposal of solid waste standards. For example of pollutant standard are COD<= 400 mg/l, BOD <= 60 mg/l, SS <= 50 mg/l.	-
2.8	Have licenses been issued to (or refused to) any of the sampled firms?	Yes	-

Section 3: Monitoring, inspection

Question	Regulator	
3.1 How is monitoring organized? I.e.		
who does the monitoring?	Engineer, Factory Inspector, Scientist	Provincial public health agencies and provincial office' s directory agencies
Are they part of your organization, or are they separate?	Yes, they are in the part of DIW from Factory Control and Inspection bureau, Provincial Office ' s Directory, Safety Technology Center and Hazardous substance control bureau.	They are Central organization agencies
How much staff do they have	624	2
Do staffing levels vary according to the numbers and sizes of firms monitored?	No	Yes
How are staff trained or selected for monitoring?	They were trained about Environment and safety.	They must graduated in related field and passed base knowledge training
What do they monitor in each firm?	There are 1. Process checking 2. Pollution and Waste water treatment system checking 3. Waste' s example collecting to analysis the scientific result	-
What events may cause each occasion of being monitored?	They are 1. receive complaints 2. follow problem solving 3. inspect according to annual plan	Receive complaints
3.2 Are there particular sectors or kinds of firms that you want to monitor more regularly or comprehensively than others?	Yes, they are the firms that have BOD loading up to 100 kg/day.	The small business are not in permission scope
3.3 Are there different monitoring rules, or standards, for different firms?		
E.g. National or international?	No	No
Firms in special zones, e.g. Export Processing Zones; Industrial Estates?	No	No

Question		Regulator	
3.4	What systems are in place-automated, computerized?	Computerized system	monitoring/inspection, sample collecting
3.5	How is monitoring linked specifically to environmental technology, or the problems that environmental technology could address?	can tell that how appropriate/effective a type of waste treatment system is	
3.6	What are the technological obstacles to effective monitoring?		
3.7	What guidelines do they follow for inspection (multi-sector or single sector inspectors)?	multi-sector inspectors	multi-sector inspectors
3.8	What is the policy for monitoring and inspection?		
	Collaboration / negotiation?	Collaboration	Collaboration
	Or repressive / imposed?	Imposed	Imposed
3.9	What monitoring data do you have for the sampled firms?	Waste water database	-
	And is it possible to see this?	Yes	-

Section 4: Penalties and legal process

Question		Regulator	
4.1	What is the penalty process based on inspection?	Refer Scientific analysis results of pollutant parameters	1. Have community/local government agencies complaint 2. Inspection/monitoring by Coordinate with central organization agencies
4.2	Are any penalties specifically related to technology?	No	No
	Which? Details?	-	-
4.3	What suggestions can you make concerning improving the effectiveness of the penalty system? Are there any aspects of the system that you feel can work better, if changes are made?	Increasing penal provisions	Strict monitoring and serious penalty
4.4	Is the legislative process effective in assisting the regulator?	Yes, it is.	Yes, it is.
4.5	Is there opposition to fining local companies, in case this impacts negatively on competitiveness?	Yes, there is.	Yes, there is.

Question		Regulator	
4.6	How does the judiciary view environmental issues and environmental law?	1. Environment regulations should be improved appropriately for category of factories 2. Should improve the overlap of the state sector works	Environmental issues and environmental law in firms' s opinions are not appropriate
4.7	Have any of the sampled firms received compliance enforcement actions?	No	No
	Which?	-	-
	Other details... history, implications, apparent impacts...	-	-

Section 5: Technology, finance and information initiatives: access to capital, or human resources, information

Question		Regulator	
5.1	What assistance does the regulator offer to the firm? (if any)	Pollution treatment Technology	
	Advice and information	Yes.	No
	Access to official, government, schemes such as subsidies	Yes.	Yes
5.2	Does the regulator work with other centers of technological expertise: (please rank: 1=not important, 5=very important)		
	Universities	2	3
	Government technology offices and agencies	2	3
	Standards and quality control agencies	2	3
	International organizations	4	1
	Private-sector firms	5	2
	Private-sector consultancies	3	1
	NGOs	2	1
	Other (specify)	-	-
5.3	What official mechanisms and assistance programs are available?	Pilot project " Cleaner Technology "	Coordinating with the relative organizations
5.4	How do firms generate technical information?	-	-
	What can the regulator offer the firm in terms of advice and information support?	Providing all information of CT on DIW ' s web-site	-

Question	Regulator	
5.5 What are –in your view- the main reasons why firms implement technology changes? Please elaborate (and rank in importance: 1=not important, 5=very important):		
cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	5	3 (energy consumption)
productivity increase (in terms of increased volume of output)	5	2
Quality improvements (specify whether process / product quality)	5	3 (process / product quality)
meeting environmental regulations /standards	4	2
opening up new markets	4	2
extending the product range	3	3
environmental pressure from NGOs, local community, business associations/other firms	3	3
Other (specify)	-	-
5.6 What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1-5	1. Executive officer vision 2. Technology 3. Information	1. Refutation 2. Lack of understanding 3. High investment
Lack of information?	3	3
High implementation cost?	5	3
No alternative chemical/raw material input?	5	3
No alternative process technology?	5	3
Uncertainty about performance impact?	5	2
Lack of tradition/skills?	3	3
Other: specify	-	-
5.7 If some firms have not adopted new EST in recent years, can you explain why not? Rank Importance 1-5		Lack of understanding and refuse technology
Lack of information?	5	3
High implementation cost?	5	3
No alternative chemical/raw material input?	5	3
No alternative process technology?	5	3
Uncertainty about performance impact?	3	2
Lack of tradition/skills?	4	3

Question	Regulator	
Other: specify	-	-
5.8 In what ways do you interrelate with the specific firms in our sample?		
List firms		
list interactions		
5.9 Do you have any specific comments about the firms in the sample?		

Section 6: Future directions: changes in regulations and legislation, agency structure

Question	Regulator	
6.1 What changes are required to improve the current regulatory framework?	1. Change the role from command and control to be supporting organization. 2. Compile Environmental management regulations especially	Environmental regulations should be more important issues
6.2 What are the obstacles to these changes?	1. Central government agencies worry about lower authorities 2. Local Administrative organization lack of monitoring capability	Without Coordinating
6.3 How far will trends towards increasing international sales, and international ownership of firms, impact on the ability of the government to regulate firms?	Limited	Stable
6.4 Do you think the regulatory system may become more environmental in the future?	Yes	Yes
How will environmental issues be seen in the future?	- Environmental regulations will become more important issue - Serious penalty for the person who violates or refuse the environmental regulations	Environmental regulations will become more important issue

Question	Regulator	
6.5 Do you believe that the industry/sector benefits from working with this regulatory system, or that it suffers in terms of international competitiveness?	Yes	Yes
6.6 What will be the most powerful in the future? 1=not important, 5=very important		
National regulatory system	4	3
Firm-based systems of regulation	3	2
International systems of regulation	5	2
Other (specify)	-	-

Annex 7

Business Associations Questionnaires

Business Association	
1	The Association of Thai Textile Bleaching, Dyeing, Printing and Finishing Industries - ATDP

Section 1: Basic data

Question	Business Association
1.1 Name of the association	ATDP
address:	Bangkok
1.2 Name (s) of interviewees	Mr.Pichai Uttamapinant
position(s),	President
international experience	Yes
1.3 Year of establishment:	1991
1.4 Objectives of association	- To help and to support members finding solution about textile bleaching, dyeing, printing and finishing business and technology - To be members' s representative on business negotiation
1.5 Membership	135
number of companies included	-
sector	-
criteria for membership	The candidates submit application to Secretary General then they are proposed to Executive board within 15 days after pass a resolution they will be perfect members. The members consist 3 groups. There are secretary member, ordinary member, joint member
1.6 Are there other business associations in this particular sector and country; or internationally, that may overlap in interests? Specify	Yes, the other national associations like the association of clothing weaving and spinning. And also cooperation with the International association as JODC to solve textile industries' s environment problem

Question	Business Association
	under GREEN AIDS PLAN (GAP) project
1.7 What information or special services do you provide to your members and at what cost?	Able to get Information from journal named Colorway that free charge for all members, regulators, technology centers and research institutes

Section 2: Market characteristics / sectoral trends

Question	Business Association
2.1 How large is the sector (how many firms?), and which are the key players that dominate the market (if any)?	There are 400 firms and the market leaders are Union Textile Industries Co., Ltd. , Nan Yang Knitting Factory Co., Ltd. , Jong Stit Co., Ltd. , Sampran Weaving Co., Ltd.
2.2 Have there been changes in the nature and intensity of competition/ market requirements in the sector over the last 10 years? Indicate relative importance 1=not important, 5=very important	
Changes in market competition and requirements	
Type of competition (price; quality; diversity/uniqueness of product) (please specify)	Price = 5 ; quality = 5 ; diversity/uniqueness of product = 5
Intensity of competition (and please state if this has become harder, milder, stable)	Harder = 5
Other requirements	International customer requirement (Ekotex, Azodye, Formaldehyde) = 5
2.3 What strategies are firms adopting to improve their position in the market?	Identifying new markets = 3 ; developing new products = 5 ; increasing market share=2; cutting costs = 4 ; differentiating the products = 3
2.4 In what way does environmental performance affects the competitiveness of enterprises in the sector? (please rank 1-5)	
Does this vary between different firms? How about the firms investigated?	
2.5 Do firms attempt to construct an environmentally-friendly image in any way (advertising/product marketing)?	Yes, but not much.
What is the marketing effect of a 'green company image'?	Increasing market share from understanding customers and need in selecting an environmentally-friendly product
Does this vary according to what market segments they cater for nationally or internationally?	Yes.

Question	Business Association
2.6 Do you see further growth in the importance of environmental issues in the various market segments of the sector ?	Yes, medium importance
2.7 What are the major changes facing the sector in the next 10-20 years?	
What will be the key issues in competitiveness in the longer-term?	1. improve process for energy saving and environmental effect reduction 2. increase production efficiency to have the most right first time 3. recover more than 50% of water to use in process

Section 3: Environmental policy /Regulation

Question	Business Association
3.1 Have national environmental regulations reduced or strengthened the competitiveness of firms in the sector?	Both reduced and strengthened the competitiveness. It is depend on adaptation ability of firm
If so, in what ways?	
3.2 Are environmental regulations in other countries affecting the firms' competitiveness	Yes.
If yes, in what ways	As same as 3.1
3.3 Which of the firms in the sample are considered to be the most environmentally conformist?	
And which not?	
3.4 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)	
Noise pollution	3
Air pollution	3
Water pollution	2
river	Yes.
lake	
sea	

Question		Business Association
3.5	In your view, is the government putting unnecessary burdens on the industry in terms of competitiveness in the domestic/export market?	No, there were improved satisfyingly.
	If so, explain why.	-
3.6	What could be done from the government side to enable firms better respond to environmental regulation / improve environmental performance?	Reduce direct tax more than usual for the better environmental regulation / improve environmental performance responding firms
3.7	To what extent is the business community involved in formulating national environmental policy /regulation?	Participate in driving environmental policy /regulation Without exception and impartiality
	Does the business association lobby governments or firms for changes in regulation?	Yes.
	If so, for what type of changes?	It used to have a regulation that the firms must feed the fishes in the last wastewater treatment pond. It was not practical. Thus, there were much pressure to quit this regulation in the next time.

Section 4: External pressure

Question		Business Association
4.1	Are there any campaigns (from your Business Association) to improve environmental performance of firms?	Yes.
	Do these relate specifically to the sector studied?	Yes, energy reduction
4.2	Have there been any times when firms were (or are) pressured by third parties (in particular local communities, NGOs and Business Associations) to improve environmental performance?	Yes, there have been.
	Did this involve any of the firms in the sample?	Yes.
	If so, describe the pressure exercised and result it had on the firm's environmental performance.	Pressure to reduce smoke from using fuel oil so they construct wet scrubber at smoke funnel of boiler
4.3	Do you meet regularly with environmental advisers?	Yes.
	Who?	1. Thailand Environment Institute 2. Japan Experts under GREEN AIDS PLAN project 3. Environmental consultants

Section 5: Technology infrastructure

Question	Business Association
5.1 Do you provide support to members (or firms in general) on technology matters?	Yes.
If yes, then how?	-
Form of support (Please rank in terms of importance – 1=not important, 5=very important), and concerning which types of technology, or system of technology?.	
Provision of information technology sources	
Ranking	5
Concerning which technology or standards in general?	environmental regulation and customer requirement
Support in technology selection	
Ranking	5
Concerning which technology or standards in general?	environmental regulation and customer requirement
Support in technology implementation	
Ranking	5
Concerning which technology or standards in general?	environmental regulation and customer requirement
Establishing links with suppliers	
Ranking	4
Concerning which technology or standards in general?	ISO 9000, ISO 14000
Financial subsidies	
Ranking	4
Concerning which technology or standards in general?	_
Stimulating enterprise cooperation	
Ranking	4
Concerning which technology or standards in general?	ISO 9000, 14000
Other (specify)	_
Ranking	_
Concerning which technology or standards in general?	_
5.2 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes?	
water	Very influence

Question		Business Association
	energy	Most influence
	raw materials	Very influence
5.3	How would you assess the quality and effectiveness of technology infrastructure in the country; and please provide a brief list of companies and institutions that can provide technological support or development	By usually inspected parameters according to method of instrument' s program but some lists can not be checked because the major firms lack of Instruments, tradition/skills inspectors. So, they have to rely on both of national and international organization but the cost of procedure is rather high.
5.4	Do financial intermediaries impose environmental requirements on firms when considering requests for financing?	Yes, they do.
5.5	Who are the technologically leading companies in the sector, and do you turn to them for advice and support?	_
5.6	In what ways do you interrelate with the specific firms in our sample?	
	List firm	
	list interactions	
5.7	Do you have any specific comments about the firms in the sample?	
5.8	What are –in your view- the main reasons why firms in your sector implement technology changes? Please elaborate (and rank in importance: 1=not important, 5=very important):	
	cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	5
	productivity increase (in terms of increased volume of output)	4
	Quality improvements (specify whether process / product quality)	4
	meeting environmental regulations /standards	3
	opening up new markets	5
	extending the product range	4
	environmental pressure from NGOs, local community, business associations/other firms	3
	Other (specify)	-
5.9	What is restricting (if anything) the adoption or development of cleaner technologies? Rank Importance 1-5	

Question	Business Association
Lack of information?	5
High implementation cost?	4
No alternative chemical/raw material input?	3
No alternative process technology?	2
Uncertainty about performance impact?	2
Lack of tradition/skills?	2
Other: specify	-
5.10 If your members have not adopted new EST in recent years, can you explain why not? Rank Importance 1-5	
Lack of information?	1
High implementation cost?	4
No alternative chemical/raw material input?	3
No alternative process technology?	3
Uncertainty about performance impact?	2
Lack of tradition/skills?	5
Other: specify	-

Annex 8

English – Thai Questionnaires

Annex 8

UNIDO Research project:
Assessing the uptake of ESTs in selected developing countries

FIRM Questionnaire: Version 07/11/01

Note : text in italics as well as footnotes serve as guidance for the interviewer

Section 1: Basic firm data (semi-structured)

1.1 Name of the firm, address:

1.2 Name(s) of interviewee(s), position(s), international experience *(i.e. briefly indicate background);*

1.3 Year of establishment:

1.4 Ownership structure:
private domestic ___% (specify whether shares are held publicly)
private foreign ___%
government ___%

1.5 Major lines of business (ISIC 6 digit code):
describe key products ; processes (please, indicate production volume for main products):

briefly describe the firm's key products and processes in relation to its main competitors:
does the firm use international standards / enterprise standards for its main products? (if so, specify):

1.6 Plant nos.; locations; divisions within production process[1]:

1.7 Installed capacity (specify unit of measurement): _____(in 1991) _____(in 2001)
Utilized capacity (at present): ____%

1.8. Output as a percentage of 1991? In 1996____%. In 2000_____%

1.9 In what year was most of your plant and equipment built_____?

1.10 Turnover (in domestic currency): _____(in 1991); _____(in 2000)
1.11 Profit ratio (total profits as fraction of sales/turnover): ____ (in1991) ____ (in 2000)

[1] A firm may have production units in more locations, when you ask about capacity below and further down about technology etc, you have to make clear which production unit is meant

1.12 Cost of production in 1991, 1996 and 2000 from official reports (in local currency):

	1991	1996	2000
Depreciation and interest payment			
Labour costs			
Raw material costs			
Energy costs			
water			
other			

1.13 Export orientation: where is the main product of the firm sold?:
Domestic market: _____ % in 1991; _____% in 2000
Exported: _____% in 1991; _____% in 2000

1.14 Main countries and regions to which the product is exported (if applicable):
European Union: _____% in 1991;_____% in 2000
Other European countries: _____%in 1991;_____%in 2000
North America (USA & Canada):_____%in 1991;_____%in 2000
Region: _____%in 1991;_____%in 2000
Other (please specify): _____%in 1991;_____%in 2000

1.15 What percentage of revenue did your firm get from exports?
In 1991 _____%; in 2000_____%

1.16 Total Labor force:
numbers in production/ R&D/administration:
proportion of labor force / administration from overseas, or with international experience (*optional*):

1.17 What is the firm's relative size and position[2], its market niche? Would you consider the firm to be a market leader?

Section 2: Business environment (semi-structured)

(a) Market developments and determinants of profitability:

2.1 Who are your main customers?
domestic/foreign?
Are you a sub-contractor for larger company?
(*is the firm associated with highly visible conglomerates?)*

2.2 What are your customers' main requirements?
describe the relative importance of price, quality: (incl. product/ process certification)
does foreign demand differ in any way from domestic demand? *(if applicable)*
Could you give a brief summary of what aspects (or types) of product quality different markets require:

[2] relative to its main competitors, either national or international; the measure of size we propose is sales

Please specify which type of product/process certification is required:

2.3 Has the demand for your products changed over the last ten years and if so, in which ways?
(is there an environmental dimension?;(how important has the environment become in terms of how the firm's products are developed and marketed?)

2.4 Who are your main competitors?

	Proportion (%)
1. mainly domestic	
2. less than 50% abroad;	
3.more than 50% abroad	
4. virtually all abroad	

2.5 How would you rate the degree of competition on your main sales markets?:
1. limited; 2. average; 3. strong *(with a view of facilitating the construction of an index)*

2.6 Have there been changes in the nature and intensity of competition/ market requirements since 1990?
nature: price, quality, diversity/uniqueness
intensity: harder/ milder/ stable
market requirements: regulatory / voluntary (domestic/foreign)

2.7 What is the firm's strategy for increasing its competitiveness?

(What are the main objectives of the firm's strategy? What is the importance of environmental objectives in this regard?)

	Rank 1-5
identifying new markets	
developing new products	
increasing market share	
cutting costs	
differentiating the products –i.e. making products unique	

2.8 What are the main challenges for the firm in improving its competitiveness/implementing its business strategy?

(b) Community / NGO/ business association pressure

2.9 What are the main topics that community/NGO/ business associations may place pressure on your company
(the aim here is to assess a general guide to pressure, rather than assume that the pressure is necessarily environmental)

2.10 In environmental terms, would it be possible to indicate how far your company is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)

Type of pollution	1	2	3	4	5
Noise pollution					
Air pollution					
Water pollution (please state: river/lake/sea)					

2.11 During the period 1991 - 2000, have any of the following groups brought pressure on your company to reduce pollution? Please note the number of times groups have telephoned, faxed, e-mailed or visited your firm. For news media, please note the number of media reports.

Please use the following classifications: 0, 1 to 5, 6 – 10, 11 – 20, 20+

	Objection to issuance of permit	Pressure to reduce pollution	Pollution-related lawsuit
Environmental NGOs			
Student groups			
Industry Associations			
Consumer Groups			
News media			
Citizens or Citizens Groups			
Other			

2.12 Has your company's strategy ever been influenced by the advice or suggestions of business associations?
If so, how? Which?
Are the business associations local, national, or international?
How did they contact you?
Did you consider this a positive development or unpopular and forced?
Explain why

2.13 Have you ever been influenced by campaigns from NGOs or community organizations?
If so, how? Which?
Were the groups local, national, international?
How did they campaign? (Newspapers? Non-public advice? Citizen protests?)
Did you consider this a positive development or unpopular and forced?
Explain why

2.14 During the period 1991 - 2000, have your firm's customers at home or abroad, or your suppliers exerted pressure to improve environmental management in the factory? Please evaluate the importance of such pressures for your company from 1 to 5, with 1 denoting not important and 5 denoting very important. Write 0 if no pressure was exerted.

	Importance (1-5)
Domestic customers	
Foreign customers	
Suppliers	

(c) Technology infrastructure:

2.15 What does the firm do when it becomes necessary to consider technological change[3]?

Does the firm rely on institutions and consultancies for technological change? (give examples of such institutions... international organizations; national government advisory bodies; private-sector consultancies, etc)

Or from technological resources and advice from within its own company or other companies?

2.16 How does the firm access information and support on technological change?

What kind of technological change ('hardware'/processes)

Does the firm rely more on technology providers within its own company (or family of companies) than organizations outside the firm?

2.17 How would you assess the existing system of technological support services (range of services, quality, accessibility)?

In your own firm and parent company?

In the country or locality as a whole (is more support provided from within the government than from private sector? And is the support better from national or international advisers?)

Section 3: Regulatory environment/pressure (semi-structured)

3.1 What are the key environmental regulations applicable to the firm? Please list them.

How have they affected the firm?

3.2 What are the penalties for compliance failure? What procedures are involved?

3.3 Has the firm been penalized for non-compliance?
If so, details

[3] In the broadest terms, technological change can be defined as 'changes in the way inputs are being transformed into outputs'. More specifically, technological change can be seen as any change in production/process technologies (incl. equipment and input material changes), organizational systems as well as in products.

3.4 Is their any form of cooperation with regulators? *(responsive regulation)*
Example: consultation on regulations; negotiated standards and emissions; room for voluntary regulation by companies)

3.5 How do regulators act in regard to environmental technology?
Do they recommend specific environment technology (both process and EoP)?
Do they offer incentives, or other support, referrals, and information?
Or do they penalize only?

3.6 Do you or environmental authorities make information about the emissions of major pollutants by your firm freely available to the public?
Yes __ /No___

3.7 Does the firm see environmental regulations as costs or benefits (i.e. win/win situation- having both economic as well as environmental benefits)?

3.8 Have national environmental regulations reduced or strengthened your competitiveness? (for example, by penalizing companies that are not willing to invest in high-quality products?)
In what ways?
Do the regulations affect the competitiveness of your competitors?

3.9 Are environmental regulations in other countries affecting the firm's competitiveness?
if yes, in what ways?

3.10 Do you expect stricter environmental regulations in future?
If yes, how do you plan to respond?

Section 4: Technological change and environmental performance (semi-structured)

4.1 How would you characterize the level of technology of the firm compared with the sector as a whole (i.e. the nationally)?
in terms of process technology:
(the following may be options you can mention to suggest to the interviewee)

- Best Available Technology
- standard-modern
- traditional

in terms of products:

- high quality
- standard
- low

4.2 Do you have a quality management system? If so, is it ISO compatible? Are you ISO certified?

4.3 What were the major changes in technology over the past ten years?: *(please refer to footnote 3 in section 2 for a definition of technological change)*

4.4 Which were the main objectives behind the technological changes? Please rank and specify:

Motives	Rank 1-5 (1=not important; 5=very important)
Cost reduction (specify if labor costs / energy consumption / consumption of raw materials)	
Productivity increase (in terms of output volume)	
Quality improvements (product/ process)	
Meeting environmental regulations/standards	
Opening up new markets	
Extend product range	
Other (please specify)	

4.5 In what way have developments in the prices for water/energy/raw materials influenced technological change? (please rank 1-5) *(only if applicable- that is if significant changes have occurred over the last ten years in raw material/water or energy prices)*,

4.6 In terms of equipment:

- Where did the equipment come from (firm/country)?
- How was it financed? (e.g. loan, subsidy, equity)

4.7 Do financial intermediaries impose environmental regulations for equipment financing? *(if applicable)*

4.8 What was the firm's annual average capital and operation & maintenance expenditures for pollution control[4] in local currency? In 1991____;in 1996____in 2000?

4.9 List the most important environmental projects that the firm has undertaken since 1991. Consider all measures that you believe have reduced pollution, i.e. End-of-Pipe measures, process changes, input materials substitution, energy saving measures, organizational changes, product changes. All measures that reduce pollution emissions should be included even if the main intention was not to fulfill environmental requirements. If an investment or measure saved your firm money, please specify the amount. If some of the investments in waste reduction are inseparable from investments in production technology, please specify the cost of overall investment.

[4] Both End of Pipe and cleaner production equipment

Project[5]	Year started	Year completed	Costs in local currency	Environmental impact[6]	Annual cost savings due to implemented measures e.g. fuel costs, materials saving,better production efficiency (optional)	Source of project financing %
			Total investment	Maintenance/ operational costs	–	Company Commercial loan Government Other (specify)

4.10 What were the reasons for implementing the above projects? Please elaborate. Subsequently rate the importance of the following sources of pressure on your company:
(from 1-5 with 1 denoting not important and 5 denoting very important)

	Importance (1-5)
Regulatory pressure, high pollution charges and fines	
Environmental norms and standards for selling goods in foreign markets	
Requirements of the firm's business partners (suppliers, customers, investors)	
Environmental requirements imposed by owners and shareholders of the firm	
Expectations that in the future regulations will be more stringent and charges will be higher	
The cost of wasteful energy and material input use	
Public pressure (by local communities, NGOs)	
Peer pressure (by business associations, other firms)	
Incentives (loans, grants, tax exemptions,...)	
Goal not to lag behind competitors who have achieved good result in waste reductions	
Other: (specify)	

4.11 What is the ratio between pollution prevention and end-of-pipe techniques?

4.12 How were the changes implemented?

- On which sources of information did the firm rely when identifying technology? *(e.g. trade fairs, suppliers of machinery and equipment,*

[5] The following categories will need to be used by the national institutions at the time of data analysis: 1. EoP: e.g. waste water treatment / air filters; 2. input material change; 3. better process control; 4. equipment modification; 5. technology change; 6. on-site recovery and reuse; 7. product modification (please refer to annex 1 for a further elaboration of these categories)

[6] data on reduction in pollution load; reduction in water, energy use; reduction in raw material consumption – these data will need to be classified as per an applicable environmental impact scheme (see annex 2 for an initial example)

suppliers of raw materials and components/intermediate products, customer info , business associations, consultancy firms, other firms, technology institutions, journals/publications, exchange of technical personnel etc)?

- How would you assess your access to technological information?
- What was the source of the technology (in terms of both 'hard' and 'soft' technologies) itself ?
  - Please specify if the provider is located:
  - within the same state/province as the enterprise?
  - ...or within the country?
  - ...or within the region / other developing country?
  - ...or in an industrialized country?
- Did the firm rely on external technical support in assessing, selecting and implementing the technology (i.e. equipment) ? (i.e. firms or agencies not within the company or parent company)
- Did the firm cooperate with other firms in implementing the changes?
  - vertical networks: (ie enterprises within the firm's value chain)
  - horizontal networks: (ie cooperation with non-trading partners)?

4.13 What links do you have with technological associations or other producers or disseminators of technology, and how do you use these links?

(eg regular contact with universities; government agencies for technology; consultancies..)

4.14 Did you experience problems in implementing the changes? (e.g. need to 'indigenize'/adapting, adjusting the technology?) If so, please elaborate.

4.15 What resources or personnel do you have within your company to enhance your adoption of environmental technology?[7]

(e.g. a special technology department?; how many staff?; how long have they been in existence? Where are they trained? do you have a research and development division?; special relationship or JV with a company or agency that offers these?, other) Please elaborate

4.16 Does the firm have an environmental policy or strategy? If so, since when?
What are the main objectives and how are they implemented?
Why does this firm have this kind of policy?

(and if not, why not?)

4.17 Does your company participate in any waste minimization or pollution prevention programme?
And why?

(and if not, why not?)

4.18 What is restricting (if anything) the adoption or development of cleaner technologies[8]?

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[7] Together with question 4.7 and 4.13, this question will be used to construct a technological capability index. As per S. Lall, technological capability can be defined as "the skills, technical knowledge and organizational coherence required to make industrial technologies function in an enterprise". (see annex 3 for an illustrative matrix of firm-level technological capabilities.

[8] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

(first have the firm to elaborate and then present them with the following options) (in the report, please indicate to what extent the firm is aware of the options and to what extent the firm has the technological capability to evaluate the options and implement the technology)

LET THE COMPANY SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options…	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

4.19 If your firm has not adopted new EST in recent years, can you explain why not? *(this is the same table as before, but other factors may be important)*

LET THE COMPANY SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options…	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

BUSINESS ASSOCIATION/S Questionnaire: Version 15/11/01

Section 1: Basic data (semi-structured)

1.1 Name of the association/ address:

1.2 Name (s) of interviewees / position(s), international experience; (i.e. background)

1.3 Year of establishment:

1.4 Objectives of association

1.5 Membership, number of companies included, sector, and criteria for membership

1.6 Are there other business associations in this particular sector and country; or internationally, that may overlap in interests? Specify

1.7 What information or special services do you provide to your members and at what cost?

Section 2: Market characteristics / sectoral trends (semi-structured)

2.1 How large is the sector (how many firms?), and which are the key players that dominate the market (if any)?

2.2 Have there been changes in the nature and intensity of competition/ market requirements in the sector over the last 10 years?

Changes in market competition and requirements	Indicate relative importance 1=not important, 5=very important
Type of competition (price; quality; diversity/uniqueness of product) (please specify)	
Intensity of competition (and please state if this has become harder, milder, stable)	
Other requirements	

2.3 What strategies are firms adopting to improve their position in the market? (How far do these vary between different firms; and specifically between the firms in the sample) (Please give some specific examples that you consider to be representative or innovative)

2.4 In what way does environmental performance affects the competitiveness of enterprises in the sector? (i.e. how important has the environment become in

terms of how the firms products are developed and marketed?) (please rank 1-5)
Does this vary between different firms? How about the firms investigated?

2.5 Do firms attempt to construct an environmentally-friendly image in any way (advertising/product marketing)?
What is the marketing effect of a 'green company image'?
Does this vary according to what market segments they cater for nationally or internationally?

2.6 Do you see further growth in the importance of environmental issues in the various market segments of the sector? (e.g. increased PACs, consumer preference, public environmental awareness/opposition)?

2.7 What are the major changes facing the sector in the next 10-20 years? What will be the key issues in competitiveness in the longer-term?

Section 3: Environmental policy /Regulation (semi-structured)

3.1 Have national environmental regulations reduced or strengthened the competitiveness of firms in the sector?
If so, in what ways?

3.2 Are environmental regulations in other countries affecting the firms' competitiveness
If yes, in what ways

3.3 Which of the firms in the sample are considered to be the most environmentally conformist? And which not?

3.4 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)

Type of pollution	1	2	3	4	5
Noise pollution					
Air pollution					
Water pollution (please state: river/lake/sea)					

3.5 In your view, is the government putting unnecessary burdens on the industry in terms of competitiveness in the domestic/export market? If so, explain why.

3.6 What could be done from the government side to enable firms better respond to environmental regulation / improve environmental performance?

3.7 To what extent is the business community involved in formulating national environmental policy /regulation?
Does the business association lobby governments or firms for changes in regulation? If so, for what type of changes?

Section 4: External pressure (semi-structured)

4.1 Are there any campaigns (from your Business Association) to improve environmental performance of firms?
Do these relate specifically to the sector studied?

4.2 Have there been any times when firms were (or are) pressured by third parties (in particular local communities, NGOs and Business Associations) to improve environmental performance? Did this involve any of the firms in the sample?
If so, describe the pressure exercised and result it had on the firm's environmental performance.

4.3 Do you meet regularly with environmental advisers?
Who?

Section 5: Technology infrastructure (semi-structured)

5.1 Do you provide support to members (or firms in general) on technology matters?
If yes, then how? (*have the association first elaborate and then present options)*
(Please note that technology can be considered in broadest terms: e.g. ISO 9000; ISO 14000; plus product technologies)

(Please rank in terms of importance), and concerning which types of technology, or system of technology?

Form of support	1=not important, 5=very important	Concerning which technology or standards in general?
Provision of informationon technology sources		
Support in technology selection		
Support in technology implementation		
Establishing links with suppliers		
Financial subsidies		
Stimulating enterprise cooperation		
Other (specify)		

5.2 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes? *(only if applicable- that is if significant changes have occurred over the last ten years in raw material/water or energy prices)*

5.3 How would you assess the quality and effectiveness of technology infrastructure in the country; and please provide a brief list of companies and institutions that can provide technological support or development

5.4 Do financial intermediaries impose environmental requirements on firms when considering requests for financing?

5.5 Who are the technologically leading companies in the sector, and do you turn to them for advice and support?

5.6 In what ways do you interrelate with the specific firms in our sample?
List firms... list interactions

5.7 Do you have any specific comments about the firms in the sample?

5.8 What are –in your view- the main reasons why firms in your sector implement technology changes? Please elaborate (and rank in importance):

Reasons for technology changes	1=not important, 5=very important
cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	
productivity increase (in terms of increased volume of output)	
Quality improvements (specify whether process / product quality)	
meeting environmental regulations /standards	
opening up new markets	
extending the product range	
environmental pressure from NGOs, local community, business associations/other firms	
Other (specify)	

5.9 What is restricting (if anything) the adoption or development of cleaner technologies[1]?
(please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion.

LET THE business association SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options...	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

[1] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

5.10 If your members have not adopted new EST in recent years, can you explain why not?

(this is the same table as before, but other factors may be important)

LET THE business association SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options…	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

Section 1: Basic data (semi-structured)

1.1 Name of organization

1.2 Year established

1.3 Position and rank in government hierarchy, which department; whether at the state or provincial level
Who (which office, ministry) do you report to?

1.4 Objectives of organization regarding environmental performance

1.5 What resources are available to you?
Budget
Personnel
Do you have any links to international organizations or personnel?

1.6 How is the regulator organized?
How many divisions, and what are the divisions (e.g. inspection, legal)

1.7 How does the organization report findings?
Publication of information, reporting, etc.

Section 2: Environmental issues: problems, objectives, statements, policies, regulations (semi-structured)

2.1 What are the key objectives of the regulator?
- Legislation?
- Alternative (non-command and control) forms of regulation?
- Information and support?

2.2 What forms of regulation exist, or are planned for?
Is regulation restricted to legislation, or are there alternative forms?
Are these changing/ evolving?

2.3 How is legislation/ regulation established?
Are private-sector companies involved?
Are international organizations consulted, e.g. ISO?

2.4 What are the key areas of environmental concern, at the levels of:
- Local?
- State (region)?
- Federal level?

2.5 What are the key industrial sectors of concern?
Why?
What are the areas of concern (e.g. air and/or water pollution?; workers' and/or consumers' safety?)

2.6 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)

Type of pollution	1	2	3	4	5
Noise pollution					
Air pollution					
Water pollution (please state: river/ lake/sea)					

2.7 What environmental standards (limits to discharge, effluents and disposal of solid waste) apply to the sector as per law and regulations? Please specify the environmental standards that the sampled firms have to meet.

2.8 Have licenses been issued to (or refused to) any of the sampled firms?

Section 3: Monitoring, inspection (semi-structured)

3.1 How is monitoring organized? I.e.
(i) who does the monitoring?
(ii) Are they part of your organization, or are they separate?
(iii) How much staff do they have
(iv) Do staffing levels vary according to the numbers and sizes of firms monitored?
(v) How are staff trained or selected for monitoring?
(vi) What do they monitor in each firm?
(vii) What events may cause each occasion of being monitored?

3.2 Are there particular sectors or kinds of firms that you want to monitor more regularly or comprehensively than others?

3.3 Are there different monitoring rules, or standards, for different firms?
E.g. National or international?
Firms in special zones, e.g. Export Processing Zones; Industrial Estates?

3.4 What systems are in place-automated, computerized?

3.5 How is monitoring linked specifically to environmental technology, or the problems that environmental technology could address?

3.6 What are the technological obstacles to effective monitoring?

3.7 What guidelines do they follow for inspection (multi-sector or single sector inspectors)?

3.8 What is the policy for monitoring and inspection?
Collaboration / negotiation?
Or repressive / imposed?

3.9 What monitoring data do you have for the sampled firms?
And is it possible to see this?

Section 4: Penalties and legal process (semi-structured)

4.1 What is the penalty process based on inspection?

4.2 Are any penalties specifically related to technology?
Which? Details?

4.3 What suggestions can you make concerning improving the effectiveness of the penalty system? Are there any aspects of the system that you feel can work better, if changes are made?

4.4 Is the legislative process effective in assisting the regulator?

4.5 Is there opposition to fining local companies, in case this impacts negatively on competitiveness?

4.6 How does the judiciary view environmental issues and environmental law?

4.7 Have any of the sampled firms received compliance enforcement actions?
Which?
Other details... history, implications, apparent impacts...

Section 5: Technology, finance and information initiatives: access to capital, or human resources, information (semi-structured)

5.1 What assistance does the regulator offer to the firm? (if any)
- Advice and information
- Access to official, government, schemes such as subsidies

5.2 Does the regulator work with other centers of technological expertise: (please rank):

Collaborator	1=not important, 5=very important
Universities	
Government technology offices and agencies	
Standards and quality control agencies	
International organizations	
Private-sector firms	
Private-sector consultancies	
NGOs	
Other (specify)	

5.3 What official mechanisms and assistance programs are available?

5.4 How do firms generate technical information? What can the regulator offer the firm in terms of advice and information support?

5.5 What are –in your view- the main reasons why firms implement technology changes? Please elaborate (and rank in importance):

Reasons for technology changes	1=not important, 5=very important
cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	
productivity increase (in terms of increased volume of output)	
Quality improvements (specify whether process / product quality)	
meeting environmental regulations /standards	
opening up new markets	
extending the product range	
environmental pressure from NGOs, local community, business associations/other firms	
Other (specify)	

5.6 What is restricting (if anything) the adoption or development of cleaner technologies[1]?

(please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion.

[1] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

LET THE organization SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options...	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

5.7 If some firms have not adopted new EST in recent years, can you explain why not?

(this is the same table as before, but other factors may be important)

LET THE organization SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options...	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

5.8 In what ways do you interrelate with the specific firms in our sample?
List firms... list interactions

5.9 Do you have any specific comments about the firms in the sample?

Section 6: Future directions: changes in regulations and legislation, agency structure (open, unstructured)

6.1 What changes are required to improve the current regulatory framework?

6.2 What are the obstacles to these changes?

6.3 How far will trends towards increasing international sales, and international ownership of firms, impact on the ability of the government to regulate firms?

6.4 Do you think the regulatory system may become more environmental in the future? How will environmental issues be seen in the future?

6.5 Do you believe that the industry/sector benefits from working with this regulatory system, or that it suffers in terms of international competitiveness?

6.6 What will be the most powerful in the future? (and please rank)

Form of regulation	1=not important, 5=very important
National regulatory system	
Firm-based systems of regulation	
International systems of regulation	
Other (specify)	

Section 1: Basic data (semi-structured)

1.1 Name of organization

1.2 Year established

1.3 Objectives of organization

1.4 What resources are available to you?
- (i) Budget
- (ii) Personnel / labor force
- (iii) Number of offices
- (iv) Do you have any links to international organizations or personnel?

1.5 How is the center organized?
How many divisions, and what are the divisions (organigram?)
Does it include some or all of: R&D; manufacturing; marketing; dissemination

1.6 Is the centre government owned or private
domestic / international?

Section 2: Market trends and niche (semi-structured)

2.1 Who are your main customers, market?
- (i) National / international (what proportion each)
- (ii) Small/medium/large enterprises (what proportion each)

2.2 Is the center government subsidized, or required to make profit?

2.3 What are the main factors underlying your market?
What is the niche you occupy?
How does the center become profitable?

2.4 How does the center develop technology? (please rank):

	1=not important, 5=very important	Details (e.g. which technology? Which organization?)
By disseminating existing technology from elsewhere?		
By researching and developing its own technology?		
Through negotiation with other centers? (which? International?)		
Through negotiation with third party or private-sector companies NGOs? (which?)		
Other (specify)		

2.5 What type of services do you offer?
(the following can be suggested as options)
e.g. (i) design services
(ii) information on new production technologies
(iii) evaluation and selection of production technologies
(iv) implementation of new production technologies
(v) testing and analysis services
(vi) solutions to environmental problems
(vii) assistance in quality management systems
(viii) Other (specify)

2.6 Do environmental issues play a role in the range of services that you offer? If so, how important is it and does it vary according to the profile of enterprises in the sector?

2.7 How has the underlying demand for your services changed over the last ten years?

Section 3: Environmental issues, objectives, and technology (semi-structured)

3.1 Do you try to encourage firms to adopt new forms of technology, or technology standards (such as ISO 9000, 14000)? Or do you simply provide information if they are interested?
If yes, then please explain how you encourage the adoption of ESTs

3.2 How do you relate with individual companies: how is your service delivered, and at what cost? Do the costs vary?

3.3 What are –in your view- the main reasons why firms (in the industry sector) implement technology changes? Please elaborate (and rank in importance):

Reasons for technology changes	1=not important, 5=very important
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	
productivity increase (in terms of increased volume of output)	
Quality improvements (specify whether process / product quality)	
meeting environmental regulations /standards	
opening up new markets	
extending the product range	
environmental pressure from NGOs, local community, business associations/other firms	
Other (specify)	

3.4 In what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes? *(only if applicable- that is if significant changes have occurred over the last ten years in raw material/water or energy prices),*

3.5 In environmental terms, would it be possible to indicate how far the chosen industry sector is seen to be associated with the following forms of pollution? Please rank these 1-5 (where 1 is not at all; and 5 is very much)

Type of pollution	1	2	3	4	5
Noise pollution					
Air pollution					
Water pollution (please state: river/lake/sea)					

3.6 What is restricting (if anything) the adoption or development of cleaner technologies[1]?
(please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion).

LET THE organization SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options...	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

3.7 What changes would like to occur in order to enhance technology change, and where do these lie (with government (e.g. regulators); with companies)

3.8 In what ways do you interrelate with the specific firms in our sample?
List firms... list interactions

3.9 Do you have any specific comments about the firms in the sample? (in particular about their ability to implement technical changes)

Section 4: Future directions: changes in market and expectations (open, unstructured)

4.1 What future changes and challenges do you expect over the next few years for the firms in the sector?

[1] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

4.2 How important do you see 'environmental' issues in years to come?

4.3 How will your services change to accommodate expected changes in market and demand?

RAW MATERIAL/ TECHNOLOGY SUPPLIERS

Version 15/11/01

Section 1: Basic data (semi-structured)

1.1 Name of organization

1.2 Year established in this (x) country

1.3 Main products

1.4 What resources are available to the supplier in x country ?
- (i) Budget
- (ii) Personnel / labor force
- (iii) Do they have any links to international organizations or personnel?

1.5 How is the supplier organized?
- (i) How many divisions, and what are the divisions (organigram)
- (ii) Vertically integrated subsidiary of parent company?

1.6 Ownership: national / international (what proportion)

Section 2: Market trends (semi-structured)

2.1 Who are your main customers, market?
Please elaborate on the profile of your customers. Are they
- (i) National / international (what proportion of sales)
- (ii) Small/medium/large scale firms (what proportion of sales)
- (iii) Do you have large trading contracts with specific well-known firms?

2.2 What the main factors underlying your market?
What is the niche it occupies?

2.3 What factors challenges your profitability?

2.4 How has the underlying demand for its services changed over the last ten years?

Section 3: Environmental issues, objectives, and technology (semi-structured)

3.1 Do you supply services to firms?
Do you offer advice on raw material and equipment selection to firms?
Or provide engineering advice in terms of equipment installation and operation?

3.2 Do environmental issues play a role in your market? If so, how important is it and does it vary according to the profile of enterprises in the sector?

3.3 In your view, what are the reasons that firm x[1] implemented technology changes? Please elaborate (and rank in importance):

Reasons for technology changes	1=not important, 5=very important
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	
productivity increase (in terms of increased volume of output)	
Quality improvements (specify whether process / product quality)	
meeting environmental regulations /standards	
opening up new markets	
extending the product range	
environmental pressure from NGOs, local community, business associations/other firms	
Other (specify)	

3.4 n what way have developments in the prices for water/energy/raw materials influenced firm-level technological changes? *(only if applicable- that is if significant changes have occurred over the last ten years in raw material/water or energy prices)*,

3.5 What is restricting (if anything) the adoption or development of cleaner technologies[2]? *(please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion.*

LET THE interviewee SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options…	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

3.6 What changes in services, regulation, or other market characteristics would you like to see in order to assure greater adoption of environmental technology?

3.7 Is it helpful, actually, to refer to your technology as 'environmental' or would you prefer it presented in different terms, such as 'more competitive'?

[1] Firm x denotes one/more particular firm/s of the sample

[2] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

3.8 In what ways do you interrelate with the specific firms in our sample?
List firms... list interactions

3.9 Do you have any specific comments about the firms in the sample?

Section 4: Future directions: changes in market and expectations (open, unstructured)

4.1 What future changes and challenges do you expect over the next few years?

4.2 Do you see environmental issues as a key part of your market planning? How and why.

4.3 How will your services change to accommodate expected changes in market and demand

Section 1: Basic data (semi-structured)

1.1 Name of organization

1.2 Status:
- International organization
- National organization
- Regional or local organization
- Regional or local representative of national or international organization

1.3 Self classification: what does the organization call itself?
- NGO?
- Community organization?
- Pressure group?
- Think tank?
- Lobbying group?
- Other?

1.4 Year established

1.5 Size of organization
- Membership?
- Number of staff, locally (in this office) or in total (nationally, worldwide)
- Numbers of offices nationally or locally
- Budget (if possible to be told)

1.6 How is the body organized?
How many divisions, and what are the divisions (if applicable)

1.7.1 How does the organization report findings?
Publication of information, reporting, etc.

1.8 What links to other information or activist groups? (if possible)
- Newspaper / media
- Other NGOs
- Other..

Section 2: Environmental issues: problems, objectives, statements, policies, regulations (semi-structured)

2.1 What are the key objectives of the organization? (*open question first then present the list)*

Objectives	Priority of organization (please rank: 1=not important, 5=very important)
Other (specify)	
Other	
Other	
Environmental protection?	
Social justice? (local inclusivity)	
Workers rights and health?	
Information and support?	

2.2 Why is it necessary to have political activism from your organization? What form of environmental or political control is missing in local or national or international politics, or within firm regulation?

2.3 In environmental terms, would it be possible to indicate how far you perceive the following types of pollution to be the most important threat from industry in your area? Please rank these 1-5 (where 1 is not at all; and 5 is very much)

Type of pollution	1	2	3	4	5
Noise pollution					
Air pollution					
Water pollution (please state: river/lake/sea)					

2.4 What current or past campaigns have you undertaken?

2.5 And have these been at the local, regional, national, or international level?

2.6 What have been the key points of concern that have motivated your organization to take action?

2.7 What have been your greatest successes so far?

2.8 What have been your greatest problems or (possibly) failures so far?

Section 3: Specific firms and technology (semi-structured)

3.1 What specific actions or campaigns have you organized against this particular industrial sector, or particular sampled firm?

3.2 What were the impacts of that action?

3.3 Do you have any specific comments about the firms in the sample?

3.4 How far does your action relate to technological change? (please rank according to importance)

	1=not important, 5=very important
Do you try to resists technological change by companies?	
Do you encourages the adoption of new, perhaps cleaner, technologies?	
do you seek greater inclusion in decision making about technologies?	
Are you not specifically concerned with technology, but in other aspects of environmental performance?	
Other..?	

3.5 How far do you cooperate or ally with other organizations when conducting lobbying or campaigning? (please rank)

	1=not at all, 5=very much
Universities	
government technology offices and agencies	
international organizations	
private-sector firms	
private-sector consultancies	
NGOs	
Media (print? TV? Radio?)	
Other...? (specify)	

3.6 *(Please think about how you ask this question. It is possible that this question may not be relevant for this particular NGO or organization. But if you can ask it, and the organization has strong views, it would help the rest of the survey. You may wish to change the words from those used below).*

One of the main reasons for us conducting this survey is to understand how and why firms may change technology, especially environmental technology. If you are involved in discussing different technologies, is it possible to ask why you urge firms to change technology?

Please elaborate (and rank in importance):

Reasons for technology changes	1=not important, 5=very important
Cost reduction (specify if labor costs /energy consumption/ consumption of raw materials)	
productivity increase (in terms of increased volume of output)	
Quality improvements (specify whether process / product quality)	
meeting environmental regulations /standards	
opening up new markets	
extending the product range	
environmental pressure from NGOs, local community, business associations/other firms	
Other (specify)	

3.7 What is restricting (if anything) the adoption or development of cleaner technologies by firms[1]?

(please let the interviewee elaborate first, and then perhaps suggest the following options as suggestion.

LET THE NGO SPECIFY THE REASONS, but the following may be mentioned by them, or by you in order to suggest options...	RANK IMPORTANCE 1-5
Lack of information?	
High implementation cost?	
No alternative chemical/raw material input?	
No alternative process technology?	
Uncertainty about performance impact?	
Lack of tradition/skills?	
Other: specify	

Section 4: Future directions (open, unstructured)

4.1 What changes are required to improve the current regulatory framework for industry?

4.2 What are the obstacles to these changes?

4.3 What are your future priorities for lobbying or campaigning in relation to industry, and particularly the environmental performance of industry?

[1] Please refer to annex 4 for an initial list of CP options –this list needs to be revised and updated by the national institutions (sectoral technology specialist and cleaner production specialist)

4.4 Do you think the regulatory system may become more environmental in the future? How will environmental issues be seen in the future?

4.5 What will be the most powerful in the future? (and please rank)

Form of regulation	1=not important, 5=very important
National regulatory system	
Firm-based systems of regulation	
International systems of regulation	
Other (specify)	

โครงการวิจัยของ UNIDO
การประเมินความเข้าใจในเรื่อง
เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา
(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับบริษัท

ตอนที่ 1 ข้อมูลทั่วไปของบริษัท

1.1 ชื่อบริษัท .....

ที่อยู่ .....

ท่านมีบริษัท/โรงงานในเครือหรือไม่

☐ มี

ถ้ามี โปรดระบุ	ชื่อบริษัท /โรงงาน	ที่ตั้ง	ผลิตภัณฑ์
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

☐ ไม่มี

1.2 ผู้ตอบแบบสอบถาม

	ชื่อ-นามสกุล	ตำแหน่ง	ประสบการณ์งานในต่างประเทศ	
1.	.....	.....	☐ มี	☐ ไม่มี
2.	.....	.....	☐ มี	☐ ไม่มี
3.	.....	.....	☐ มี	☐ ไม่มี

1.3 ปีที่ก่อตั้งบริษัท .....

1.4 ผู้ถือหุ้น

บริษัทภายในประเทศ ..... % (☐ ในรูปของบริษัทมหาชน)

บริษัทต่างประเทศ ..... %

1.5 ลักษณะธุรกิจ

1.5.1 โปรดระบุชื่อผลิตภัณฑ์/สินค้าหลักและกระบวนการผลิต รวมทั้งปริมาณการผลิต

ชื่อผลิตภัณฑ์/สินค้า	กระบวนการผลิต	ปริมาณการผลิต
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

1.5.2 โปรดเปรียบเทียบผลิตภัณฑ์/สินค้าหลักของบริษัทกับของบริษัทคู่แข่ง

- ด้านคุณภาพ

.....

- ด้านราคา

.....

1.5.3 บริษัทท่านมีมาตรฐานที่ใช้ในการผลิตและการควบคุมคุณภาพผลิตภัณฑ์หลักแต่ละขั้นตอนหรือไม่

- ☐ ไม่มี
- ☐ มี
  - ☐ มาตรฐานสากล
  - ☐ มาตรฐานลูกค้า
  - ☐ มาตรฐานที่บริษัทกำหนดขึ้น (โปรดระบุ) .....

1.6 ประเภทของกระบวนการผลิตในบริษัท/โรงงาน

- ☐ Pretreatment
- ☐ Dyeing
- ☐ Printing
- ☐ Finishing

1.7 รายละเอียดข้อมูลในปีที่ตั้งโรงงาน ปี 2534 ปี 2539 ปี 2543 และ ปี 2544

รายละเอียดข้อมูล	ปีที่ตั้งโรงงาน	2534	2539	2543	2544
กำลังการผลิต (ตัน/ปี)					
ผลผลิต (ตัน/ปี)					
มูลค่าผลิตภัณฑ์ (ล้านบาท/ปี)					
อัตราส่วนกำไร (%)					

1.8 ปีที่มีการขยายโรงงานและติดตั้งเครื่องจักรอุปกรณ์มากที่สุด ปีพ.ศ. .....

1.9 ค่าใช้จ่ายในการผลิตในปี 2534 ปี 2539 และปี 2543

รายการ	จำนวนเงิน (บาท)		
	ปี 2534	2539	2543
ค่าเสื่อมของเครื่องจักรและค่าดอกเบี้ย			
ค่าแรง			
ค่าวัตถุดิบ (สารเคมี,สีย้อม,ฯลฯ)			
ค่าพลังงาน			
ค่าน้ำ			
อื่นๆ			

1.10 การจำหน่ายผลิตภัณฑ์

- ❑ จำหน่ายภายในประเทศ ปี 2534 ..... % ปี 2543 ..... %
- ❑ ส่งออก ปี 2534 ..... % ปี 2543 ..... %
  - ❑ โดยตรง
  - ❑ โดยทางอ้อม (โปรดข้ามไปตอบข้อ 1.12)

1.11 หากมีการส่งออกโดยตรง โปรดระบุประเทศที่ส่งออก

- ❑ ประเทศในกลุ่มสหภาพยุโรป ปี 2534 ..... % ปี 2543 ..... %
- ❑ ประเทศในแถบยุโรป (นอกกลุ่มสหภาพ) ปี 2534 ..... % ปี 2543 ..... %
- ❑ ประเทศสหรัฐอเมริกาและแคนาดา ปี 2534 ..... % ปี 2543 ..... %
- ❑ ประเทศในแถบเอเชียตะวันออกเฉียงใต้ ปี 2534 ..... % ปี 2543 ..... %
- ❑ อื่นๆ โปรดระบุ .....

1.12 รายได้ที่ได้จากการส่งออก (คิดเทียบเป็นเปอร์เซ็นต์กับรายได้ทั้งหมด)

ปี 2539 ..... %

ปี 2543 ..... %

1.13 ข้อมูลเกี่ยวกับพนักงาน

1.13.1 จำนวนพนักงานในกระบวนการผลิต ..... คน

จำนวนพนักงานในหน่วยวิจัยและพัฒนา ..... คน

จำนวนพนักงานในหน่วยงานบริหาร/จัดการ ..... คน

จำนวนพนักงานในหน่วยอื่นๆ (โปรดระบุ) ..... คน

1.13.2 พนักงานที่มีประสบการณ์ทำงานในต่างประเทศ

❑ ไม่มี ❑ มี จำนวนทั้งหมด ..... คน

แผนกกระบวนการผลิต ..... คน

แผนกวิจัยและพัฒนา ..... คน

แผนกบริหาร/จัดการ ..... คน

อื่นๆ (โปรดระบุ) ..... คน

1.14 สถานภาพของบริษัท

1.14.1 ขนาดของบริษัท (พิจารณาจากยอดขาย)

❑ ขนาดกลาง-ย่อม ❑ ขนาดใหญ่

1.14.2 หากเปรียบเทียบกับบริษัทคู่แข่งแล้ว บริษัทของท่านจัดเป็นผู้นำในการผลิตสินค้า

❑ ใช่ ❑ ไม่ใช่

ตอนที่ 2 สภาวะแวดล้อมของธุรกิจ

(ก) <u>การพัฒนาตลาดและการกำหนดผลกำไร</u>

2.1 ผู้ที่เป็นลูกค้าหลักของบริษัท

❑ ลูกค้าภายในประเทศ ❑ ลูกค้าต่างประเทศ

2.2 ความต้องการของลูกค้า

2.2.1 ความต้องการหลักของลูกค้าในการพิจารณาซื้อสินค้า

❑ ราคา ❑ คุณภาพรวมทั้งการรับรองตามมาตรฐานต่างๆ (โปรดระบุชื่อมาตรฐานที่ลูกค้าต้องการ)

❑ ระยะเวลาการส่งมอบ ❑ อื่นๆ (โปรดระบุ) ----------

2.2.2 ลูกค้าต่างประเทศมีความต้องการแตกต่างจากลูกค้าภายในประเทศ หรือไม่ อย่างไร (ในกรณีที่ท่านมีลูกค้าต่างประเทศ)

❑ ไม่ใช่

❑ ใช่ (โปรดระบุ) ----------

2.3 ในระยะ 10 ปี ที่ผ่านมาความต้องการของลูกค้าในตัวสินค้ามีทิศทางที่ต่างไปจากเดิมหรือไม่ (เช่น ลูกค้ามีความต้องการสินค้าที่ไม่มีผลกระทบต่อสิ่งแวดล้อม)

❑ ไม่เปลี่ยน

❑ เปลี่ยน (โปรดอธิบาย) ----------

2.4 คู่แข่งทางด้านธุรกิจ

	คู่แข่ง	สัดส่วน (%)
1.	คู่แข่งภายในประเทศ	
2.	คู่แข่งต่างประเทศ	

2.5 การแข่งขันของสินค้าในตลาด ณ ปัจจุบันมีความรุนแรง ระดับใด

❑ น้อย ❑ ปานกลาง ❑ มาก

2.6 รูปแบบการแข่งขันของสินค้าในตลาดที่เปลี่ยนไปในระยะเวลา 10 ปีที่ผ่านมา

	ราคา	คุณภาพ	ความเป็นเอกลักษณ์
ความรุนแรง	❑ น้อย	❑ น้อย	❑ น้อย
	❑ ปานกลาง คงที่	❑ ปานกลาง คงที่	❑ ปานกลาง คงที่
	❑ มาก	❑ มาก	❑ มาก
	❑ มากขึ้นเรื่อยๆ	❑ มากขึ้นเรื่อยๆ	❑ มากขึ้นเรื่อยๆ

2.7 กลยุทธ์ที่ทางบริษัทใช้เพื่อเสริมสร้างความสามารถในการแข่งขัน

(โปรดเรียงลำดับความสำคัญจาก 1 = สำคัญน้อยที่สุด ; 5 = สำคัญมากที่สุด)

กลยุทธ์	ความสำคัญ
หาตลาดใหม่	
พัฒนาสินค้า/ผลิตภัณฑ์ตัวใหม่	
เพิ่มส่วนแบ่งทางการตลาด	
ลดต้นทุน	
พัฒนาให้สินค้า/ผลิตภัณฑ์มีลักษณะพิเศษเฉพาะที่ต่างจากของคู่แข่ง	

2.8 แรงจูงใจที่ทำให้บริษัทต้องการพัฒนาขีดความสามารถในการแข่งขันและการใช้กลยุทธ์ต่างๆ

☐ เพิ่มยอดขาย ☐ เพิ่มภาพพจน์ให้บริษัท ☐ ยกระดับคุณภาพชีวิตของพนักงาน

☐ เพิ่มศักยภาพของพนักงาน อื่นๆ .....

(ข) <u>แรงกดดันจากสังคม/NGO/สมาคมทางธุรกิจ</u>

2.9 สังคม/NGO/สมาคมทางธุรกิจได้สร้างแรงกดดันให้แก่บริษัทของท่านหรือไม่

☐ ไม่มี

☐ มี

โปรดระบุ .....

.....

2.10 บริษัทของท่านสร้างผลกระทบทางสิ่งแวดล้อมมากหรือน้อยเพียงไร

(1 = ไม่เลย ; 5 = มากที่สุด)

มลภาวะ	1	2	3	4	5
มลภาวะทางเสียง					
มลภาวะทางอากาศ					
มลภาวะทางน้ำ (โปรดระบุแหล่งน้ำธรรมชาติที่ได้รับผลกระทบ)					

2.11 ในช่วงปี 2534-2543 ท่านได้รับแรงกดดันจากกลุ่มใดบ้างในเรื่องการลดมลภาวะทางสิ่งแวดล้อม โปรดให้ความสำคัญตามจำนวนครั้งที่ได้รับโทรศัพท์ โทรสาร e-mail หรือ การพูดคุยโดยตรงในหัวข้อต่างๆดังแสดงในตาราง (จำนวนครั้ง : 0, 1 ถึง 5, 6 ถึง 10, 11 ถึง 20 หรือ มากกว่า 20)

กลุ่ม/หน่วยงาน	งด/ยกเลิก การออกใบอนุญาต	กดดันให้ลด การก่อมลภาวะ	กฎระเบียบที่บังคับ
NGOs			
นักเรียน/นักศึกษา			
สมาคมอุตสาหกรรม			
ผู้บริโภค			
สื่อต่างๆ			
ประชาชนทั่วไป			
อื่นๆ			

2.12 ข้อเสนอแนะ / คำแนะนำจากสมาคมทางธุรกิจต่างๆมีผลต่อการดำเนินกลยุทธ์ของบริษัท

- ☐ ไม่ใช่
- ☐ ใช่ • โปรดระบุชื่อสมาคมและอธิบายว่ามีผลอย่างไร

.....

- สมาคมที่มีผลต่อกลยุทธ์ของบริษัท
  - ☐ สมาคมในท้องถิ่น ☐ สมาคมระดับชาติ ☐ สมาคมนานาชาติ
- สมาคมข้างต้นสร้างแรงกดดันให้แก่บริษัทท่านโดยใช้
  - ☐ สื่อหนังสือพิมพ์ ☐ ข้อเสนอแนะ ☐ การประท้วง
- ท่านพิจารณาว่าแรงกดดันจากสมาคมเหล่านี้ทำให้เกิด
  - ☐ การปรับปรุงในทางที่ดีขึ้น ☐ การถูกบังคับโดยไม่เต็มใจ

2.13 บริษัทของท่านเคยได้รับผลกระทบจากการรณรงค์ต่างๆของ NGO หรือหน่วยงานต่างๆของชุมชน

- ☐ ไม่เคย
- ☐ เคย • โปรดระบุชื่อสมาคมและอธิบายว่ามีผลอย่างไร .....

- สมาคมที่มีผลต่อกลยุทธ์ของบริษัท
  - ☐ สมาคมในท้องถิ่น ☐ สมาคมระดับชาติ ☐ สมาคมนานาชาติ
- สมาคมข้างต้นสร้างแรงกดดันให้แก่บริษัทท่านโดยใช้
  - ☐ สื่อหนังสือพิมพ์ ☐ ข้อเสนอแนะ ☐ การประท้วง
- ท่านพิจารณาว่าแรงกดดันจากสมาคมเหล่านี้ทำให้เกิด
  - ☐ การปรับปรุงในทางที่ดีขึ้น ☐ การถูกบังคับโดยไม่เต็มใจ

2.14 ในช่วงปี 2534-2543 บริษัทเคยได้รับคำร้องเรียนจากลูกค้าทั้งในและต่างประเทศ รวมทั้งผู้แทนจำหน่าย (Supplier) เรื่องปัญหาการจัดการสิ่งแวดล้อมหรือไม่ โปรดให้ความสำคัญโดยใช้ตัวเลข (0 ไม่เคยได้รับคำร้องเรียน; 1 คำร้องเรียนที่ได้รับไม่มีผลกระทบต่อบริษัท; 5 คำร้องเรียนที่ได้รับมีผลกระทบต่อบริษัทมากที่สุด)

กลุ่มลูกค้า	ความสำคัญ (0-5)
ลูกค้าในประเทศ	
ลูกค้าต่างประเทศ	
ผู้แทนจำหน่าย	

(ค) <u>โครงสร้างทางเทคโนโลยี</u>

2.15 หากบริษัทมีความต้องการในการปรับเปลี่ยนเทคโนโลยีที่ใช้ บริษัทจะ

- ❑ หาเทคโนโลยี/ทรัพยากรจากภายในบริษัท
- ❑ หาเทคโนโลยี/ทรัพยากรจากภายนอกบริษัท
- ❑ ปรึกษาสถาบันทางการศึกษาและบริษัทที่ปรึกษา(โปรดระบุ) .....

2.16 การปรับเปลี่ยนเทคโนโลยีที่เกิดขึ้นมักเป็น

- ❑ การปรับเปลี่ยนเครื่องจักร ❑ การปรับเปลี่ยนกระบวนการผลิต
- ❑ อื่นๆ โปรดระบุ

2.17 ท่านประเมินว่าหน่วยงานต่างๆให้บริการสนับสนุนเทคโนโลยีที่บริษัทใช้อยู่อย่างไร

❑ ดีมาก ❑ ดี ❑ น้อย

ผู้ให้บริการสนับสนุนทางด้านเทคโนโลยีดังกล่าว (โปรดจัดลำดับความสำคัญ 1 = สำคัญน้อยที่สุด 3 = สำคัญมากที่สุด)

หน่วยงาน	ความสำคัญ (0-3)
รัฐบาล	
หน่วยงานเอกชนภายในประเทศ	
หน่วยงานต่างประเทศ	

ตอนที่ 3 กฎระเบียบ/ข้อบังคับด้านสิ่งแวดล้อม

3.1 โปรดระบุกฎระเบียบ/ข้อบังคับด้านสิ่งแวดล้อมที่ทางบริษัทใช้อยู่และอธิบายว่ากฎระเบียบ/ข้อบังคับเหล่านั้นมีผลต่อบริษัทอย่างไร

1. ..... 3. .....

2. ..... 4. .....

3.2 บริษัทเคยประสบปัญหาในการปฏิบัติตามกฎระเบียบ/ข้อบังคับด้านสิ่งแวดล้อมหรือไม่

- ❑ ไม่เคย (ข้ามไปตอบข้อ 3.4)
- ❑ เคย (โปรดอธิบาย) .....

3.3 หากทางบริษัทไม่สามารถแก้ไขกระบวนการผลิตต่างๆตามคำร้องเรียนให้สอดคล้องกับกฎระเบียบ/ข้อบังคับได้จะได้รับผลอย่างไร

.....

.....

3.4 บริษัทเคยร่วมมือ/หารือกับผู้ออกกฎระเบียบ/ข้อบังคับในเรื่องต่างๆ (เช่น ปรึกษารายละเอียดของข้อบังคับต่างๆ หาข้อตกลงร่วมเพื่อปรับปรุงมาตรฐานต่างๆ เป็นต้น

- ❑ ไม่เคย
- ❑ เคย (โปรดอธิบาย) .....

3.5 ผู้ออกกฎระเบียบ/ข้อบังคับเคยให้ความช่วยเหลือในด้านเทคโนโลยีเพื่อปรับปรุงสิ่งแวดล้อมหรือไม่

- ❑ ไม่เคย
- ❑ เคย โดย
  - ❑ ให้คำแนะนำในการเลือกใช้เทคโนโลยีที่เหมาะสม
  - ❑ สร้างแรงจูงใจ ให้ความสนับสนุนด้านแหล่งข้อมูลและให้ชื่อหน่วยงานที่เกี่ยวข้องที่สามารถช่วยบริษัทท่านได้
  - ❑ อื่นๆ (โปรดระบุ) .....

3.6 บริษัทของท่านยินยอม (หรือผู้มีอำนาจในทางกฎหมายบังคับให้ท่าน) เปิดเผยข้อมูลการปล่อยมลภาวะจากโรงงานให้สาธารณชนได้รับทราบโดยไม่ปิดบัง

❑ ใช่ ❑ ไม่ใช่

3.7 บริษัทของท่านพิจารณาเห็นว่าการทำตามกฎระเบียบ/ข้อบังคับทางสิ่งแวดล้อมเป็น

❑ ค่าใช้จ่ายที่เพิ่มขึ้น ❑ ประโยชน์แก่ทางบริษัท (win-win situation)

3.8 กฎระเบียบ/ข้อบังคับทางด้านสิ่งแวดล้อม

3.8.1 มีผลต่อความสามารถในการแข่งขันของบริษัทอย่างไร

❑ ลดความสามารถในการแข่งขัน ❑ เพิ่มความสามารถในการแข่งขัน

3.8.2 มีผลต่อบริษัทคู่แข่งของท่านอย่างไรโปรดอธิบาย

3.9 กฎระเบียบ/ข้อบังคับทางด้านสิ่งแวดล้อมของต่างประเทศมีผลต่อความสามารถในการแข่งขันของบริษัทท่านหรือไม่

- ☐ ไม่มี
- ☐ มี โปรดอธิบาย

3.10 ท่านคิดว่าในอนาคตกฎระเบียบ/ข้อบังคับต่างๆจะเข้มงวดขึ้นหรือไม่

- ☐ ไม่ใช่
- ☐ ใช่ ท่านเตรียมตัวต่อเหตุการณ์ดังกล่าวอย่างไร

ตอนที่ 4 การปรับเปลี่ยนเทคโนโลยีและคุณภาพสิ่งแวดล้อม

4.1 หากเปรียบเทียบกับบริษัทอื่นในกลุ่มอุตสาหกรรมเดียวกัน

4.1.1 บริษัทของท่านมีเทคโนโลยีของกระบวนการผลิต

☐ ดีที่สุด ☐ แบบมาตรฐานทั่วไป ☐ แบบดั้งเดิม

4.1.2 มาตรฐานสินค้าของท่าน

☐ สูงที่สุด ☐ ปานกลาง (ตามมาตรฐานทั่วไป) ☐ ต่ำ

4.2 บริษัทของท่านมีระบบการจัดการคุณภาพหรือไม่

☐ ไม่มี

☐ มี คือ ☐ การรับรองตามมาตรฐาน ISO

☐ อื่นๆ (โปรดระบุ)

4.3 ในช่วงระยะ 10 ปี ที่ผ่านมาบริษัทของท่านมีการปรับเปลี่ยนเทคโนโลยีที่สำคัญหรือไม่

☐ ไม่มี

☐ มี

☐ อื่นๆ (โปรดระบุ) ----------

4.4 หากมีการปรับเปลี่ยนเทคโนโลยีสิ่งใดเป็นแรงจูงใจที่สำคัญ (โปรดจัดลำดับจาก 1 = สำคัญน้อยที่สุด 5 = สำคัญมากที่สุด)

แรงจูงใจ	ความสำคัญ
การลดต้นทุน	
การเพิ่มประสิทธิภาพการผลิต (พิจารณาจากปริมาณการผลิต)	
การปรับปรุงคุณภาพผลิตภัณฑ์/กระบวนการผลิต	
กฎระเบียบ/มาตรฐานทางด้านสิ่งแวดล้อม	
การเพิ่มจำนวนตลาด,	
การเพิ่มความหลากหลายของผลิตภัณฑ์	
อื่นๆ (โปรดระบุ).....	

4.5 หากในช่วงระยะ 10 ปีที่ผ่านมาการเพิ่มขึ้นของต้นทุนเรื่องค่าน้ำ ค่าพลังงานและค่าวัตถุดิบมีผลต่อการปรับเปลี่ยนเทคโนโลยีอย่างไร (1 = ไม่มีผลเลย ; 5 = มีผลมากที่สุด)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4.6 บริษัทของท่านใช้เครื่องจักร/อุปกรณ์ของบริษัท

	ประเภทเครื่องจักร	บริษัท	ประเทศ
1.			
2.			
3.			

4.7 หากท่านกู้ยืมหรือขอความสนับสนุนในเรื่องการเงินจากหน่วยงานต่างๆหน่วยงานนั้นมีข้อกำหนดด้านสิ่งแวดล้อมในการกู้ยืมหรือให้ความสนับสนุนหรือไม่

☐ ไม่มี ☐ มี

4.8 กรุณาประเมินเงินลงทุน ตลอดจนค่าใช้จ่ายในการดำเนินการและบำรุงรักษาเครื่องจักร/อุปกรณ์ที่ใช้เพื่อลดมลภาวะทางสิ่งแวดล้อม (ทั้งการแก้ไขที่ปลายทาง (EOP) และการป้องกันที่ต้นเหตุ (CT)

	ปี 2534 (บาท)	ปี 2543 (บาท)
เงินลงทุน		
ค่าใช้จ่ายในการดำเนินการ		
ค่าใช้จ่ายในการบำรุงรักษา		

4.9 ตั้งแต่ปี 2534 บริษัทของท่านได้ดำเนินโครงการใดบ้างที่ช่วยลดมลภาวะสิ่งแวดล้อม (เช่น การแก้ไขที่ปลายทาง (EOP) การปรับเปลี่ยนกระบวนการผลิต การใช้วัตถุดิบที่ลดผลกระทบทางสิ่งแวดล้อม การประหยัดพลังงานและน้ำ การปรับเปลี่ยนองค์กร และการปรับเปลี่ยนผลิตภัณฑ์ เป็นต้น) พร้อมทั้งให้รายละเอียดต่างๆ ดังแสดงในตาราง

โครงการ	ปีที่เริ่มต้น	ปีที่สิ้นสุด	ต้นทุน (บาท)		ผลที่ได้	ผลกระทบด้านสิ่งแวดล้อม	เงินที่ประหยัดได้ (บาท)	แหล่งเงินทุน			
			การลงทุน	ค่าใช้จ่าย*				เงินบริษัท	กู้ยืม	รัฐบาล	อื่นๆ

*ในการดำเนินการและบำรุงรักษา

4.10 โปรดให้ความสำคัญ แรงจูงใจต่างๆที่ทำให้บริษัทของท่านดำเนินโครงการต่างในข้อ 4.9
(1 = ไม่สำคัญ ; 5 = มีผลมากที่สุด)

แรงจูงใจ	ความสำคัญ
กฎระเบียบ/ข้อบังคับและค่าปรับต่างๆ จากการเกิดมลพิษ	
มาตรฐานด้านสิ่งแวดล้อมที่กำหนดโดยตลาดต่างประเทศ	
ความต้องการของผู้ร่วมดำเนินธุรกิจ (ผู้ส่งมอบ, ลูกค้า, ผู้ลงทุน เป็นต้น)	
ข้อกำหนดด้านสิ่งแวดล้อมที่กำหนดโดยเจ้าของกิจการและผู้ถือหุ้น	
การเตรียมตัวให้พร้อมต่อกฎระเบียบ/ข้อบังคับที่คาดว่าจะเข้มงวดขึ้นในอนาคต	
ต้นทุนของพลังงานและค่าวัตถุดิบที่เสียไปโดยไร้ประโยชน์	

แรงกดดันจากชุมชน NGO และหน่วยงานต่างๆ	
แรงกดดันจากสมาคมธุรกิจและบริษัทต่างๆ	
แรงจูงใจ	ความสำคัญ
แรงจูงใจเรื่องเงินกู้ เงินให้เปล่า การยกเว้นภาษี	
ความต้องการให้เทียบเท่ากับบริษัทคู่แข่งที่สามารถลดภาวะได้	
อื่นๆ (โปรดระบุ)	

4.11 บริษัทของท่านมีการจัดการด้านสิ่งแวดล้อมแบบใด

- ❑ เน้นที่แบบป้องกันที่ต้นเหตุ
- ❑ เน้นที่แบบแก้ไขที่ปลายทาง
- ❑ ทั้ง 2 แบบพอๆกัน

4.12 การปรับเปลี่ยนเทคโนโลยี

4.12.1 แหล่งข้อมูลที่ทางบริษัทใช้ในการหาเทคโนโลยีที่เหมาะสม

- ❑ งานแสดงสินค้า
- ❑ ผู้แทนจำหน่าย (เครื่องจักร/อุปกรณ์ วัตถุดิบ และส่วนประกอบต่างๆ เป็นต้น)
- ❑ ข้อมูลจากลูกค้า
- ❑ สมาคมทางธุรกิจ
- ❑ บริษัทที่ปรึกษา
- ❑ บริษัทอื่น ๆ
- ❑ สถาบันทางวิชาการ
- ❑ วารสาร/สิ่งพิมพ์วิชาการ
- ❑ การแลกเปลี่ยนบุคลากร
- ❑ อื่นๆ โปรดระบุ .....

4.12.2 แหล่งเทคโนโลยีที่ใช้

❑ ภายในบริษัทและบริษัทในเครือ ❑ ภายในท้องถิ่น ❑ ภายในประเทศ

❑ ประเทศที่กำลังพัฒนา ❑ ประเทศที่พัฒนาแล้ว

4.12.3 การจัดหาเทคโนโลยีที่เหมาะสมเป็นไปได้โดย

❑ ง่าย ❑ ไม่ยากนัก ❑ ยาก

4.12.4 บริษัทร่วมมือกับหน่วยงาน/บริษัทอื่นหรือไม่ในการปรับเปลี่ยนเทคโนโลยี

- ❑ ไม่ร่วมมือ
- ❑ ร่วมมือกับ ❑ อุตสาหกรรมอื่นที่อยู่ในกลุ่มเดียวกัน (อุตสาหกรรมต้นน้ำ-ปลายน้ำ)
  ❑ หน่วยงาน/บริษัทอื่นที่ไม่ใช่บริษัทคู่ค้า

4.13 บริษัทของท่านเคยร่วมมือกับสมาคม/หน่วยงานทางวิชาการ รวมทั้งผู้คิดค้น/เผยแพร่เทคโนโลยีหรือไม่ในการปรับเปลี่ยนเทคโนโลยี

- ❑ ไม่เคย
- ❑ เคย (โปรดระบุ) .....

4.14 บริษัทของท่านพบอุปสรรคในการดำเนินการปรับเปลี่ยนเทคโนโลยีหรือไม่

❑ ไม่พบ

❑ พบ (โปรดระบุ) .....

4.15 บริษัทของท่านมีบุคลากรที่สามารถรองรับ/ส่งเสริมการปรับเปลี่ยนเทคโนโลยี (โปรดระบุชื่อ แผนก/ฝ่าย จำนวนพนักงานที่ได้รับการฝึกอบรม หน้าที่ความรับผิดชอบ อื่นๆ)

1. _____

_____

2. _____

_____

3. _____

4.16 บริษัทมีนโยบายหรือกลยุทธ์ทางสิ่งแวดล้อมหรือไม่

❑ ไม่มี เพราะ .....

❑ มี
- เริ่มก่อตั้งในปี .....
- สาเหตุที่ก่อตั้ง .....

4.17 บริษัทเคยร่วมโครงการเพื่อลดการปล่อยมลภาวะหรือเพื่อการป้องกันการเกิดมลภาวะหรือไม่

❑ ไม่เคย เพราะ .....

❑ เคย (โปรดระบุ) .....

4.18 บริษัทมีปัญหา/อุปสรรคในการใช้เทคโนโลยีสะอาดหรือไม่

❑ ไม่มี

❑ มี (โปรดระบุให้ความสำคัญถึงสาเหตุในตารางโดย 1 = ไม่สำคัญ 5 =สำคัญมากที่สุด)

	ความสำคัญ
ขาดข้อมูล	
ต้นทุนในการดำเนินการสูง	
ขาดสารเคมี/วัตถุดิบที่จะนำมาใช้ทดแทน	
ไม่มีเทคโนโลยีที่เหมาะสม	
ไม่แน่ใจในผลที่จะได้รับ	
ขาดความรู้ความชำนาญ	
อื่นๆ (โปรดระบุ)	

4.19 บริษัทของท่านเคยใช้เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมที่ยั่งยืน (ESTs) หรือไม่

☐ ไม่มี เพราะเหตุใด

☐ มี (โปรดชี้แจงถึงสาเหตุโดยให้ความสำคัญจาก 1 = ไม่สำคัญ 5 =สำคัญมากที่สุด)

สาเหตุ	ความสำคัญ
ขาดข้อมูล	
ต้นทุนในการดำเนินการสูง	
ขาดสารเคมี/วัตถุดิบที่จะนำมาใช้ทดแทน	
ไม่มีเทคโนโลยีที่เหมาะสม	
ไม่แน่ใจในผลที่จะได้รับ	
ขาดความรู้ความชำนาญ	
อื่นๆ (โปรดระบุ) ----------	

โครงการวิจัยของ UNIDO

การประเมินความเข้าใจในเรื่อง

เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา

(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับสมาคมธุรกิจ

ตอนที่ 1 ข้อมูลทั่วไปขององค์กร

1.1 ชื่อสมาคม/องค์กร .....

ที่อยู่ .....

1.2 ผู้ตอบแบบสอบถาม

	ชื่อ-นามสกุล	ตำแหน่ง	ประสบการณ์ระหว่างประเทศ	
1.	_____	_____	☐ มี	☐ ไม่มี
2.	_____	_____	☐ มี	☐ ไม่มี
3.	_____	_____	☐ มี	☐ ไม่มี

1.3 ปีที่ทำการก่อตั้งสมาคม .....

1.4 วัตถุประสงค์ของสมาคม

.....

.....

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1.5 ข้อมูลเกี่ยวกับสมาชิก

☐ มีจำนวนสมาชิก .....

☐ จำนวนบริษัทที่เป็นสมาชิก ..... แห่ง

☐ ประเภทของกิจการ ..... ประเภท

(โรงงาน ผู้แทนจำหน่าย)

☐ หลักเกณฑ์การเป็นสมาชิก .....

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1.6 มีองค์กร หรือสมาคมอื่นใดที่เกี่ยวข้องกับงานของท่านหรือไม่ ไม่ว่าจะเป็นทั้งในและต่างประเทศและกรุณาระบุความเกี่ยวข้องนั้น ๆ ด้วย

☐ ไม่มี

☐ มี คือ ☐ ในประเทศ ☐ ต่างประเทศ

โปรดระบุความเกี่ยวข้องนั้น .....

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1.7 ข้อมูลหรือบริการพิเศษอื่นใดที่องค์กรของท่านมีไว้เพื่อบริการสมาชิกหรือไม่ และมีค่าใช้จ่ายเท่าใด

☐ ไม่มี

☐ มี โปรดระบุ

บริการ	ค่าใช้จ่าย(บาท)
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

ตอนที่ 2 ลักษณะของตลาด และแนวโน้มของตลาดในกลุ่มเดียวกัน

2.1 ขนาดของอุตสาหกรรมฟอกย้อม (จำนวนบริษัท/โรงงาน ของธุรกิจ)

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ผู้นำทางการตลาดของอุตสาหกรรมฟอกย้อม (ถ้ามี)

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2.2 ในระยะ 10 ปีที่ผ่านมา ลักษณะและความรุนแรงในการแข่งขัน รวมถึงความต้องการของตลาดในอุตสาหกรรมฟอกย้อมเปลี่ยนแปลงไปบ้างหรือไม่

☐ ไม่เปลี่ยน ☐ เปลี่ยน (โปรดระบุ)

การแข่งขันและความต้องการทางการตลาดที่เปลี่ยนไปในด้าน	ความสำคัญ (1 = ไม่สำคัญ และ 5 = สำคัญที่สุด)
ราคา	
คุณภาพ	
ความหลากหลาย	
ลักษณะเฉพาะของผลิตภัณฑ์	
ความรุนแรงในการแข่งขัน (มาก ปานกลาง เท่าเดิม)	
ข้อกำหนดอื่นๆ (โปรดระบุ)	

2.3 กลยุทธ์ที่บริษัทในอุตสาหกรรมนี้ได้ปรับเปลี่ยนเพื่อเพิ่มสถานะทางการตลาดคืออะไร (โปรดเรียงลำดับความสำคัญจาก 1 = สำคัญน้อยที่สุด ; 5 = สำคัญมากที่สุด)

กลยุทธ์	ความสำคัญ
หาตลาดใหม่	
พัฒนาสินค้า/ผลิตภัณฑ์ตัวใหม่	
เพิ่มส่วนแบ่งทางการตลาด	
ลดต้นทุน	
พัฒนาให้สินค้า/ผลิตภัณฑ์มีลักษณะพิเศษเฉพาะที่ต่างจากของคู่แข่ง	

2.3.1 มีความแตกต่างเพียงใดระหว่างบริษัทซึ่งในอุตสาหกรรมฟอกย้อม (โดยเฉพาะระหว่างบริษัทที่โครงการได้ทำการสำรวจอยู่ในขณะนี้) กรุณาระบุตัวอย่างของธุรกิจนั้นด้วย

☐ มาก .....

☐ ปานกลาง .....

☐ น้อย .....

2.3.2 กรุณาระบุตัวอย่างบริษัทซึ่งจัดเป็นตัวแทนกลุ่มหรือหรือก่อให้เกิดนวัตกรรมใหม่ๆ

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2.4 การดำเนินการด้านสิ่งแวดล้อมส่งผลอย่างไรต่อความสามารถในการแข่งขันของบริษัทในอุตสาหกรรม (เช่น ประเด็นด้านสิ่งแวดล้อมมีผลอย่างไรต่อการพัฒนาผลิตภัณฑ์และการตลาด) (โปรดเรียงลำดับความสำคัญ จาก 1 = สำคัญน้อยที่สุด ; 5 = สำคัญมากที่สุด)

การดำเนินการ	ความสำคัญ
มาตรฐานด้านสิ่งแวดล้อมที่กำหนดโดยตลาดต่างประเทศ	
ความต้องการของผู้ร่วมดำเนินธุรกิจ	
กฎหมายสิ่งแวดล้อม	
ต้นทุนของพลังงานและค่าวัตถุดิบที่เสียไป	
ผลิตภัณฑ์ได้คุณภาพและไม่ทำลายสิ่งแวดล้อม	

2.4.1 ผลของการดำเนินการด้านสิ่งแวดล้อมต่อความสามารถในการแข่งขันของบริษัทมีความแตกต่างมากหรือน้อยเพียงไรระหว่างธุรกิจในอุตสาหกรรมเดียวกัน และบริษัทสามารถตรวจสอบได้อย่างไร (โปรดอธิบาย)

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2.5 บริษัทต่างๆในอุตสาหกรรม มีความมุ่งมั่นที่จะสร้างภาพลักษณ์ที่รักษาสิ่งแวดล้อมบ้างหรือไม่ (เช่น การโฆษณาหรือการทำการตลาดเพื่อผลิตภัณฑ์)

☐ ไม่มี

☐ มี (โปรดระบุ) .....

2.5.1 ภาพลักษณ์นี้ส่งผลต่อการตลาดอย่างไร (โปรดอธิบาย)

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2.5.2 จากข้อ 2.51 มีความแตกต่างระหว่างการตลาดในประเทศหรือต่างประเทศบ้างหรือไม่

☐ ไม่มี ☐ มี

โปรดอธิบาย .....

.....

2.6 ท่านสามารถเล็งเห็นความสำคัญของประเด็นด้านสิ่งแวดล้อม ซึ่งกำลังขยายตัวมากขึ้นทุกทีในส่วนประกอบทางการตลาดของท่านบ้างหรือไม่ (เช่น ความนิยมของผู้บริโภค ความตระหนักหรือการต่อต้านด้านสิ่งแวดล้อมของสาธารณชน)

☐ มาก ☐ ปานกลาง ☐ น้อย

2.7 ท่านคาดว่าอาจจะเกิดการเปลี่ยนแปลงหลักๆ อะไรบ้างภายใน 10 - 20 ปี ข้างหน้า และท่านจะใช้มาตรการใดเพื่อการแข่งขันในระยะยาว(โปรดอธิบาย)

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ตอนที่ 3 กฎระเบียบและนโยบายด้านสิ่งแวดล้อม

3.1 กฎหมายหรือระเบียบด้านสิ่งแวดล้อมของประเทศมีส่วนทำให้เพิ่ม/ลดขีดความสามารถในการแข่งขันของของอุตสาหกรรมหรือไม่ อย่างไร

☐ ไม่มี

☐ มี(โปรดระบุว่าเป็นไปในแนวทางใด) .....

.....

3.2 กฎหมายหรือระเบียบด้านสิ่งแวดล้อมของประเทศอื่นๆ ได้ส่งผลกระทบต่อการแข่งขันระหว่างองค์กรธุรกิจประเภทหรือไม่ อย่างไร

☐ ไม่มี

☐ มี(โปรดระบุว่าเป็นไปในแนวทางใด) .....

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3.3 จงแสดงให้เห็นว่าในภาคอุตสาหกรรมนั้นได้ก่อให้เกิดมลพิษต่อสิ่งแวดล้อมในรูปแบบใด กรุณาจัดลำดับจาก 1 - 5 (เมื่อ 1 คือ ก่อให้เกิดมลพิษน้อยที่สุด ; 5 คือก่อให้เกิดมลพิษมาก)

ประเภทของมลพิษ	1	2	3	4	5
มลพิษทางเสียง					
มลพิษทางอากาศ					
มลพิษทางน้ำ (กรุณาระบุว่าเป็น แม่น้ำ ทะเลสาบ หรือทะเล)					

3.4 ในความเห็นของท่าน รัฐบาลได้ออกข้อกำหนดที่ไม่จำเป็นและมีผลกระทบต่ออุตสาหกรรมในส่วนของการแข่งขันทางการค้าทั้งในและระหว่างประเทศบ้างหรือไม่ ถ้ามี กรุณาอธิบายว่าทำไมจึงเป็นเช่นนั้น

☐ ไม่มี

☐ มี เพราะ .....

3.5 ท่านคิดว่าในส่วนของภาครัฐ รัฐบาลควรดำเนินการอะไรบ้างที่จะเป็นการเปิดโอกาสให้องค์กรทางธุรกิจตอบสนองต่อกฎระเบียบทางสิ่งแวดล้อมได้ดียิ่งขึ้น หรือเป็นการปรับปรุงการปฏิบัติต่อสิ่งแวดล้อมให้ดียิ่งขึ้น(โปรดอธิบาย)

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3.6 สมาคมธุรกิจจะมีส่วนเกี่ยวข้องกับการกำหนดนโยบายหรือกฎระเบียบด้านสิ่งแวดล้อมของประเทศอะไรได้บ้าง (โปรดอธิบาย)

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3.6.1 องค์กรทางธุรกิจจะมีส่วนผลักดันรัฐบาลหรือธุรกิจต่างๆ เพื่อการเปลี่ยนแปลงกฎระบียบได้บ้างหรือไม่ ถ้าเป็นเช่นนั้นประเภทของการเปลี่ยนแปลงเหล่านั้นคืออะไร

☐ ไม่มี

☐ มี ประเภทของการเปลี่ยนแปลง คือ .....

.....

ตอนที่ 4 แรงกดดันจากภายนอก

4.1 มีการรณรงค์จากสมาคมเพื่อปรับปรุงการปฏิบัติต่อสิ่งแวดล้อมจากธุรกิจต่างๆ ให้ดียิ่งขึ้นบ้างหรือไม่

☐ ไม่มี ☐ มี

4.1.1 มีประเด็นใดที่เกี่ยวข้องกับส่วนที่กำลังทำการศึกษาอยู่หรือไม่

☐ ไม่มี

☐ มี คือ .....

4.2 ท่านจะมีเวลาหรือโอกาสในการปรับปรุงการปฏิบัติต่อสิ่งแวดล้อมจากธุรกิจของท่านหรือไม่ เมื่อถูกกดดันจากภายนอก (Third Parties) (เช่น ชุมชนท้องถิ่น NGOs หรือองค์กรธุรกิจอื่น) และมีความเกี่ยวโยงกับธุรกิจตามตัวอย่างเหล่านี้หรือไม่

☐ ไม่มี

☐ มี ถ้ามี กรุณาอธิบายถึงแรงกดดันที่ได้รับ รวมทั้งผลของการกดดันนั้นๆ ที่มีต่อการดำเนินงานด้านสิ่งแวดล้อม

ตัวอย่างธุรกิจ	แรงกดดัน	ผลของการกดดัน
1.		
2.		
3.		
4.		

4.3 ท่านได้ขอรับคำปรึกษาจากที่ปรึกษาด้านสิ่งแวดล้อมของท่านเป็นประจำหรือไม่ และผู้ใดคือที่ปรึกษาของท่าน

☐ ไม่มี

☐ มี คือ 1. .....

2. .....

3. .....

ตอนที่ 5 โครงสร้างพื้นฐานด้านเทคโนโลยี

5.1 มีการจัดเตรียมวัสดุ อุปกรณ์ทางเทคโนโลยีแก่สมาชิกหรือธุรกิจอื่นทั่วไปบ้างหรือไม่ หากมี การจัดเตรียมนั้นเป็นอย่างไร สมาคมใดได้รับการสนับสนุนเป็นอย่างดีและมีสิ่งอื่นให้เลือกอีกหรือไม่ (กรุณาระบุเทคโนโลยีที่สามารถแพร่หลายได้มากที่สุด เช่น ISO 9000, ISO 14000 รวมทั้งเทคโนโลยีด้านผลิตภัณฑ์ด้วย) กรุณาจัดอันดับความสำคัญของเทคโนโลยีหรือระบบเทคโนโลยีที่ควรต้องคำนึงถึงด้วย

รูปแบบของการสนับสนุน	1 คือ ไม่สำคัญ และ 5 คือสำคัญมาก	เทคโนโลยีหรือมาตรฐานที่ควรคำนึงถึงทั่วๆ ไป
การจัดหาแหล่งเทคโนโลยีสารสนเทศ		
การสนับสนุนในการเลือกเทคโนโลยี		
การสนับสนุนให้เกิดการนำเทคโนโลยีไปใช้งาน		
การดำเนินการให้เกิดความเชื่อมโยงกับผู้จัดหา (Suppliers)		
การสนับสนุนด้านการเงิน		
การกระตุ้นให้เกิดความร่วมมือของบริษัทต่างๆ		
อื่นๆ (ระบุ)		

5.2 การเพิ่มขึ้นของค่าใช้จ่ายสำหรับน้ำประปา พลังงาน วัตถุดิบ ที่มีผลต่อระดับการเปลี่ยนแปลงเทคโนโลยีของธุรกิจ (เฉพาะในส่วนที่มีการเปลี่ยนแปลงซึ่งมีนัยสำคัญ ตามที่ปรากฏให้เห็นภายใน 10 ปีที่ผ่านมา ในประเด็นของ ราคาวัตถุดิบ น้ำประปา พลังงาน) โปรดอธิบาย

- ราคาวัตถุดิบ .....
  .....
- น้ำประปา.....
  .....
- พลังงาน.....
  .....

5.3 ท่านสามารถประเมินคุณภาพและประสิทธิภาพของเทคโนโลยีโครงสร้างพื้นฐานได้อย่างไร และชื่อหน่วยงาน บริษัท และสถาบันซึ่งสามารถให้การสนับสนุนด้านเทคโนโลยีหรือการพัฒนาได้(โปรดอธิบาย)

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5.4 สถาบันการเงินพิจารณาเรื่อง ข้อกำหนดเงื่อนไขด้านสิ่งแวดล้อมกับอุตสาหกรรมหรือไม่ในการพิจารณาการกู้ยืมเงิน

☐ ไม่มี

☐ มี คือ 1. .....

2. .....

5.5 บริษัทใดเป็นผู้นำด้านเทคโนโลยีในกลุ่มตลาดของท่าน และท่านจะขอรับคำปรึกษาและความสนับสนุนจากพวกเขาหรือไม่ –

☐ ไม่มี

☐ มี คือ 1. .....

2. .....

3. .....

5.6 โปรดระบุชื่อบริษัท/องค์กรที่ท่านมีความเกี่ยวข้อง และระบุความเกี่ยวข้องนั้น

ชื่อบริษัท/องค์กร	ความเกี่ยวข้อง/พึ่งพา

5.7 ท่านมีข้อคิดเห็นที่เป็นรูปธรรมต่อธุรกิจต่างๆ ตามที่แสดงไว้ในรายการข้างต้นหรือไม่

☐ ไม่มี

☐ มี คือ .....

.....

5.8 เหตุผลสำคัญของท่านที่เห็นว่าธุรกิจดำเนินการไปตามเทคโนโลยีที่เปลี่ยนแปลงคืออะไร และกรุณาให้รายละเอียดและจัดอันดับความสำคัญด้วย

เหตุผลสำหรับการเปลี่ยนแปลงเทคโนโลยี	1 คือ สำคัญน้อยที่สุด และ 5 คือ สำคัญอย่างมาก
การลดค่าใช้จ่าย (ระบุว่าเป็น ค่าแรงงาน การใช้พลังงาน การใช้วัตถุดิบ).....	
การเพิ่มผลผลิต (ในด้านการเพิ่มปริมาณการผลิต)	
การปรับปรุงคุณภาพ (ระบุว่าเป็นคุณภาพของกระบวนการผลิตหรือคุณภาพผลผลิต).....	
การเปิดตลาดใหม่	
การผลิตที่ได้ตามมาตรฐานหรือกฎระเบียบด้านสิ่งแวดล้อม	
การเพิ่มความหลากหลายของผลิตภัณฑ์	
แรงกดดันด้านสิ่งแวดล้อมจาก NGOs ชุมชนท้องถิ่น สมาคมธุรกิจ หรือธุรกิจอื่นๆ	
อื่นๆ (ระบุ).....	

5.9 ข้อจำกัดของการปรับปรุงหรือพัฒนาเพื่อให้เกิดการใช้เทคโนโลยีที่สะอาดนั้นคืออะไร

1. .....
2. .....
3. .....

(กรุณาจัดลำดับความสำคัญจาก 1 = สำคัญน้อยสุด 5 = สำคัญมากที่สุด)

ข้อจำกัด	จัดลำดับความสำคัญ 1 คือ ไม่สำคัญ และ 5 คือสำคัญมาก
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	

ข้อจำกัด	จัดลำดับความสำคัญ 1 คือ ไม่สำคัญ และ 5 คือสำคัญมาก
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ).....	

5.10หากสมาชิกของท่านยังไม่มีการปรับเปลี่ยนเทคโนโลยีเพื่อสิ่งแวดล้อมใหม่ในปัจจุบันนี้ ท่านสามารถอธิบายได้หรือไม่ว่าเหตุใดจึงเป็นเช่นนั้น

เหตุผล	จัดลำดับความสำคัญ 1 คือ ไม่สำคัญ และ 5 คือสำคัญมาก
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ).....	

โครงการวิจัยของ UNIDO
การประเมินความเข้าใจในเรื่อง
เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา

(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับเจ้าหน้าที่หน่วยงานกำกับดูแลภาครัฐ

ตอนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อองค์กร .....

1.2 ปีที่ทำการก่อตั้ง .....

1.3 ตำแหน่งและระดับหน่วยงาน ☐ ส่วนกลาง ☐ ส่วนภูมิภาค ☐ อื่นๆ .....

สังกัด ☐ กระทรวง ..... ☐ ทบวง .....

☐ กรม ..... ☐ กอง .....

☐ อื่นๆ .....

1.4 วัตถุประสงค์ขององค์กรในส่วนของการดำเนินการด้านสิ่งแวดล้อม

.....

.....

1.5 ความพร้อมของหน่วยงานท่านในการดำเนินงาน

1.5.1 งบประมาณ

☐ พร้อม

☐ ไม่พร้อม เพราะ .....

1.5.2 บุคลากร

☐ พร้อม

☐ ไม่พร้อม เพราะ .....

1.5.3 ท่านมีความเชื่อมโยงกับองค์กรหรือบุคคลต่างชาติหรือไม่

☐ มี

☐ ไม่มี

☐ อื่นๆ (โปรดระบุ) .....

1.6 ข้อมูลเกี่ยวกับเจ้าพนักงาน

จำนวนแผนกในหน่วยงานมี ..... แผนก รวมจำนวนทั้งสิ้น ..... คน แบ่งเป็น

แผนกวิจัยและพัฒนา ..... คน

แผนกบริหาร/จัดการ ..... คน

แผนกกฎหมาย ..... คน

แผนกตรวจสอบ ..... คน

อื่นๆ (โปรดระบุ) ..... คน

1.7 สามารถค้นหารายงานของหน่วยงานได้อย่างไร

☐ วารสาร/สิ่งพิมพ์วิชาการ

☐ สื่อหนังสือพิมพ์

☐ เวบไซต์

☐ อื่นๆ (โปรดระบุ) .....

ตอนที่ 2 ประเด็นด้านสิ่งแวดล้อม : ปัญหา วัตถุประสงค์ สถานภาพ นโยบาย ข้อกำหนด

2.1 วัตถุประสงค์หลักของการกำกับดูแลของหน่วยงานคือ

☐ ให้ปฏิบัติตามกฎหมาย

☐ ออกกฎหมายในลักษณะที่ไม่ใช่การควบคุมกำกับเพื่อเป็นแรงจูงใจให้ปฏิบัติตาม

☐ ให้คำแนะนำ สนับสนุนด้านข้อมูล

☐ อื่นๆ (โปรดระบุ).....

2.2 รูปแบบของกฎหมาย

2.2.1 รูปแบบของกฎหมายที่ใช้อยู่ในขณะนี้คือ (แบบควบคุมกำกับดูแลตามกฎหมายหรือในรูปแบบอื่น)

.....

.....

2.2.2 มีการเปลี่ยนแปลงกฎหมายบ้างหรือไม่

☐ ไม่มี

☐ มี (โปรดอธิบาย) .....

.....

.....

2.3 ข้อกำหนดหรือกฎหมาย

2.3.1 วิธีการกำหนดกฎระเบียบนี้เกิดขึ้นมาได้อย่างไร

.....

.....

.....

- ภาคเอกชนมีส่วนร่วมด้วยหรือไม่

☐ ไม่มี

☐ มี

☐ อื่นๆ (โปรดระบุ) .....

- มีที่ปรึกษาจากต่างประเทศ (เช่น ISO)

☐ ไม่มี

☐ มี (โปรดระบุ) .....

2.4 พื้นที่ใดซึ่งต้องตระหนักเรื่องสิ่งแวดล้อมเป็นพิเศษ และจัดอยู่ในระดับไหน

☐ ท้องถิ่น ระดับความสำคัญ ☐ น้อย ☐ มาก ☐ ปานกลาง

☐ ภูมิภาค ระดับความสำคัญ ☐ น้อย

☐ มาก
☐ ปานกลาง
☐ รัฐบาล ระดับความสำคัญ ☐ น้อย
☐ มาก
☐ ปานกลาง

2.5 โปรดระบุประเด็นหลักที่โรงงานจำเป็นต้องคำนึงถึง พร้อมสาเหตุ (เช่น มลพิษทางน้ำ มลพิษทางอากาศ ความปลอดภัยของคนงานและผู้บริโภค)

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.....

.....

2.6 กรุณาระบุให้ชัดเจนว่าโรงงานได้ก่อให้เกิดมลพิษในรูปแบบใดต่อสิ่งแวดล้อม และจัดลำดับจาก 1 – 5 (1 = ก่อให้เกิดมลพิษน้อยที่สุด 5 = ก่อให้เกิดมลพิษเป็นอย่างมาก)

ประเภทของมลพิษ	ความสำคัญ
มลพิษทางเสียง	
มลพิษทางอากาศ	
มลพิษทางน้ำ (กรุณาระบุว่าเป็น แม่น้ำ ทะเลสาบ หรือทะเล)	

2.7 มาตรฐานสิ่งแวดล้อม

2.7.1 มีมาตรฐานสิ่งแวดล้อมอะไรบ้างที่ออกเป็นกฎหมายหรือข้อกำหนดที่ใช้กับธุรกิจสิ่งทอ/ฟอกย้อม (เช่น ข้อกำหนดในการปล่อยอากาศเสีย น้ำเสีย การกำจัดของเสีย)

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.....

2.7.2 กรุณาระบุมาตรฐานสิ่งแวดล้อมที่ธุรกิจสิ่งทอ/ฟอกย้อมดังแสดงในตัวอย่าง ต้องปฏิบัติตาม

.....

.....

2.8 มีการอนุมัติหรือไม่อนุมัติใบอนุญาตให้แก่ธุรกิจสิ่งทอ/ฟอกย้อมดังที่แสดงตัวอย่างหรือไม่

☐ ไม่มี ☐ มี

ตอนที่ 3 การติดตามตรวจสอบ

3.1 วิธีการติดตามตรวจสอบของหน่วยงานท่าน

3.1.1 ใครเป็นผู้ดำเนินการตรวจสอบ

1. .....
2. .....
3. .....

3.1.2 ผู้ตรวจสอบอยู่ในส่วนใดของหน่วยงานท่าน หรืออยู่ต่างหน่วยงาน

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.....

3.1.3 เจ้าพนักงานที่ดำเนินการมีจำนวน ..... คน

3.1.4 ระดับของเจ้าพนักงานตรวจติดตามนั้นจะแปรผันตามจำนวนและขนาดขององค์กรธุรกิจที่ต้องทำการตรวจติดตามด้วยหรือไม่

☐ ไม่ใช่ ☐ ใช่

3.1.5 ได้มีการฝึกอบรมหรือทำการคัดเลือกเจ้าพนักงานตรวจติดตามอย่างไร

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3.1.6 เจ้าพนักงานติดตามตรวจสอบในแต่ละโรงงานอย่างไรบ้าง

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3.1.7 มีการตรวจสอบติดตามในกรณีพิเศษ/บางโอกาส กรณีใดบ้าง

☐ เมื่อได้รับการร้องเรียนจากชุมชน

☐ ติดตามการแก้ไขปรับปรุง

☐ อื่นๆ (โปรดระบุ).....

3.2 มีโรงงานประเภทใดบ้างหรือไม่ ที่ท่านต้องการตรวจติดตามให้มากกว่าปกติ

☐ ไม่มี

☐ มี คือ .....

.....

3.3 มีกฎระเบียบ มาตรฐานในการตรวจติดตามที่แตกต่างกันสำหรับโรงงานที่มีลักษณะไม่เหมือนกันหรือไม่ (เช่น เป็นกิจการของต่างประเทศ หรือ สถานที่ตั้งโรงงานอยู่ในเขตการส่งออก หรือเขตนิคมอุตสาหกรรม เป็นต้น)

☐ ไม่มี

☐ มี คือ .....

.....

3.4 ระบบที่ใช้ติดตามควบคุมของหน่วยงานท่านเป็นระบบใด

☐ ระบบติดตามอัตโนมัติ

☐ ระบบควบคุมด้วยคอมพิวเตอร์

☐ อื่นๆ (โปรดระบุ) .....

3.5 การติดตามตรวจสอบนั้นมีความเกี่ยวโยงกับเทคโนโลยีสิ่งแวดล้อมอย่างไร หรือปัญหาใดที่เทคโนโลยีสิ่งแวดล้อมสามารถระบุหรือตรวจจับได้ (เช่น เทคโนโลยีระบบบำบัดน้ำเสีย อากาศเสีย กำจัดของเสีย)

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.....

3.6 มีแนวทางในการตรวจสอบอย่างไร

☐ ไม่มี

☐ มี (โปรดระบุ) .....

3.7 มีข้อแนะนำสำหรับการดำเนินการตรวจสอบบ้างหรือไม่

☐ ไม่มี

☐ มี โดย ☐ เป็นแนวทางตรวจสอบที่ใช้ร่วมกับอุตสาหกรรมหลายประเภท

☐ เป็นแนวทางตรวจสอบเฉพาะอุตสาหกรรมสิ่งทอ ฟอกย้อม

3.8 นโยบายของการตรวจสอบและตรวจติดตามคืออะไร

☐ ขอความร่วมมือ

☐ บังคับ/ควบคุม

3.9 ท่านมีข้อมูลการตรวจติดตามของธุรกิจสิ่งทอ/ฟอกย้อมหรือไม่

☐ ไม่มี

☐ มี (โปรดอธิบาย) .....

.....

.....

ตอนที่ 4 กระบวนการทางกฎหมายและการลงโทษ

4.1 กระบวนการลงโทษที่เกิดขึ้นใช้อะไรเป็นการตรวจสอบ มีวิธี ขั้นตอนการตรวจสอบอย่างไร

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.....

.....

4.2 มีบทลงโทษที่เกี่ยวข้องกับเทคโนโลยี (EST) หรือไม่

☐ ไม่มี

☐ มี คือ .....

.....

4.3 ท่านมีข้อเสนอแนะอะไรบ้างที่ควรจะคำนึงถึงเพื่อเพิ่มประสิทธิภาพของระบบการลงโทษ

☐ ไม่มี

☐ มี คือ .....

.....

.....

4.4 กระบวนการทางกฎหมายจะมีส่วนช่วยให้การทำงานของเจ้าหน้าที่มีประสิทธิภาพหรือไม่

☐ ไม่มีส่วน ☐ มีส่วน

4.5 มีการคัดค้านจากโรงงานหรือไม่ ว่าการลงโทษโรงงานทำให้ลดขีดความสามารถในการแข่งขันของโรงงาน

☐ ไม่มี ☐ มี

4.6 ในแง่ของตุลาการ ประเด็นด้านสิ่งแวดล้อมและกฎหมายสิ่งแวดล้อมถูกมองอย่างไร (เป็นธรรม ไม่เหมาะสม เป็นต้น)

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.....

.....

4.7 มีธุรกิจใดบ้างตามที่แสดงในตัวอย่างที่ได้รับคำร้องเรียนให้ปฏิบัติตามกฎหมาย

☐ ไม่มี

☐ มี (โปรดระบุรายละเอียดธุรกิจนั้นๆ เช่น ประวัติ ลักษณะที่สังเกตได้ ผลกระทบที่ปรากฏ เป็นต้น)

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ตอนที่ 5 การริเริ่มด้านเทคโนโลยี การเงิน และสารสนเทศ : การเข้าถึงแหล่งทุน หรือทรัพยากรบุคคล สารสนเทศ

5.1 มีข้อแนะนำอะไรซึ่งเจ้าพนักงานให้แก่องค์กรธุรกิจ

☐ ไม่มี

☐ มี โดยเป็น
- ☐ คำแนะนำและสนับสนุนด้านข้อมูล
- ☐ การติดต่อกับหน่วยงานหรือเจ้าหน้าที่รัฐบาล
- ☐ แผนการต่างๆ เช่น การสนับสนุนต่างๆ
- ☐ อื่นๆ (โปรดระบุ) .....

5.2 เจ้าพนักงานมีการดำเนินงานร่วมกับหน่วยงานอื่นที่เป็นศูนย์กลางความเชี่ยวชาญทางเทคโนโลยีหรือไม่

☐ ไม่มี เพราะเหตุใด .....

☐ มี : (กรุณาจัดอันดับโดย 1 = สำคัญน้อยที่สุด 5 = สำคัญมากที่สุด)

ผู้ให้ความร่วมมือ	ความสำคัญ
มหาวิทยาลัย	
หน่วยงานหรือองค์กรทางเทคโนโลยีของรัฐบาล	
องค์กรที่ควบคุมคุณภาพและมาตรฐาน	
องค์กรระหว่างประเทศ	
ภาคธุรกิจเอกชน	
ที่ปรึกษาธุรกิจภาคเอกชน	
NGOs	
อื่นๆ (ระบุ)	

5.3 มีกลไกของรัฐและโปรแกรมช่วยเหลือที่สามารถนำมาใช้ได้บ้างหรือไม่

☐ ไม่มี

☐ มี คือ .....

5.4 การสร้างข้อมูล การแนะนำและการสนับสนุนข้อมูล

5.4.1 องค์กรทางธุรกิจสามารถสร้างข้อมูลทางเทคนิคได้อย่างไร

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.....

5.4.2 เจ้าพนักงานสามารถเสนอความช่วยเหลือแก่องค์กรธุรกิจในส่วนของการแนะนำและการสนับสนุนข้อมูลอะไรได้บ้าง

.....

.....

5.5 ท่านคิดว่าเหตุผลสำคัญซึ่งองค์กรธุรกิจยอมปรับเปลี่ยนเทคโนโลยีคืออะไร กรุณาให้รายละเอียดและโปรดจัดลำดับความสำคัญโดย 1 = สำคัญน้อยที่สุด 5 = สำคัญมากที่สุด

เหตุผลของการเปลี่ยนแปลงเทคโนโลยี	ความสำคัญ
ลดค่าใช้จ่าย (ระบุว่าเป็น ค่าแรงงาน การใช้พลังงาน การใช้วัตถุดิบ)	
การเพิ่มผลผลิต (ในด้านการเพิ่มปริมาณการผลิต)	
การปรับปรุงคุณภาพ (ระบุว่าเป็นคุณภาพของกระบวนการผลิตหรือคุณภาพผลผลิต).....	
มาตรฐานหรือกฎระเบียบด้านสิ่งแวดล้อม	
การเปิดตลาดใหม่	
การเพิ่มความหลากหลายของผลิตภัณฑ์	
แรงกดดันด้านสิ่งแวดล้อมจาก NGOs ชุมชนท้องถิ่น สมาคมธุรกิจ หรือธุรกิจอื่นๆ	
อื่นๆ (ระบุ).....	

5.6 สิ่งใดเป็นข้อจำกัดในการปรับปรุงเปลี่ยนแปลงสำหรับการใช้เทคโนโลยีที่สะอาด (กรุณาระบุให้ชัดเจน)

1. .....
2. .....
3. .....

(กรุณาจัดลำดับความสำคัญจาก 1 = สำคัญน้อยสุด 5 = สำคัญมากที่สุด)

ข้อจำกัด	จัดลำดับความสำคัญ 1 – 5
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ)	

5.7 หากบางองค์กรธุรกิจไม่มีการปรับเปลี่ยนเทคโนโลยีเพื่อสิ่งแวดล้อมเพิ่มใหม่ในหลายปีที่ผ่านมา ท่านสามารถอธิบายได้หรือไม่ว่าเหตุใดจึงเป็นเช่นนั้น

1. .....
2. .....
3. .....

(กรุณาให้ผู้ตอบแบบสอบถามระบุให้ชัดเจนด้วยตนเองก่อน และหลังจากนั้นผู้ทำการสัมภาษณ์อาจจะแนะนำตามข้อเสนอแนะ เพื่อใช้เป็นทางเลือกดังต่อไปนี้)

เหตุผล	จัดลำดับความสำคัญ 1 – 5
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ).....	

5.8 โปรดระบุชื่อบริษัท/องค์กรตามที่ยกตัวอย่างมาที่ท่านเคยทำงานร่วมกันหรือเคยติดต่อประสานงานด้วย และโปรดระบุประเภทของกิจกรรมที่เคยทำร่วมกัน

ชื่อบริษัท/องค์กร	ความเกี่ยวข้อง/พึ่งพา

ชื่อบริษัท/องค์กร	ความเกี่ยวข้อง/พึงพา

5.9 ท่านมีข้อคิดเห็นเพิ่มเติมใดๆ ต่อธุรกิจที่แสดงในตัวอย่างที่ให้มาหรือไม่

☐ ไม่มี

☐ มี คือ .....

.....

.....

ตอนที่ 6 ทิศทางในอนาคต : การเปลี่ยนแปลงข้อกำหนดและกฎหมาย โครงสร้างองค์กร

6.1 การเปลี่ยนแปลงอะไรที่ท่านต้องการ เพื่อให้เกิดการปรับปรุงกรอบงานทางกฎหมายในปัจจุบันให้ดียิ่งขึ้น

1. .....
2. .....
3. .....

6.2 อุปสรรคของการเปลี่ยนแปลงนี้คืออะไร

1. .....
2. .....
3. .....

6.3 ท่านคิดว่าการเพิ่มขึ้นของการค้าระหว่างประเทศและการเพิ่มขึ้นของกิจการธุรกิจสิ่งทอ/ฟอกย้อมที่ต่างประเทศเป็นเจ้าของ มีแนวโน้มที่จะเป็นผลกระทบต่อความสามารถในการกำกับดูแลของรัฐในระดับใด

☐ น้อย ☐ ปานกลาง ☐ มาก

6.4 ระบบกฎหมายและสิ่งแวดล้อม

6.4.1 ท่านคิดว่าในอนาคต ระบบกฎหมายจะให้ความสำคัญกับสิ่งแวดล้อมมากยิ่งขึ้นหรือไม่

☐ ให้

☐ ไม่ให้ เพราะ .....

6.4.2 ท่านคิดว่าประเด็นด้านสิ่งแวดล้อมในอนาคตจะเป็นอย่างไร

☐ มีกฎหมายที่ให้ความสำคัญกับสิ่งแวดล้อมมากขึ้น

☐ มีบทลงโทษที่รุนแรงสำหรับผู้ทำผิดกฎหมายสิ่งแวดล้อมมากขึ้น

☐ อื่นๆ (โปรดระบุ) .....

6.5 ท่านเชื่อหรือไม่ว่าผลประโยชน์จากการดำเนินการตามระบบกฎหมายจะทำให้เกิดประโยชน์แก่ภาคอุตสาหกรรม หรืออาจไปเพิ่มความยากลำบากในด้านการแข่งขันทางการค้าระหว่างประเทศมากขึ้น

☐ เชื่อ

☐ ไม่เชื่อ เพราะ .....

6.6 ท่านคิดว่าสิ่งใดจะมีอิทธิพลมากในอนาคต (กรุณาจัดอันดับโดย 1 = สำคัญน้อยที่สุด ; 5 = สำคัญมากที่สุด)

รูปแบบกฎหมาย	ความสำคัญ
ระบบกฎหมายระดับประเทศ	
ระบบกฎหมายของอุตสาหกรรมสิ่งทอ	
การใช้ระบบกฎหมายระหว่างประเทศ	
อื่นๆ (ระบุ)	

โครงการวิจัยของ UNIDO
การประเมินความเข้าใจในเรื่อง
เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา

(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับศูนย์เทคโนโลยี

ตอนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อองค์กร .....

1.2 ปีที่ทำการก่อตั้งองค์กร .....

1.3 วัตถุประสงค์ขององค์กร

.....

.....

.....

1.4 ความพร้อมของทรัพยากรของหน่วยงานท่าน

☐ งบประมาณ

☐ บุคลากร/ลูกจ้าง

☐ จำนวนสำนักงาน

ท่านมีการดำเนินงานที่เชื่อมโยงกับองค์กรหรือบุคคลต่างประเทศหรือไม่

☐ ไม่มี

☐ มี (โปรดระบุ).....

1.5 โครงสร้างการบริหารจัดการของศูนย์ฯ/องค์กรเป็นอย่างไร

.....

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1.5.1 จำนวนฝ่าย/แผนก และมีฝ่าย/แผนกอะไรบ้าง

☐ วิจัยและพัฒนา

☐ การผลิต

☐ การตลาด

☐ งานเผยแพร่

☐ อื่นๆ.....

1.6 ศูนย์ฯ/องค์กรของท่านเป็นของรัฐบาลหรือเอกชน

• รัฐบาล ☐ ในประเทศ ☐ ต่างประเทศ

• เอกชน ☐ ในประเทศ ☐ ต่างประเทศ

ตอนที่ 2 แนวโน้มของตลาดและตำแหน่งของตลาดที่เหมาะสม

2.1 กลุ่มเป้าหมายหลักที่ศูนย์ฯ/องค์กรคือ

2.1.1 ในประเทศ และต่างประเทศ (แต่ละอย่างมีสัดส่วนเป็นอย่างไร)

ภายในประเทศ ..... %

ต่างประเทศ ..... %

2.1.2 ขนาดของกิจการกลุ่มลูกค้า ขนาดเล็ก กลาง หรือใหญ่ (แต่ละอย่างมีสัดส่วนเป็นอย่างไร)

ขนาดของกิจการ	สัดส่วน (%)
☐ ขนาดเล็ก	.....
☐ ขนาดกลาง	.....
☐ ขนาดใหญ่	.....

2.2 ศูนย์ฯ นี้ได้รับการสนับสนุนจากภาครัฐหรือไม่ หรือต้องการแสวงหากำไรเพื่อเลี้ยงตัวเอง

☐ ไม่มี

☐ มี (โปรดระบุ).....

2.3 ปัจจัยหลักที่ทำให้ศูนย์ฯ ให้บริการได้

1. .....

2. .....

3. .....

2.3.1 สถานภาพ(ทางการตลาด)ของศูนย์ฯ ที่ให้บริการครอบคลุมเรื่องอะไร

1. .....

2. .....

3. .....

2.3.2 ทำอย่างไรศูนย์ฯ ของท่านจะสามารถสร้างกำไรได้(โปรดอธิบาย)

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2.4 ศูนย์ฯ นี้จะมีการพัฒนาเทคโนโลยีได้อย่างไร (กรุณาจัดอันดับ)

	1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก	รายละเอียด (เทคโนโลยี/และหน่วยงาน)
โดยเผยแพร่เทคโนโลยีที่ได้รับจากแหล่งอื่น		

โดยการวิจัยและพัฒนาเทคโนโลยีขึ้นมาเอง		
	1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก	รายละเอียด (เทคโนโลยี/และหน่วยงาน)
โดยผ่านทางการเจรจาหรือความร่วมมือกับศูนย์ฯ อื่นๆ (หน่วยงานใด/กรณีต่างประเทศ) (โปรดระบุ).....		
โดยผ่านทางการเจรจาหรือความร่วมมือกับหน่วยงานที่เป็นกลาง (Third Party) หรือบริษัทเอกชนทั่วไป หรือองค์กรที่แสวงหาผลกำไร (NGOs) (โปรดระบุ)		
อื่น ๆ (ระบุ).....		

2.5 ประเภทของบริการที่ศูนย์ฯ ของท่านให้บริการมีดังนี้คือ

- ☐ บริการออกแบบ
- ☐ ข้อมูลทางเทคโนโลยีของผลิตภัณฑ์ใหม่ๆ
- ☐ ประเมินและคัดเลือกเทคโนโลยีการผลิต
- ☐ การนำเทคโนโลยีการผลิตใหม่ไปใช้
- ☐ ทดสอบและวิเคราะห์บริการ
- ☐ วิธีการแก้ไขปัญหาสิ่งแวดล้อม
- ☐ ให้ความช่วยเหลือในระบบการจัดการคุณภาพ
- ☐ อื่นๆ (ระบุ).....

2.6 ประเด็นสิ่งแวดล้อมมีบทบาทในการให้บริการของศูนย์ฯ ท่านหรือไม่

- ☐ ไม่มี
- ☐ มี ถ้ามีโปรดระบุความสำคัญ และระดับความสำคัญเพื่อเปรียบเทียบกับขนาดของกิจการ

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  .....

2.7 ความเปลี่ยนแปลงของของการบริการของศูนย์ฯ ท่านเมื่อเทียบกับ 10 ปีที่ผ่านมาเป็นอย่างไร

- ☐ ไม่เปลี่ยน
- ☐ เปลี่ยน (โปรดระบุ) .....

  .....

ตอนที่ 3 ประเด็นสิ่งแวดล้อม วัตถุประสงค์ และเทคโนโลยี

3.1 ท่านพยายามที่จะสนับสนุนธุรกิจให้เปลี่ยนแปลงไปในรูปแบบเทคโนโลยีใหม่ๆ บ้างหรือไม่ หรือสนับสนุนให้ใช้มาตรฐานต่างๆ (เช่น ISO 9000, 14000) บ้างหรือไม่ หรือท่านจะสนับสนุนข้อมูลพื้นฐานทั่วไปแก่ธุรกิจที่ให้ใช้บริการหรือไม่

☐ ไม่ใช่

☐ ใช่ ถ้าใช่ กรุณาอธิบายว่าการสนับสนุนเพื่อการเปลี่ยนแปลงของการใช้เทคโนโลยีที่เป็นมิตรกับสิ่งแวดล้อมเป็นอย่างไร .....

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.....

3.2 ความสัมพันธ์ของศูนย์ฯ กับบริษัทแต่ละรายในด้านบริการและราคาเป็นอย่างไร ในกรณีค่าใช้จ่ายโปรดระบุถ้าแปรผันกับขนาดกิจการอีกหรือไม่

☐ ไม่มี

☐ มี (โปรดระบุ).....

.....

3.3 ในความเห็นของท่าน เหตุผลหลักที่ทำให้ธุรกิจดำเนินการเปลี่ยนแปลงเทคโนโลยีคืออะไร กรุณาจัดความสำคัญ

เหตุผลสำหรับการเปลี่ยนแปลงเทคโนโลยี	1 คือ ไม่สำคัญ และ 5 คือ สำคัญอย่างมาก
การลดค่าใช้จ่าย (ระบุว่าเป็น ค่าแรงงาน การใช้พลังงาน การใช้วัตถุดิบ)	
การเพิ่มผลผลิต (ในด้านการเพิ่มปริมาณการผลิต)	
การปรับปรุงคุณภาพ (ระบุว่าเป็นคุณภาพของกระบวนการผลิตหรือคุณภาพผลผลิต).....	
การผลิตตามมาตรฐานหรือกฎระเบียบด้านสิ่งแวดล้อม	
การเปิดตลาดใหม่	
การเพิ่มความหลากหลายของผลิตภัณฑ์	
แรงกดดันด้านสิ่งแวดล้อมจาก NGOs ชุมชนท้องถิ่น สมาคมธุรกิจ หรือธุรกิจอื่นๆ	
อื่นๆ (ระบุ)	

3.4 การเพิ่มขึ้นของค่าใช้จ่ายสำหรับน้ำประปา พลังงาน วัตถุดิบ ที่มีผลต่อระดับการเปลี่ยนแปลงเทคโนโลยีของธุรกิจ (เฉพาะในส่วนที่มีการเปลี่ยนแปลงซึ่งมีนัยสำคัญ ตามที่ปรากฏให้เห็นภายใน 10 ปีที่ผ่านมา ในประเด็นของ ราคาวัตถุดิบ น้ำประปา พลังงาน) โปรดอธิบาย

- ราคาวัตถุดิบ

  .....

  .....

- น้ำประปา

  .....

  .....

- พลังงาน

  .....

  .....

3.5 จงแสดงให้เห็นว่าในภาคอุตสาหกรรมนั้นได้ก่อให้เกิดมลพิษต่อสิ่งแวดล้อมในรูปแบบใด กรุณาจัดลำดับจาก 1-5 (เมื่อ 1 คือ ไม่ก่อให้เกิดมลพิษเลย และ 5 คือก่อให้เกิดมลพิษมาก)

ประเภทของมลพิษ	ความสำคัญ
มลพิษทางเสียง	
มลพิษทางอากาศ	
มลพิษทางน้ำ (กรุณาระบุว่าเป็น แม่น้ำ ทะเลสาบ หรือทะเล)	

3.6 ข้อจำกัดของการปรับปรุงหรือพัฒนาเพื่อให้เกิดการใช้เทคโนโลยีที่สะอาดนั้นคืออะไร

1. .....
2. .....
3. .....

(กรุณาจัดลำดับความสำคัญจาก 1 = สำคัญน้อยสุด 5 = สำคัญมากที่สุด)

ข้อจำกัด	จัดลำดับความสำคัญ 1 – 5
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	

อื่นๆ (ระบุ).....	

3.7 สิ่งที่ท่านต้องการให้มีการยกระดับการเปลี่ยนแปลงเทคโนโลยีเพื่อสามารถให้ปรากฏชัดเจนได้คืออะไร อยู่ในระดับไหน (รัฐบาล หรือบริษัทเอกชน)

1. .....

2. .....

3. .....

3.8 โปรดระบุชื่อบริษัท/องค์กรที่ท่านมีความเกี่ยวข้อง และระบุความเกี่ยวข้องนั้น

ชื่อบริษัท/องค์กร	ความเกี่ยวข้อง/พึ่งพา

3.9 ท่านมีข้อคิดเห็นที่เป็นรูปธรรมต่อธุรกิจต่างๆ ตามที่แสดงไว้ในรายการข้างต้นหรือไม่ (ในส่วนที่เกี่ยวกับการนำเทคโนโลยีที่เปลี่ยนแปลงไปสู่การใช้งานได้)

☐ ไม่มี

☐ มี (โปรดระบุ) .....

ตอนที่ 4 ทิศทางในอนาคต : ความเปลี่ยนแปลงและความคาดหวังต่อตลาด

4.1 การเปลี่ยนแปลงและความท้าทายในอนาคต ที่ท่านคาดว่าต้องใช้เวลามากกว่า 2-3 ปีข้างหน้า สำหรับธุรกิจสิ่งทอคืออะไร

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4.2 ท่านเล็งเห็นถึงความสำคัญของประเด็นด้านสิ่งแวดล้อมของปีที่จะมาถึงข้างหน้านี้อย่างไร

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4.3 ท่านคิดว่าจะมีการเปลี่ยนแปลงบริการของศูนย์ฯ/องค์กรอย่างไรเพื่อให้สอดคล้องกับความเปลี่ยนแปลงและความต้องการของตลาด

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โครงการวิจัยของ UNIDO
การประเมินความเข้าใจในเรื่อง
เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา

(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับการจัดหาวัตถุดิบและเทคโนโลยี

ตอนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อบริษัท .....

1.2 ปีที่ก่อตั้ง .....

1.3 ผลิตภัณฑ์หลัก .....

1.4 ในฐานะที่ท่านเป็นผู้แทนจำหน่ายท่านมีความพร้อมในเรื่องเหล่านี้หรือไม่

1.4.1 งบประมาณ

❑ พร้อม ❑ ไม่พร้อม เพราะ .....

1.4.2 บุคลากร / แรงงาน

❑ พร้อม ❑ ไม่พร้อม เพราะ .....

1.4.3 ท่านเป็นผู้แทนจำหน่ายของบริษัทในต่างประเทศใช่หรือไม่

❑ ใช่ ❑ ไม่ใช่

1.5 ข้อมูลเกี่ยวกับบริษัท

1.5.1 จำนวนแผนก ..... แผนก รวมจำนวนทั้งหมด ..... คน โดยแบ่งเป็น

จำนวนพนักงานแผนกวิจัยและพัฒนา ..... คน

จำนวนพนักงานแผนกบริหาร/จัดการ ..... คน

จำนวนพนักงานแผนกขาย ..... คน

จำนวนพนักงานแผนกตรวจสอบ ..... คน

อื่นๆ (โปรดระบุ) ..... คน

1.5.2 ท่านมีการประสานงานความช่วยเหลือกับบริษัทแม่หรือไม่

❑ มี ❑ ไม่มี

1.6 ผู้ถือหุ้น

บริษัทภายในประเทศ ..... %

บริษัทต่างประเทศ ..... %

โครงการวิจัยของ UNIDO
การประเมินความเข้าใจในเรื่อง
เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา
(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามสำหรับการจัดหาวัตถุดิบและเทคโนโลยี

ตอนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อบริษัท .....

1.2 ปีที่ก่อตั้ง .....

1.3 ผลิตภัณฑ์หลัก .....

1.4 ในฐานะที่ท่านเป็นผู้แทนจำหน่ายท่านมีความพร้อมในเรื่องเหล่านี้หรือไม่

1.4.1 งบประมาณ

☐ พร้อม ☐ ไม่พร้อม เพราะ .....

1.4.2 บุคลากร / แรงงาน

☐ พร้อม ☐ ไม่พร้อม เพราะ .....

1.4.3 ท่านเป็นผู้แทนจำหน่ายของบริษัทในต่างประเทศใช่หรือไม่

☐ ใช่ ☐ ไม่ใช่

1.5 ข้อมูลเกี่ยวกับบริษัท

1.5.1 จำนวนแผนก ..... แผนก รวมจำนวนทั้งหมด ..... คน โดยแบ่งเป็น

จำนวนพนักงานแผนกวิจัยและพัฒนา ..... คน

จำนวนพนักงานแผนกบริหาร/จัดการ ..... คน

จำนวนพนักงานแผนกขาย ..... คน

จำนวนพนักงานแผนกตรวจสอบ ..... คน

อื่นๆ (โปรดระบุ) ..... คน

1.5.2 ท่านมีการประสานงานความช่วยเหลือกับบริษัทแม่หรือไม่

☐ มี ☐ ไม่มี

1.6 ผู้ถือหุ้น

บริษัทภายในประเทศ ..... %

บริษัทต่างประเทศ ..... %

ตอนที่ 2 แนวโน้มของตลาด

2.1 ผู้ที่เป็นลูกค้าและตลาดหลักของบริษัท

2.1.1 กรุณาระบุสัดส่วนทางการค้า

ลูกค้าภายในประเทศ ..... %

ลูกค้าต่างประเทศ ..... %

2.1.2 ขนาดของธุรกิจ

☐ ขนาดกลาง-ย่อม ☐ ขนาดใหญ่

2.1.3 ท่านมีลูกค้าคนสำคัญที่ติดต่อและเซ็นสัญญากันเป็นระยะยาวหรือไม่

☐ มี ☐ ไม่มี

2.2 อะไรคือปัจจัยพื้นฐานทางการตลาดของท่าน และตลาดเฉพาะที่ท่านมีศักยภาพคืออะไร

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2.3 ปัจจัยอะไรบ้างที่มีผลต่อกำไร-ขาดทุนของบริษัท

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.....

.....

2.4 ในช่วง 10 ปีที่ผ่านมาแนวโน้มความต้องการของลูกค้าในบริการของท่านเปลี่ยนแปลงไปจากเดิมหรือไม่

☐ ไม่เปลี่ยน

☐ เปลี่ยน (โปรดอธิบาย) .....

.....

.....

ตอนที่ 3 ประเด็นด้านสิ่งแวดล้อม วัตถุประสงค์ และเทคโนโลยี

3.1 บริษัทของท่านมีการให้บริการแก่กลุ่มโรงงานอุตสาหกรรมหรือหน่วยงานต่างๆ บ้างหรือไม่

- ☐ ไม่
- ☐ มี โดย
  - ☐ ท่านได้เสนอคำปรึกษาในการเลือกวัสดุ อุปกรณ์
  - ☐ ท่านได้ให้คำปรึกษาด้านวิศวกรรมในส่วนของการติดตั้งเครื่องจักร เครื่องมือ รวมถึงการใช้งานเครื่องมือเหล่านั้น
  - ☐ อื่นๆ (โปรดระบุ) .....
    .....

3.2 ท่านคิดว่าประเด็นด้านสิ่งแวดล้อมเป็นประเด็นหนึ่งที่มีบทบาทในตลาดของท่านใช่หรือไม่

- ☐ ไม่ใช่
- ☐ ใช่ โดย
  - โปรดระบุว่าประเด็นเหล่านั้นมีความสำคัญอย่างไร
    .....
    .....
  - ประเด็นเหล่านั้นแปรผันตามความมีชื่อเสียงของบริษัทลูกค้าใช่หรือไม่
    - ☐ ไม่ใช่
    - ☐ ใช่ (โปรดอธิบาย) .....
      .....

3.3 ในความเห็นของท่าน เหตุผลหลักที่ทำให้ลูกค้าดำเนินการเปลี่ยนแปลงเทคโนโลยีที่ใช้ (กรุณาจัดลำดับความสำคัญจาก 1 = สำคัญน้อยสุด 5 = สำคัญมากที่สุด)

เหตุผลสำหรับการเปลี่ยนแปลงเทคโนโลยี	ความสำคัญ
การลดต้นทุน (ระบุว่าเป็น ค่าแรงงาน การใช้พลังงาน การใช้วัตถุดิบ).....	
การเพิ่มผลผลิต (ในด้านการเพิ่มปริมาณการผลิต)	
การปรับปรุงคุณภาพ (ระบุว่าเป็นคุณภาพของกระบวนการผลิตหรือคุณภาพผลิตภัณฑ์).....	
ปรับปรุงตามมาตรฐานหรือกฎระเบียบด้านสิ่งแวดล้อม	
บุกเบิกตลาดใหม่	
เพิ่มความหลากหลายของผลิตภัณฑ์	
แรงกดดันด้านสิ่งแวดล้อมจากองค์กรเอกชน ชุมชนท้องถิ่น สมาคมธุรกิจ หรือธุรกิจอื่นๆ	
อื่นๆ (ระบุ)	

3.4 การปรับราคาค่าน้ำประปา พลังงาน วัตถุดิบ มีอิทธิพลต่อระดับการเปลี่ยนแปลงเทคโนโลยีของธุรกิจในทางใดบ้าง มากหรือน้อย และเปลี่ยนแปลงอย่างไร (เฉพาะกรณีที่มีการเปลี่ยนแปลงราคาวัตถุดิบ น้ำประปา พลังงานอย่างมีนัยสำคัญ ในรอบ 10 ปีที่ผ่านมา)

- ราคาวัตถุดิบ.....
  .....
- น้ำประปา.....
  .....
- พลังงาน.....
  .....

3.5 ในความคิดเห็นของท่าน ข้อจำกัดในการปรับปรุงหรือพัฒนาเพื่อให้เกิดการใช้เทคโนโลยีที่สะอาดกว่านั้นคืออะไร (โปรดระบุเหตุผล)

.....
.....
.....

(โปรดจัดลำดับจาก 1 = สำคัญน้อยที่สุด ; 5 = สำคัญมากที่สุด)

ข้อจำกัด	ความสำคัญ
ขาดแคลนข้อมูล	
ต้นทุนในการดำเนินการสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ)	

3.6 การปรับปรุงเทคโนโลยีด้านสิ่งแวดล้อม

3.6.1 ท่านต้องการเห็นการเปลี่ยนแปลงในด้านใดบ้าง เพื่อให้เกิดการปรับปรุงเทคโนโลยีด้านสิ่งแวดล้อม

- ☐ การบริการ
- ☐ กฎหมาย/กฎระเบียบ
- ☐ ลักษณะทางการตลาด
- ☐ อื่นๆ (โปรดระบุ) .....

3.7 ในความเป็นจริงแล้ว ท่านต้องการแสดงให้เห็นว่าเทคโนโลยีของท่านเป็นมิตรกับสิ่งแวดล้อม หรือต้องการที่จะแสดงให้เห็นเป็นอย่างอื่น เช่น เป็นความได้เปรียบทางการแข่งขันที่เหนือกว่า หรือไม่

- ❑ ใช่
- ❑ ไม่ใช่
- ❑ อื่นๆ (โปรดระบุ) .....

3.8 บริษัทของท่านมีความสัมพันธ์กับบริษัทที่อยู่ในกลุ่มตัวอย่างที่แสดงไว้หรือไม่

บัญชีรายชื่อธุรกิจ	ลักษณะความสัมพันธ์
บ. ศิลปเสนีพานิชย์ จำกัด	.....
ห้างหุ้นส่วนสามัญนิติบุคคลธนไพศาล	.....
บ. ยูไนเต็ดเท็กซ์ไทล์มิลล์ จำกัด	.....
บ. สยามโปลีเท็กซ์อุตสาหกรรม จำกัด	.....
บ. เชียงแสงเท็กซ์ไทล์อินดัสทรีส์ จำกัด	.....
บ. พัทยาพิมพ์ย้อม จำกัด	.....
บ. แสนทวีเท็กซ์ไทล์ จำกัด	.....
บ. พอใจพิมพ์ย้อมผ้าไทย จำกัด	.....
บ. ไทยอิสเทอน อินดัสทรีส์ จำกัด	.....
บ. โรงงานพิมพ์ย้อมผ้าไทย (1980) จำกัด	.....
(อื่นๆ ระบุ).....	.....
.....	.....
.....	.....
.....	.....

3.9 ท่านมีข้อคิดเห็นที่เป็นรูปธรรมต่อธุรกิจต่างๆ ตามที่แสดงไว้ในรายการข้างต้นหรือไม่

- ❑ ไม่มี
- ❑ มี (โปรดระบุ) .....

.....

.....

ตอนที่ 4 ทิศทางในอนาคต : ความคาดหวังที่เปลี่ยนแปลงไปต่อตลาด

4.1 อีก 2-3 ปีข้างหน้าในอนาคต ท่านคาดหวังว่าจะมีการเปลี่ยนแปลงด้านใดบ้าง

.....

.....

4.2 ท่านเล็งเห็นความสำคัญของประเด็นด้านสิ่งแวดล้อมว่ามีผลในการวางแผนการตลาดหรือไม่

- ☐ ไม่มี
- ☐ มี ท่านมีความคิดว่ามีความสำคัญอย่างไร .....

.....

4.3 ท่านจะมีการปรับปรุงการบริการอย่างไร เพื่อรองรับการเปลี่ยนแปลงที่คาดว่าจะเกิดขึ้นในตลาด และความต้องการของลูกค้า

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.....

.....

โครงการวิจัยของ UNIDO

การประเมินความเข้าใจในเรื่อง

เทคโนโลยีเพื่อการพัฒนาสิ่งแวดล้อมอย่างยั่งยืนในประเทศกำลังพัฒนา

(UNIDO Project on Assessing the Uptake of Environmentally Sound Technology (EST) in Selected Developing Countries)

แบบสอบถามองค์กรเอกชนและองค์กรของชุมชน

ตอนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อองค์กร .....

1.2 สถานะ

- ☐ องค์กรระหว่างประเทศ
- ☐ องค์กรในประเทศ
- ☐ องค์กรส่วนท้องถิ่นหรือองค์กรส่วนภูมิภาค
- ☐ เป็นตัวแทนส่วนท้องถิ่นหรือตัวแทนส่วนภูมิภาคขององค์กรในประเทศหรือองค์กรระหว่างประเทศ

1.3 ระบุลักษณะขององค์กร : มีชื่อเรียกว่าอะไร

- ☐ NGOs
- ☐ องค์กรชุมชน
- ☐ กลุ่มที่ก่อให้เกิดความกดดัน
- ☐ กลุ่มระดมความคิด
- ☐ กลุ่มแนวร่วมเพื่อการเคลื่อนไหวต่างๆ

1.4 ปีที่ทำการก่อตั้งองค์กร .....

1.5 ขนาดขององค์กร

- ☐ มีจำนวนสมาชิก(โปรดระบุ).....
- ☐ จำนวนพนักงาน (เฉพาะในประเทศ หรือจะรวมพนักงานในองค์กรเครือข่ายร่วมระหว่างประเทศด้วยก็ได้)

  จำนวนพนักงานทั้งหมด.....คน

  - ☐ ไม่รวม พนักงานในองค์กรหรือเครือข่ายระหว่างประเทศ
  - ☐ รวม พนักงานในองค์กรหรือเครือข่ายระหว่างประเทศ

  จำนวนสำนักงานทั้งหมด(ภายในประเทศหรือภายในท้องที่นั้นๆ ก็ได้) ..... แห่ง

  งบประมาณ (ถ้าสามารถบอกได้) .....

1.6 ข้อมูลเกี่ยวกับองค์กร

1.6.1 ลักษณะโครงสร้างบริหารขององค์กร

1.6.2 มีจำนวนแผนก ..... แผนก รวมจำนวนทั้งหมด ..... คน โดยแบ่งเป็น

1. แผนก ..... จำนวน ..... คน
2. แผนก ..... จำนวน ..... คน
3. แผนก ..... จำนวน ..... คน
4. แผนก ..... จำนวน ..... คน

1.7 ข้อมูลต่างๆ ขององค์กร

1.7.1 สามารถค้นหารายละเอียดขององค์กรท่านได้อย่างไร

- ☐ วารสาร/สิ่งพิมพ์วิชาการ
- ☐ สื่อหนังสือพิมพ์
- ☐ เวบไซต์
- ☐ อื่นๆ (โปรดระบุ) .....

1.7.2 มีการตีพิมพ์เอกสารหรือรายงานข้อมูลต่างๆ ขององค์กรเผยแพร่หรือไม่

- ☐ ไม่มี
- ☐ มี (โปรดระบุ).....

.....

1.8 ความเชื่อมโยงทางขององค์กรท่านกับกลุ่มกิจกรรมต่างๆ มีอะไรบ้าง

- ☐ หนังสือพิมพ์ สื่อต่างๆ
- ☐ NGOs อื่นๆ
- ☐ อื่นๆ(โปรดระบุ).....

ตอนที่ 2 ประเด็นด้านสิ่งแวดล้อม : ปัญหา วัตถุประสงค์ สถานภาพ นโยบาย ข้อกำหนด กฎหมาย

2.1 วัตถุประสงค์หลักขององค์กรท่าน

วัตถุประสงค์	ลำดับความสำคัญภายในองค์กร (1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก)
.....	
.....	
.....	
การปกป้องคุ้มครองสิ่งแวดล้อม	
เพื่อความเป็นธรรมในสังคม (ในระดับท้องถิ่น)	
สิทธิมนุษยชนและสุขภาพของคนทำงาน	
ข้อมูลข่าวสารและการสนับสนุน	

2.2 เหตุใดองค์กรของท่านจึงมีความจำเป็นที่จะต้องเข้าร่วมกับกิจกรรมทางการเมือง รูปแบบการควบคุมทางการเมือง หรือทางสิ่งแวดล้อมที่ขาดหายไปจากการเมืองระดับชาติและระดับนานาชาติคืออะไร หรือจะเป็นกฎเกณฑ์ของธุรกิจ

1. .....
2. .....
3. .....

2.3 จงแสดงให้เห็นว่ามลพิษที่ท่านอาจจะต้องประสบจากมลพิษสำคัญของภาคอุตสาหกรรมนั้นรุนแรงหรือไม่ และมลพิษใดที่ภาคอุตสาหกรรมควรให้ความสำคัญในการบำบัดมากที่สุด กรุณาจัดลำดับจาก 1 - 5 (เมื่อ 1 คือ ไม่เลย และ 5 คือมาก)

ประเภทของมลพิษ	1	2	3	4	5
มลพิษทางเสียง					
มลพิษทางอากาศ					
มลพิษทางน้ำ (กรุณาระบุว่าเป็น แม่น้ำ ทะเลสาบ หรือทะเล)					

2.4 รูปแบบการรณรงค์ขององค์กรที่ท่านดำเนินการในขณะนี้หรือที่ผ่านมาคืออะไรบ้าง (โปรดระบุ)

.....

.....

.....

2.5 รูปแบบการรณรงค์ในข้อ 2.4 ที่ท่านดำเนินการนี้จัดอยู่ในระดับใด

- ☐ ท้องถิ่น
- ☐ ภูมิภาค
- ☐ ระดับชาติ
- ☐ ระดับนานาชาติ

2.6 สิ่งสำคัญที่ต้องคำนึงถึงเพื่อสร้างแรงจูงใจในการขับเคลื่อนการดำเนินการขององค์กรคืออะไร

.....

.....

.....

2.7 ความสำเร็จที่สำคัญที่สุดของท่านคืออะไร

.....

.....

.....

2.8 ปัญหาที่สำคัญที่สุดหรือความล้มเหลวรุนแรงที่สุดคืออะไร

.....

.....

.....

ตอนที่ 3 ธุรกิจและเทคโนโลยีเฉพาะ

3.1 องค์กรของท่านมีกิจกรรมหรือรณรงค์เป็นการเฉพาะ เพื่อต่อต้านอุตสาหกรรมสิ่งทอฟอกย้อมหรือไม่ อะไรบ้าง โปรดระบุบริษัท/องค์กรที่ท่านมีความเกี่ยวข้องดังกล่าว

☐ ไม่มี

☐ มี (โปรดระบุ).....

.....

.....

3.2 ผลกระทบที่เกิดขึ้นจากกิจกรรมหรือรณรงค์ในข้อ 3.1 เป็นอย่างไรบ้าง

1. .....
2. .....
3. .....
4. .....
5. .....

3.3 โปรดระบุชื่อบริษัท/องค์กรที่ท่านมีความเกี่ยวข้อง และระบุความเกี่ยวข้องนั้น

ชื่อบริษัท/องค์กร	ความเกี่ยวข้อง/พึงพา

3.4 ท่านคิดว่าการดำเนินกิจกรรมของหน่วยงานท่านมีผลต่อการเปลี่ยนแปลงเทคโนโลยีนั้นสำคัญมากน้อยเพียงใด ในประเด็นตามตารางต่อไปนี้ และกรุณาจัดอันดับความสำคัญด้วย

การดำเนินการเปลี่ยนแปลงเทคโนโลยี	1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก
การพยายามต่อต้านบริษัทในการที่จะเปลี่ยนแปลงเทคโนโลยีบ้างหรือไม่	
ท่านได้สนับสนุนการเปลี่ยนแปลงเทคโนโลยีใหม่หรือเทคโนโลยีสะอาดบ้างหรือไม่	
ท่านได้รวบรวมข้อสรุปที่สำคัญต่างๆ เพื่อการตัดสินใจในด้านเทคโนโลยีบ้างหรือไม่	
ท่านไม่ได้คำนึงถึงเรื่องเทคโนโลยี แต่ท่านคำนึงถึงคุณภาพการดำเนินการด้านสิ่งแวดล้อมด้วยใช่หรือไม่	
อื่นๆ	

3.5 ความเกี่ยวพันของท่านกับการเข้าร่วมเป็นภาคีสมาชิกหรือเพื่อผสานความร่วมมือกับองค์กรอื่น เมื่อต้องการเป็นตัวนำหรือเป็นการรณรงค์เพื่อการนี้ มากน้อยเพียงใด (กรุณาจัดอันดับ)

ความร่วมมือกับองค์กร	1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก
มหาวิทยาลัยต่างๆ	
องค์กรหรือหน่วยงานรัฐบาลที่สนับสนุนเทคโนโลยี	
องค์กรระหว่างประเทศ	
ธุรกิจภาคเอกชน	
ที่ปรึกษาภาคเอกชน	
NGOs	
สื่อต่างๆ (สิ่งพิมพ์ โทรทัศน์ วิทยุ)	
อื่นๆ (ระบุ)	

3.6 หากท่านมีส่วนร่วมในการแลกเปลี่ยนเทคโนโลยี เราต้องการทราบเหตุผลที่สำคัญที่ทำให้หน่วยงานท่านเรียกร้องให้ธุรกิจเปลี่ยนแปลงเทคโนโลยี

เหตุผลสำหรับการเปลี่ยนแปลงเทคโนโลยี	1 คือไม่สำคัญและ 5 คือสำคัญอย่างมาก
การลดค่าใช้จ่าย (ระบุว่าเป็น ค่าแรงงาน การใช้พลังงาน การใช้วัตถุดิบ)	
การเพิ่มผลผลิต (ในด้านการเพิ่มปริมาณการผลิต)	
การปรับปรุงคุณภาพ (ระบุว่าเป็นคุณภาพของกระบวนการผลิตหรือคุณภาพผลผลิต)	
การผลิตตามมาตรฐานหรือกฎระเบียบด้านสิ่งแวดล้อม	
การเปิดตลาดใหม่	
การเพิ่มความหลากหลายของผลิตภัณฑ์	
แรงกดดันด้านสิ่งแวดล้อมจาก NGOs ชุมชนท้องถิ่น สมาคมธุรกิจ หรือธุรกิจอื่นๆ	
อื่นๆ (ระบุ)	

3.7 ข้อจำกัดของการปรับปรุงหรือพัฒนาเพื่อให้เกิดการใช้เทคโนโลยีที่สะอาดนั้นคืออะไร (โปรดระบุ)

1. .....
2. .....
3. .....

(กรุณาจัดลำดับความสำคัญจาก 1 = สำคัญน้อยสุด 5 = สำคัญมากที่สุด)

ข้อจำกัด	ความสำคัญ
ขาดแคลนข้อมูล	
มีค่าใช้จ่ายในการนำไปปฏิบัติสูง	
ไม่สามารถเลือกใช้สารเคมีทดแทน หรือไม่สามารถเปลี่ยนวัตถุดิบในการผลิตได้	
ไม่มีทางเลือกเกี่ยวกับเทคโนโลยีในการกระบวนการผลิต	
ไม่แน่ใจว่าจะมีผลกระทบเกิดขึ้นอย่างไร	
ขาดแคลนทักษะหรือไม่สามารถเปลี่ยนแปลงการดำเนินการแบบเดิมได้	
อื่นๆ (ระบุ)	

ตอนที่ 4 ทิศทางในอนาคต

4.1 ความเปลี่ยนแปลงใดที่จำเป็น เพื่อการปรับปรุงกรอบของกฎหมายที่เป็นอยู่ในขณะนี้สำหรับวงการอุตสาหกรรม

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4.2 อุปสรรคในการเปลี่ยนแปลงคืออะไร

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4.3 ในอนาคตท่านคาดว่าจะจัดความสำคัญของการเจรจาหรือรณรงค์ในส่วนที่เกี่ยวข้องกับอุตสาหกรรมในส่วนของการปฏิบัติต่อสิ่งแวดล้อมโดยวงการอุตสาหกรรมจะมีอะไรเป็นสิ่งสำคัญบ้าง

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4.4 ท่านคาดว่าระบบของกฎหมายในอนาคตจะรวมเอาประเด็นด้านสิ่งแวดล้อมเข้ามามากขึ้นหรือไม่ และประเด็นด้านสิ่งแวดล้อมที่ควรจะนำเข้ามาร่วมพิจารณาเพิ่มขึ้นเป็นอย่างไรบ้าง

☐ ไม่มี

☐ มี (โปรดอธิบาย).....

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4.5 ท่านคาดว่าในอนาคตประเด็นต่างๆ ต่อไปนี้จะมีอิทธิพลต่อสิ่งแวดล้อมอย่างไร (และกรุณาระบุความสำคัญ)

รูปแบบของกฎหมาย	1 คือ ไม่สำคัญ และ 5 คือ สำคัญมาก
ระบบกฎหมายของชาติ	
ระบบกฎหมายเฉพาะธุรกิจ	
ระบบกฎหมายระหว่างประเทศ	
อื่นๆ (ระบุ)	