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A Framework for Technical Assistance Programming in Thailand's Industry

I. Aim of the Study

The objective of this paper, as self-contained annexure to the document "Thailand: A Framework for Technical Assistance Programming in Industry", is to analyse the industry sector development by selected sub-sectors. The paper provides an attempt to broadly identify the development prospects, the main bottlenecks and deficit areas as well as an indication of priority fields, which may require technical assistance in the future.

II. Status and Pattern of Industrial Development in Thailand

This section presents a review of various aspects of Thailand's manufacturing sector such as the trend of its share in GDP, and the branch distribution with respect to value-added, foreign trade, investment as well as regional and size distribution of the manufacturing establishment.

The manufacturing sector in Thailand has increased its relative importance in the economy substantially since the beginning of the 1970s. The share of manufacturing in GDP rose from 11.0% in 1960 to 16.0% in 1970 and to 19.6% in 1980, while the agricultural share (whose value added still comprises the largest part) dropped from 38.0% to 28.3% and to 25.4%, over the same period.1/ Since the early 1980s, the share of manufacturing sector in GDP has dropped slightly to 19.1 percent in 1984, due to the overall economic slowdown resulting mainly from the lower world economic growth. The growth rate in manufacturing dropped below that of the other three industrial subsectors--mining and quarrying, construction, and electricity and water supply--for the period of the late 1970s and early 1980s. During the past two decades, the three basic sources of manufacturing growth--domestic demand, import substitution, and export demand, experiencing a structural change. There has been a greater importance of domestic demand growth and of export demand, with a declining contribution from import substitution (Table 1).

The structure of sectoral distribution of manufacturing value-added (MVA) shows a rather stable pattern. The manufacturing sector in Thailand is still broadly divided into those industries processing primary products and those transforming imported raw materials and intermediate goods into final goods for either domestic consumption and more recently for exports. In 1984, 29.5 percent of MVA was attributed to food, beverages and tobacco. Textiles, wearing apparel and leather, leather products and footwear are the next most important group accounting for 25.2% of value added. Activity in this group

1/ Figures represent the GDP at current market prices.

Table I: SOURCES OF GROWTH OF MANUFACTURED OUTPUT
(% contribution to increase)

	1975-78 /a			1977-80 /a		
	DE /b	IS	EX	DE /b	IS	EX
Processed food	46.9	-4.6	57.7	72.3	-7.5	35.2
Beverages and tobacco	101.6	-2.2	-117.7	110.6	-11.2	0.5
Construction materials	103.6	-1.0	-2.6	130.1	-28.6	-1.5
Textiles and clothing	65.8	3.4	30.8	74.5	10.4	15.0
Leather and leather products	-420.2	-18.5	538.6	51.6	-3.0	51.4
Wood and wood products	107.2	-16.0	8.8	96.8	-1.2	4.4
Paper and paper products	102.6	-4.0	1.5	70.6	2.7	26.7
Chemicals and petroleum	130.2	-29.5	-0.6	72.1	-10.7	38.6
Rubber and rubber products	31.8	16.4	51.7	-11.8	-9.2	121.0
Metals and products	64.1	-1.0	36.9	70.3	-3.6	33.3
Machinery	60.8	4.4	34.8	81.8	-60.5	78.8
Transport equipment	81.1	18.2	0.5	81.9	16.1	1.9
Other	89.0	-33.5	44.5	64.7	13.9	21.4
Total	79.5	-7.7	28.2	44.6	-14.9	199.6

Source: World Bank, "Thailand's Manufactured Exports: Key Issues and Policy Options," Washington, D.C., 1985.

/a DE = Domestic demand effect.
IS = Import substitution.
EX = Export demand.

/b Domestic demand effects greater than 100 indicate that domestic demand grew faster than production and either the import share increased (negative import substitution) or the surpluses available for export were reduced (negative export expansion) or both to meet the higher domestic demand in excess of domestic supply.

has grown very rapidly over the past 10 years with much of the growth oriented towards exports. Wood and cork, paper and paper products, and rubber and rubber products contribute 4.7% of MVA in 1984. Products in this group have had a gradual declining trend over the past decade. Chemical production, despite its small base, has been growing rapidly, and, together with petroleum refining, accounted for 8.7% of manufacturing value added in 1984. Products manufactured by the engineering industry counted in terms of four main categories - basic metal, metal products, machinery, electrical machinery and supplies - contributed 5.8% of MVA with the largest part produced for domestic demand. Finally, the transport equipment sub-sector contributed 9.6% of MVA and is devoted primarily to the assembly and repair of motor vehicles and motor cycles for domestic use, rather than for exports.

With regard to private vs. public sector investment in Thailand's manufacturing sector, only sketchy evidence is available which indicates thatthe manufacturing sector accounted for a considerable share of private investment growth in the 1970s and in the first half of the 1980s. The available data on gross investment by sector also shows that it has been dominated by the private sector all throughout.

The structural change of Thailand's foreign trade reveals that exports of manufactured goods (in terms of CCCN) have grown rapidly since the 1970s, from a share of 29.8% of the total exports in 1978 to 43.4% in 1984. The share of manufactured imports over the same period was, on the contrary, declining gradually. Manufactured exports are, for a large part, marketed in other developing countries, while manufactured imports are predominantly from developed countries. Thailand's manufactured exports have gone through a structural change during the second half of the 1970s and early 1980s. Textiles and garments, which constituted a substantial share in manufactured exports' growth in the first half of the 1970s, has its share declined in recent years, while other manufactured exports such as wood products, electronic goods and electrical machinery, jewelry and precious stones have expanded rapidly, which indicates a potential for continued diversification.

A breakdown of manufacturing industries by regions reveals drastic regional disparities in industrial activity. About 52% of the total MVA and 35% of (manufacturing) employment is concentrated in Bangkok and another 36% and 30%, respectively in the Central Region. Despite the emphasis of the Government's development strategy on increasing the growth and dispersion of activities in this sector to the other regions, the concentration of manufacturing activities in Bangkok and Central Region has continued to grow in recent years.

Data on the size distribution of manufacturing industries in Thailand indicate a dualistic pattern characterized by a large majority of small and medium scale enterprises. In 1982, the cottage industries (which employ less than 10 workers) account for about two-thirds of all firms. Those with under 50 employees account for 95% of the firms while only less than 1% of the firms employ more than 300 workers.

III. Development Prospects and Constraints in Important Manufacturing Sub-Sectors

Engineering Industries

The Sixth Five-Year Plan (1987-1991) assigns engineering industries a top priority among various selected industries to be developmed during the Plan's period. They are expected to provide the basis upon which other types of industries will be developed over the long run. The engineering industries are defined as those manufacturing five product groups as classified by NESDB: basic metal, metal products, machinery, electrical machinery and supplies, and transport equipment. During the 1970s and the first half of the 1980s, the share of value-added from engineering industries in MVA has increased gradually, from 12.4% in 1970 to 14.0% in 1980 and to 15.4% in 1984. Within the group of engineering industries, transport equipment contributed the largest share, or 5.2% of MVA in 1970 and 9.6% of MVA in 1984. Time series of the share of MVA show a declining trend of value added for basic metal, metal products, and machinery, while the electrical machinery and supplies are experiencing an expansion trend in terms of their share in MVA.

The main factor behind the emphasis on the production of local engineering products is the trade imbalance with respect to engineering goods. Thailand's total exports of engineering goods in 1984 earned 19,958 million baht while its import of engineering goods in the same year amounted to 99,438 million baht. The trade imbalance is even more pronounced when integrated circuits, which accounted for more than half of the total exports of engineering industries, are excluded. Imports of engineering goods accounted for more than 50% of the country's total export earnings. It is obvious that, unless the local engineering industries are vigorously developed, Thailand will become increasingly dependent on the imports of engineering goods for its industrialization process.

Table 2: Share and Trade Structure of Engineering Projects

Year	VA of All Manufacturing (Mil. Baht) (1)	Engineering Industries (Mil. Baht) (2)	Share (%) (2)÷(1)x100 (3)	Export Value (Mil. Baht) (4)	Import Value (Mil. Baht) (5)
1970	23,320	2,883	12.4	1,707	13,271
1980	60,597	8,493	14.0	21,258	67,595
1984	76,944	11,815	15.4	19,958	99,307

Sources: NESDB, National Income of Thailand and Foreign Trade Statistics of Thailand.

The engineering industries in general are regarded as having characteritics that favor their more rapid development. They are thought of (i) having strong linkages, both backward and forward; (ii) having high income elasticity of demand, (iii) being efficient on a small scale of output production; (iv) being labor intensive but also skill-intensive, and (v) having a stable state of production technology, while, at the same time being carriers of technological change due to the heterogenous nature of the products, and (vi) having potential in the export market for a number of products.

In the case of Thailand, none of these characteristics appear to be as strong as they might appear to be, due to the lack of many sufficient conditions needed for these characteristics, such as adequate numbers and types of skilled technicians and engineers, a flow of information on technical progress, an adequate amount of domestic research and development and an integrated and interdependent development program. The weakness of these industries is due, on the one hand, to the bias in the fiscal system of protection which works against domestic production of engineering goods, and to the inadequacy in technical assistance from the Government on the other.

Basic metal and metal products industries consist of products such as products of iron and steel, copper, aluminium, lead, zinc and tin, cutlery and hand tools, and other articles of basic metals. Their production, export value and import value are presented as follows.

Table 3: Production and Trade in Metal and Metal Products, 1984
(in million of Baht)

Products	Value-added	Export	Import
Iron & steel	-	1,816	19,188
Copper	-	80	1,315
Aluminum	-	401	2,598
Lead	-	6	186
Zinc	-	8	1,163
Tin	-	5,436	8
Other base metal	-	30	17
Tools, cutleries, forks, spoons	-	160	1,296
Misc. articles	-	104	655
Total	1,320	8,041	26,426

Source: Foreign Trade Statistics of Thailand, Customs Department.

Between 1980 and 1984, production of metal and metal products increased at about 3.4% in value terms per annum, compared with an average growth of GDP at the same period, which was about 5.6% p.a. The growth performance of the metal and metal products industries was thus still unsatisfactory. The industries consist of highly heterogenous types of products, yet most of which are subject to common processes. More than 80% of the firms are small scale of machine shops type.

Main problems in the industries include obsolete technology and low quality of casting in small scale foundries, lack of qualified pattern makers in larger scale foundries, high scrap rate in press work, obsolete technology in small fabrication shops, low product design capability in fabrication work whose export potential is high, and low capability of machinery.

Machinery industry consists of products of two main product groups -- boiler machinery and electrical machinery and appliances. In 1984 their export value were 11,554 million baht and their import value stood at 54,735 million baht. A survey of industrial development in Thailand 2/ summarizes its major trends since the 1960s as follows:

(1) A number of workshops, having earlier required, and bought from outside, machinery of certain types, realized that they had the technical capabilities to produce such machinery themselves;

(2) Certain workshops undertook repair work in industries such as paper mills and sugar mills. The equipment was often bulky and some replacement parts could not be obtained readily due to obsolence. These shops later expanded their work to include the production of spare parts and a few produced and supplied complete machines to those sectors;

(3) Some trading firms found it profitable to manufacture the machinery they had previously been importing. Joint venture companies were set up to which the foreign partner generally supplied the technical know-how;

(4) Expansion of agro-industries in factories which were often built on turn-key basis. The technology was normally brought in from abroad and the products are of international standard with the main technical knowledge gained in processing and control technology.

Problems encountered by this industry include plant layout, and working conditions, use of unskilled, semi-unskilled, and skilled labour, product quality and management system. A proper technical solution for further development of this industry would require the promotion of institutions such as specialized units with highly competent personnel in the area of production technology, especially indigenous type.

2/ Boonma Thampitakkul, "Current State of Machinery Industry," IMC paper no. 3, Nov. 1984.

Iron and steel production usually serves as the basic industry for further development of engineering industries as a whole. The past development of Thai iron and steel production suggests that it is still far from being successful. Problems facing its development include (i) underutilization of production capacity, (ii) high production cost due mainly to its high import content, (iii) competition with imported goods of the same or similar types, and (iv) low quality of goods. Three main factors are responsible for these bottlenecks: (a) quality of raw materials; (b) inadequacy of skilled workers, standardized machinery, and lack of proper production management; and (c) market instability. The production of iron and steel products in Thailand grew at a rate of about 1% during 1979/1984 and it is expected that domestic demand will increase substantially by the end of the decade due to the emphasis on development of engineering industries during the Sixth Plan. However, the solution, according to NESDB's report, in the case of Thailand will not be a huge integrated steel plant. Rather, in the Sixth Plan more attempts will be devoted to a restructuring of the existing industry, the improvement of quality of products, and the building up of quality casting and forging capacity. Given this situation above, there is an urgent need to search for appropriate modification in product mix and production technology in order to increase capacity utilization, product quality, and operational efficiency. International assistance can play a role in helping Thailand achieve this goal. Because the iron & steel industry in Thailand is not yet well developed, the World Bank 3/ identified a number of product lines in which Thailand seems to have comparative advantage and that may be favorably situated for expansion as follows: (See Table on next page).

A substantial quantities of these products are currently imported due both to the shortage of their locally-made supply and to the low quality of available locally-made products, even though some of these products, such as power tillers are widely accepted by the farmers. Furthermore, even though these products require a rather simple technology and can be produced relatively efficiently on a small scale, technologies used in this subsector are quite elementary and the production process, in many cases, is rather inefficient even on a small scale.

Automotive parts industries are promoted as linkages of the local automotive industry, through the subcontracting of parts and the specialization of production. The ultimate goal concerning this particular industry is the complete local production of motor vehicles. To this end, several measures have been introduced such as raising import duty on CKD and CBU vehicles, regulations on the numbers of series and models, and "local content" laws.

3/ World Bank, "Development of the Engineering Industries in Thailand," Washington, D.C., 1980.

Table 4: Potential Product Lines for Thailand

Product Group	Product Lines
Tools	engineers' cutting tools, hand tools, vices and cutlery.
Small agricultural machinery	
Small industrial engines	water pumps, portable generators etc.
Pumps and valves	
Architecturai and construction hardware	hinges, frames, locks, pipes
Shipbuilding and repairing	steel plate, deck machinery, engines
Machine tools	center lathes, hacksan machines, bench drills, shaping machines, circular saws, planers
Electrical industrial apparatus and machinery	transformers, switchgear, pole line hardware
Air compressors	
Automative components	

However, it is realized that for the past 2 decades the objectives for the industry have not been attained. Factors posing contraints on the development of the industry include the permission of too many assembly firms, too many models, but too low of volume of output to achieve economies of scale and linkage effects; the local content laws in which the local content requirement has been pushed to greater than 50%, higher local content requirements, has resulted in consequently, press the local production of parts and components that are too complex and hence, the result has been very high cost. In sum, the performance of automotive parts industries has been unsatisfactory. Parts production is very import intensive; 60% of its total production cost is for the importation of raw materials; employment creation has not been great; capacity is underutilized and a very low degree of technological transfer has taken place. Despite these constraints, it is realized that this engineering industry branch has some export prospects and is closely linked with other engineering branches. Some policy schemes have thus been established to promote parts production through (a) seeking greater export markets, (b) maintaining local content (LC) at prevailing levels, and (c) upgrading the technical level of the branch.

At present it is realized that there exists, among other things, an overwhelming need for technical assistance in the overall engineering industry at levels:

(A) The plant level. Technical assistance is needed in areas such as work flow, use of materials and out scrappage, quality control, use of existing labor, inspection and production controls, machinery and equipment efficiency.

(B) The institutional level. At present there are 4 forms of technical assistance being provided to the engineering industries at this level: training, consultancy, dissemination of information and documents, and support for the creation of professional associations. These activities have been carried on by several Government and private agencies--the Industrial Service Division (ISD) and the Thailand Management Development and Productivity Centre (TMDPC) of the Department of Industrial promotion in the Ministry of Industry; the National Institute of Skilled Development (NISD) of the Labour Department, the Ministry of Interior; the Engineering Institute of Thailand (EIT); and Technological Promotion Association (TPA). Of these agencies, ISD and TMDPC seem to take the leading role in all four areas. These activities however, are hardly adequate in the world of fast changing technologies. In the future, further technical assistance should be provided in all four areas. The expansion of training activities can be carried on in the areas of industrial design, surface finishing, tool and die design, plastic technology, foundry technology, and low-cost automation. The consultancy service can be expanded as well, probably by encouraging new agencies such as the Technology Transfer Centre (TTC) of the Ministry of Science, Technology and Energy to take a more active role, or by establishing a new Technology Development Centre as an autonomous consultancy institution, through the cooperation between government and private sectors.

Agro-based Industries

The agro-based industries were given top priority during the Fourth Five-Year Plan (1977-81), mainly for the purpose of import substitution and their linkage effects with respect to the expected growth of the agricultural sector. Those with export potential have been encouraged further throughout the Fifth Plan (1982-86), and will be given high priority in the Sixth Plan (1987-91). The share of this industry shows a declining trend--from 43.9% of the MVA in 1970 to 34.1% and 29.5% in 1979 and 1984 respectively. Its growth rate, which accelerated during the 1970s has declined in the early 1980s. However, this subsector still occupies a large part of the MVA--about 30%.

Table 5: Value added and Export of Agro-based Industry.

	1970	1976	1979	1984
Value-added (% of MVA)	43.9	35.5	34.1	29.5
Growth (constant price)	-	15.1	12.1	7.7
Export value (% of Manufactored export value)	-	-	59.0	45.7

Source: NESDB and the Bank of Thailand.

The overall export value of major agro-based products has also a declining trend, by accounting for 59.0% of manufactured export value in 1979 and for 45.7% of manufactured export value in 1984. This declining trend, however, does not represent the declining export value of, or even export quantity of the products themselves, because their export value has increased substantially over time. Rather this indicates a more accelerated rate of growth of other types of manufactured export such as textiles, integrated circuits, and precious stones.

Agro-based products to be studied in this paper include sugar, processed food i.e. frozen fish and seafood, canned fish, canned fruits and vegetables and dairy products (i.e. flour, milk, and milk proucts). These products are of concerned due to their sizeable contribution to the MVA and their export potentials.

Sugar production in Thailand was well established after the World War II, first with the goal of import substitution due to sugar shortage following the War. Since the second half of the 1960s, it has then been developed into an industry with a substantial export suplus.

Table 6: Production, Export and Import of Sugar

	1970	1979	1984
Production (thousand ton)	406.6	1,795.2	2,213.8
Yield of cane per rai (ton)	6.9	6.5	5.8
Export Value (Mil. Baht)	107.3	4,797.0	5,222.0

Source: Bank of Thailand

At present, there are about 45 sugar factories in operation in various provinces of four regions (i.e. North, Central, East, and Northeast). The mill production capacity, in 1984, ranged from 800 to 10,000 ton of cane per day. The quantity of sugar produced during each season depends, apart from the mills' capacity utilization, very much on the yield of sugar-cane. During the late 1970s and the first half of the 1980s, yield per rai of sugar cane, and hence sugar production, has declined, with the exception of the crop year 1981/82 when the yield per rai climbed up to 8.30 tons. Since the cost of sugarcane alone (as the raw material for sugar) accounts for about 60 to 70% of total production cost of sugar mills, the cane price has thus always been a serious issue between the millers and the planters, who are also well organized. Eventually, the Government tried to settle the issue by offering the "revenue sharing scheme" whereby 70% of the net revenue from the sugar trade is to be allocated to planters and 30% is to go to the millers. Problems still exist however as both parties complain of high production costs. Consequently, the Government has sometimes subsidized sugar production by making up the difference between the price demanded by the planters and the price acceptable for millers. For the 1985/86 season, the basic price of sugar-cane was finally settled at 323 baht per ton, while the planters' demand was for 420 baht per ton. The domestic price of sugar in 1985 was kept much higher than the international prices in order to subsidize the very low export prices. However, the Government claimed that Thailand still has a long run comparative advantage in sugar production.

The main problems confronting sugar millers are high cost of production and low level of capacity utilization. The problem of high cost is closely related to the problem of high cane production cost. In 1984, it was estimated that cane production per ton was 347.2 baht for small farms, and 357.5 baht for large farms, 4/ while the average milling cost of sugar is said to be over 200 baht per ton.

Prospects for cost reduction rely on the modernization of sugar technology such as the introduction and extension of mechanical havesting, andimprovement of the delivery system. However, since these technologies are to be imported, and at a rather high price, the cost reduction through such a method would require that these imports be made available on a concessional basis. Other problems confronting the sugar industry include a low level of vertical integration, inappropriate location of many sugar mills, and reliance on outdated machinery.

The priority area for technical assistance for the sugar industry is the need for a better method to utilize and to expand the types of by-products which could indirectly help reduce the production cost of sugar. The main by-products of sugar production are molasses, bagasse, and filtercakes of which normally around 4%, 25-30%, and 3.8%, respectively. Downstream products of molasses include industrial alcohol, cattle feed, citric acid, bakers yeast, lactic acid, microbial fats, fodder yeast, acetate rayon yarn, liquid sugar and power alcohol. Bagasse can be used as fuel and for downstream production of papers, paper board, particle board and furfural. More and better uses of bagasse has been encouraged, especially in the Sixth Plan, as a traditional source of energy in the rural industrial sector. In this case, more knowledge concerning storage techniques are required due to the perishable nature of bagasse.

In sum, technical assistance for the sugar industry along the lines mentioned above, would involve a more complete knowledge about the range of internationally available technologies, detailed market studies on suitable downstream activities for Thailand.

Processed food is another important agro-based industry in Thailand due to its high value-added contribution and export potential. The export value of main product lines of processed food such as tapioca products, prawns, canned pineapple, canned fish and canned crustaceans, togetner accounted for 58.8% of all manufactured exports in 1978, and declined gradually to 38.8% of manufactured exports in 1984. The lower share of processed food exports was due mainly to the decline of export value in tapioca products and prawns while export value of canned products during the same period had increased rather rapidly.

4/ S. Raksasap and A. Panikabutr, The Sugar Trade of Thailand (Research Report, IDRC, 1984), p.p. 28-29.

Table 7: Export value of Major Processed Food *

	1978	1979	1980	1981	1982	1983	1984
Export Value (million baht)	14,543	15,242	20,526	23,926	28,963	25,148	29,523
Export value as % of manufactured exports	58.81	44.86	47.66	43.71	45.82	41.00	38.79

Source: Bank of Thailand

* includes frozen fowl, canned pineapples, canned fish, canned crustaceans, frozen prawns, tapioca products.

Canned fruit, especially canned pineapple, has been a major contributor to foreign exchange earnings for over a decade. By 1984 there were 7 (companies) manufacturing canned pineapple, with the total capacity of 17.6 million boxes per year. 5/ The actual production in 1984 was 12.4 million boxes, and hence the capacity utilization of this industry ranged from 75% to 100% of total capacity. The export value of canned pineapple has increased from 1,244 million baht in 1979 to 2,846 million baht in 1984. 6/ On the average its export has expanded at the rate of about 10% p.a. since the late 1970s. The main problems concerning the manufacture of canned pineapple are firstly, a tight raw material market (pineapple) due to heavy competition both with those selling fresh pineapple and a recently with a booming frozen pineapple industry. Secondly, production costs are rather high, especially raw material costs due to the high cost of producing pineapple, which is about 1.01 baht per kilogram on the average. 7/

5/ BOT, Summary of Business and Industrial Situation, 1984, P. 41.
6/ BOT, Monthly Economic Report, June, 1985, P. 57.
7/ BOT, Summary of Business and Industrial Situation, 1981, P. 79.

Frozen seafood has become a more important foreign exchange earner in recent years. Its export value has climbed up rapidly, from 2,069 million baht in 1977 to 4,857 million baht in 1982, while its import remains very low, ranging from 16 to 270 million baht during the same period. 8/ Important items of frozen seafood are shrimps and prawns, which account for more than 50% of total export of this item. The export value of frozen shrimps and prawns stood at 1,172 million baht in 1977 and at 3,165 million baht in 1983. Frozen squids and octopus rank second are followed by frozen fishes. The major part of Thai frozen seafood went to Japan and the U.S. Canned fish comprised of (a) sardines in oil and in tomato sauce, and (b) tuna in water. Its export value has increased steadily over the years, from 253 million baht in 1978 to 1,109 million baht in 1981, and to 3,696 million baht in 1984. Major importing countries of canned fish include the U.S. (30%), Germany FDR, Nigeria and Australia. Canned fish is another product that has a clear potential of further growth. Dairy products 9/ are comprised of the manufacture of flour and flour products, milk and products, and meat. The flour industry manufactures four main types of flour -- cassava flour, rice flour, maize flour, and wheat flour. In 1982, there were 170 factories manufacturing various types of flour, and 1,095 factories producing flour products such as cakes, bread, tapioca seed. Cassava and rice flour is produced to serve both domestic demand and export demand while the production of maize and wheat flour is only enough to serve domestic demand. Domestic demand for cassava and rice flour includes consumption demand and the intermediate demand of various industries such as food, textile, paper, and lumber industries. The export value of cassava flour and products surpassed 1,000 million baht by 1980 and increased steadily after that. Major importers of Thai cassava flour and products include Japan, U.S. and Taiwan. Problems confronting the flour industry include high material cost, the low quality of raw materials which leads to the low quality of final products, production inefficiency due to out-dated machinery and production technology.

The manufacture of milk and milk products developed to serve the purpose of import substitution into an industry, that has recently produced a surplus for export. Milk products are comprised mainly of fresh milk, recombined milk, and sweetened condensed milk. In 1983, there were 11 medium to large scale factories producing various types of fresh milk, and 4 main factories manufacturing sweetened condensed milk. Total production capacity of the industry in 1983, was 67,160 ton for fresh milk, and 297,810 ton for condensed milk. Capacity utilization of the industry, in 1983, was about 86% for recombined milk, and 50% for condensed milk. Problems encountered by milk manufacturers include high cost of raw material (i.e. raw milk) due to the

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8/ Juangjai Ajanant, Export Promotion in Processed Foods and Textile Products, (A Draft Report, 1983), P. 3

9/ Research Division, IFCT, Food Industry: Flour, Milk and Meat, 1984, P. 4-5.

shortage of locally produced milk, the low quality of products due mainly to the use of alternative raw materials other than raw milk, and the relatively low level of demand for milk and milk products, especially the domestic demand. The future growth of milk industry would thus require a more efficient method of producing raw milk, which will help lower the cost of milk production, and measures to encourage the further expansion of the market for milk, both domestic and foreign.

Given such potentials the further growth of the processed food industry requires more technical assistance to provide (i) access to sophisticated technology and marketing expertise; (ii) improvement of storage,transportation, packaging, product promotion and quality control. At present, the main constraint on the Thai processed food trade, especially the international trade, is the strict requirements regarding sanitation and labelling. The export procedures, required by the Thai Government, is also criticized for being too complicated and too costly.

LEATHER INDUSTRIES

Thailand's leather industry has emerged from one producing enough to meet local demand into a large export earning industry in a short period less than a decade. Leather industry does not only create value-added to the local raw materials but also increases employment. The value added of leather products in real terms has increased from 232 million baht in 1970 to 293 million baht in 1979 and to 449 million baht in 1984. The industry absorbed 15,000 workers in 1984. Its share of manufactured exports increases from 1.5% in 1970 to 3.2% in 1984. Income from raw hides, skins and leather products increases from 249.4 million Baht in 1976 to 2,000 million Baht in 1984. It was estimated that, in 1984, 80% of leather products is exported, with the export value of 1,497 million Baht.

The major raw materials for leather products are raw hides and skins of which 90% is locally produced. Another 10% is imported high quality hides and skins. In 1980 there were 120 tanneries which are labor intensive with the capacity of 48,000 tons per year for raw hides and skins and of 15,000 tons per year for leather. The tanneries turn out a variety of animal and reptile leathers i.e., cow, buffalo, sheep, goat, snake and crocodile skin. The most popular are cow and buffalo skin, which account for 90% of total skin produced.

Leather products cover a wide range of items from small items such as belts, wallets, watch straps to bigger ones like bags, shoes, gloves etc. Thailand has about 230 manufacturers of leather products. Of these, 16 have received investment promotion in 1980. The Government restructured certain tax policies to promote leather industry. For example, to alleviate the problem of scarce raw hides and skins, the import duties was reduced to only 3% in 1980. Machineries used in this industry had tax exemption. Moreover, the Government also directed sale promotional efforts at overseas markets.

Processing in leather products industry is complicated. There are 3 main steps: beamhouse operations, tannage and after tannage. In the first step raw hides are sorted and trimmed, soaring rehydrated, unhairing bathed and deliming batted. There are 2 types of tannage in the second process: using chrome chemical which is applied for light leather such as hand bag, cushion cover; and using tanning chemical which is applied for heavy leather such as belts, shoes. In the last steps raw hides are neutralized, dyed or bleached, vacuum dried, staked, buffed, glazed and ironed or rolled. Skilled labors are needed in this industry. Assistance in corresponding training activities could be highly beneficial.

Exports of leather products include such items as shoes, handbags, and small items namely belts and watch straps. On the average leather products export rose markedly. Export of leather shoes have had an increasing trend in recent years. In 1981, Thailand exported 2.46 million pairs of shoes which was worth 365 million baht. In 1983 it was expanded by 44.6% in volume and 21.2% in value. 10/ The present main market is the Middle East. Attempts to expand to Europe and America are now being made.

The export of ladies' handbags has increased rapidly since 1981. Its growth rate was 65.5% in 1982 and 40.5% in 1983. In 1984, its export value stood at 110 million baht, while its import value was 0.86 million baht. Important markets include West Germany, Saudi Arabia, Hong Kong, Australia and Singapore.

The export demand for genuine leather travelling bags falls remarkedly in recent years. Although its export value grew by 226.8% in 1982, it receded by 68.31% in 1983. In 1984, its exports of the items, however, is still relatively low, its export value was amounted to about 1 million baht.

The export of genuine leather belts has been increasing steadily. Its export value edged up 3% growth rate in 1982 and shot up further to 35.35% growth rate in 1983. By 1984, its export value reached 21 million baht. Important markets are Singapore, Hongkong and Saudi Arabia.

Unstable export is the case of watch straps. The export value in 1983 declined slightly by 2.0% but rebounded by 38.7% in 1983. Its export value reached 3 million baht in 1984. Important markets are Nigeria, Singapore and Hongkong..

Imported raw hides, skins and leather has a decreasing trend due to the high price and adequate domestic supply. However, Thailand still imports high quality skins. In 1984, 87 million baht of high quality raw hides and skins were imported while the total export value of various types of raw hides and skins was 728 million baht.

In leather industry, important area for technical assistance should start from the processing which depends highly on the quality of hides and skins. The level of manpower skills and techniques used also need assistance which would generate a high rate of return in terms of additional foreign exchange earnings due to higher quality of products and international standard design.

10/ Export Service Center, Ministry of Commerce.

Chemical, petrochemical industries

Until recently, the chemical industry had not been systematically developed. Its structure is oriented towards the production of consumer products for domestic use with only a few as intermediate products being produced. It relies heavily on imported raw materials (i.e. chemicals). The import value of chemicals stood at 14,979 million Baht in 1978, and 31,681 million Baht in 1984 while their export value ranged between 444 to 2,187 million Baht during the same period.1/ The existing capacity is also underutilized. In light of natural gas discovery in the Gulf of Thailand, a comprehensive plan to establish the petrochemical complex, to be located in the Eastern Seaboard area, has been designed and implemented. The complex is to include an olefins plant to process ethane and propane into ethylene and propylene. These in turn will supply the required inputs for a number of chemical plants.

Over the past 2 decades, the contribution of chemical and petrochemical products to the MVA has been stable, with the share increases from 6.34 percent in 1970 to 7.22 percent in 1979, and to 8.65 in 1984. Chemical and petrochemical production in Thailand are mainly the inputs for the fertilizer, plastic and detergent industries.

Though, there have been attempts made by the public sector to set up fertilizer plants in the past, most of them failed completely. To meet the domestic demand of fertilizer, private fertilizer mixing plants were encouraged in 1975 and remain the country's major suppliers of fertilizers today.

With the discovery of natural gas in the Gulf of Thailand, high hopes were raised as to the feasibility of setting up a chemical fertilizer complex in Thailand. From the studies conducted by International Fertilizer Development Center in cooperation with the IBRD, the need for a chemical fertilizer complex to cater to demand from the agricultural sector is emphasized with the expected availability of raw materials when the natural gas separation plant goes into operation in the near future. The supply of methane from the gas separation plant is assured at an average daily rate of 50-60 million SCF during the first phase of the project the investor will be able to meet 75 percent of the local demand for some types of fertilizers like MAP and DAP whose production capacity is 1,300 tons per day, and totally replace imported straight fertilizers especially the nitrogeneous ones.2/

Among major polymer plastic five varieties can be singled out as being the most commonly used in Thailand: Low-density poly ethylene (LDPE), high density poly ethylene (HDPE), poly propylene (PP), polystyrene (PS) and poly vinyl chloride (PVC). At present, since supplies of these downstream petrochemical products are unable to fulfill

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1/ BOT, Monthly Economic Report, June 1985, pp. 40-41

2/ Bangkok Bank Monthly Review, Chemical Fertilizer Complex: Derivatives of Natural Gas, vol. 23, No. 6, p. 232

domestic demand, imports have to continue. The imports increased from 2,265.4 million Baht in 1982 to 2,873.3 million Baht in 1983.3/

Most plastics factories in Thailand are small scale, labor intensive enterprises. The total production capacity is about 250,000-300,000 metric tons a year. An upward trend for exported plastic product was observed during 1981-1983. There was an increase from 723.54 million Baht in 1982 to 938 million Baht in 1983.4/

The petrochemical industry seems to have a prosperous future in the 1980's. There will be major natural gas-based development in both upstream and downstream activities linked tohis industry. Based on the increasing supply of natural gas, 1/4 of the supply of the locally produced natural gas will be made available for use as feedstock for the gas separation plant and petrochemical industry.

The current plan to develop the petrochemical industry includes the construction of two gas separation plants each with a capacity of 350 million cu.ft. per day and the construction of an ethane/propane cracking plant to provide feedstocks for the upstream petrochemical industries which includes the construction of a 300,000 ton ethylene plant. Therefore, the production of final products of ethylene especially for export is expected to increase more than the normal trend to absorb the extra ethylene output. Consequently, during the 1980's there will be substantial investments in the petrochemical industry both by the government and the private sector.

The subsectors such as plastic fabrication which are more labor-intensive will also be promoted as export oriented industries dut to Thailand's comparative advantages.

Technical assistance by providing advice both on the economic and physical feasibility of setting up the domestic production of petrochemicals such as polypropylene could be very useful. The capital outlay required for an economically feasible project is very high and has a large foreign exchange component. International assistance could contribute to providing expertise which can advise the Thai public and private sector on the establishment and management of joint ventures in the chemical and petrochemical branches, staff training for the participating agencies and the equipment for workshops and laboratories.

Advice on how to: (a) increase the industrial efficiency and to maximize the capacity, (b) apply modern techniques and modern equipment to improve present the production process and (c) create more backward and forward linkage industries should be provided by the technical assistance. Computer aid and a technological transfer program for the employees and technicians would be highly beneficial.

3/ Krung thai Bank, Situation of Important Industries, p. 311

4/ Export Service Center, Ministry of Commerce

Wood-based industry, pulp and paper

Wood-based industry, has long been in existence in Thailand. The industry is based on domestic inputs, which is now affected by dwindling forestry resources Wood processing includes veneer, plywood, hard board or fiber board, particle board, furniture, carved wood work and wooden household articles. In 1984, the manufacturing value added was 76.9 billion Baht. Wood and paper products together accounted for 3.3 percent of the MVA. This industry is highly labor intensive.

Wood-based industries were promoted in the early 1960s both for domestic sales as well as for exports. The promotion was suspended in 1971 following the request of the Forestry Organization due to the shortage of logs.

The plywood and veneer industry is almost wholly owned by Thai nationals with foreigners having about 4 percent share of ownership in 1982. The production of veneer, plywood, hard board and particle board make use of local woods. The process is simple, with no attempt to modernize the existing facilities due to the present state of low profitability.

The major cost components of wood-based industry are raw materials and labor cost. In 1982, raw material cost in plywood and in veneer industries were 69.6 percent and 77.6 percent, respectively. Whereas the labor cost was 17.6 percent in the former and 9.6 percent in the latter.1/ The low level of capacity utilization in plywood and veneer industry indicates a high degree of inefficiency in the industry.

Plywood is produced largely for local consumption. However, the hard board plywood is also exported. A large proportion of teak veneer is exported due to its special quality. Veneer's export increases from 110.6 million Baht in 1975 to 289.7 million Baht in 1979 and to 524.9 million Baht in 1984 while plywood's export decreases from 37.5 million Baht in 1975 to 7.1 million Baht in 1979,2/ and finally to only 1.5 million Baht in 1984.

In the past, imports of plywood and veneer used to be negligible. While import of plywood has continued to be negligible, import of veneer has grown and is now about one-third of domestic production. Between 1976 to 1984, its import value increased from 4.2 million Baht to 5.0 million Baht.3/

In terms of potential for veneer, Thailand can compete internationally. Plywood manufacturing should also be competitive if raw materials can be obtained such that capacity can be fully utilized. Lack

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1/ Ibid, Vol. II. p.8

2/ Ibid, p.13

3/ Ibid, p.13

of effective control on forestry exploitation has reduced raw materials for plywood and veneer and thus limiting their potentials.

Wooden furniture includes products from teak wood, parawood, petrocarpus wood, dalbergia wood and others. There exist 150 Thai wooden furniture factories ranging from small to medium sized production plants in 1982, which aim strictly at meeting the needs of local demands. The Board of Investment granted promotional privileges to the industry in 1972 which was a watershed year for the export of wood furniture. The export jumps from 29.9 million Baht in 1973 to 130.6 million Baht in 1984.4/ Exports of Thai wooden furniture indicate a steady growth tendency in the years to come stimulated by the prohibition to export sawn timber since 1977. This has expedited exports from the wooden furniture industry to a great extent. Major markets for Thai wooden furniture include European countries, USA, Japan, Hong Kong and Singapore. These countries account for the import of 90 percent of the total value of Thai wooden products exported to the total of about 60 countries.

Thai wooden household articles has received trade privileges in the form of exemption from import duty. The woods used in making household articles include teak wood, rose wood, rubber wood and laminated solid wood which have been kiln dried so there is no problem of the wood shrinking.

The main markets for Thai wooden household articles are USA, Germany, England, Japan and the Netherlands. The export value has been increasing steadily. In 1981 export value of these items stood at 404.67 million Baht, which increases to 501.6 million Baht in 1984.5/

The main problem in wood-based industry is the shortage of raw material. The solution for this severe problem is importing wood from Burma, Indonesia and Malaysia in forms of log, timber, wood chip and firewood. At present the imported price tends to increase which causes the higher cost of wood production. Thailand's future in wood-based industries depend on the success of the country's reafforestation efforts. Given an appropriate resource base, Thailand has already proven its international competitiveness in wood-based industries such as veneer and furniture.

Technical assistance should locate in new technology to enhance the efficiency of the industry and fully utilize the raw materials and machines' capacity. Production techniques for higher quality and international standard design are also required. Technical support for a reafforestation and skilled labor training programs can be very beneficial.

4/ Bangkok Bank Monthly Review, Vol. 20, No. 6, p.209

5/ Export Service Center, A Guide to Thai Products 1985

Pulp and Paper

The industry divides paper into 6 main categories, i.e. pulp, newsprint, writing paper, kraft paper, sanitary paper and others.

Pulp includes short and long fibre from wood and some economic crops such as rice, sugar-cane and jute. There were 5 producers with the capacity of 115,600 tons in 1984. Imported pulp decreases from 92,152 tons in 1982 to 68,641 tons in 1984 due to the increase in domestic production.6/ Since demand for pulp is a derived demand, it increases as the demand for paper rises.

Thailand cannot produce newsprint. Therefore, all newsprints used are imported from Norway, Sweden, New Zealand and Canada. In 1982, the import was 985 million Baht and the value increased to 1,003 million Baht in 1984.

At present there are six mills involved in the production of writing paper. Of these, 2 are state-enterprises and the remaining 4 are private. Their production amounts to only 67 percent of total production capacity. According to the Bank of Thailand, output of writing paper totalled 72,100 tons in 1983 which was equal to the growth rate of 6.5 percent over 1982.7/ Production of high quality writing paper involves high costs of production, import is thus more favorable. However, the import decreased from 10,748 tons in 1981 to 8,986 tons in 1983. The exports are not on a large scale, as local production is not quite sufficient to meet domestic demand. Exports of writing paper amounted to 1,024 tons in 1981 and 432 tons in 1983.8/

Out of 13 mills producing kraft paper, 7 are promoted by the Board of Investment. Their total production capacity is about 273,400 tons per annum. The production of kraft paper has been expanding steadily, from 137,500 metric tons in 1978 to 217,980 metric tons in 1983.9/ Imports of kraft paper are limited only to such varieties which cannot be produced domestically, i.e. kraft paper weighing 400-440 grams per square meter. Imports have been gradually increasing from 3,056 metric tons in 1980 to 4,739 metric tons in 1983.10/

Production of sanitary paper has been steadily increasing from 18,000 metric tons in 1978 to 31,000 metric tones in 1983. There are 6

6/ Krung Thai Bank, Situation of Important Industries 1984, p.163

7/ Bangkok Bank, Monthly Review, Vol. 25, No. 7, p.263

8/ Ibid, p.263

9/ Ibid, p.264

10/ Ibid

producers of which 3 are promoted by the Board of Investment. Their total production capacity is 38,050 metric tons per annum. Sanitary paper is the largest exported item and accounts for more than half of the total paper exports. Its export volume rose from 3,190 metric tons in 1978 to 3,804.1 metric tons in 1982 but fell to 2,666.7 metric tons in 1983.11/ Imports of sanitary paper are negligible and are limited to a certain variety which is not domestically produced.

Thailand's pulp and paper industry faces several problems originating from a shortage of raw materials for production of pulp, rising production cost, lack of modern equipment, limited capital investment and low quality of paper production. Compare to international standards, the country's paper industry is small and production fluctuates from year to year.

Pulp and paper industry can take advantage from technical assistance in the following areas: computer aided combination of fibre and paper residues to obtain maximum output, computer aided manufacturing, advanced machines and electronic devices to increase the operational efficiency and capacity of the manufacturers, higher education in chemical used to obtain high quality product and in-plant pathology so that substituted raw material can be invented, on-the-job training in the field of advanced technology both to increase output and to prevent pollution, and recycling project.

11/ Ibid

Textile Industry

The Textile industry has contributed significantly to Thailand's foreign exchange earnings. It has been categorized as one of the principal exports of Thailand. In 1973, the textile exports constituted 2.1 percent of the total export value. The number rose to 8.1 percent in 1979, and to 11.0 percent in 1984.1/ The export value of textile products reached 6,866 million Baht in 1978 and 19,155 million Baht in 1984.2/ The contribution of the textile industry in the manufacturing sector has been substantial. It accounted for 14.0, 22.0 and 25.0 percent of manufacturing value added (MVA) in 1970, 1979 and 1984,3/ respectively. Textile products in this paper include those of synthetic fibre, fabrics (cotton, man-made, and knitted), and wearing apparel (or garments).

In the 1960s and early 1970s, the textile industry in Thailand was encouraged as one import substitution activity. Since then, it has expanded substantially, both in terms of the number of factories and production capacity. At present, the average capacity utilization of medium to large scale textile factories is 85 to 100 percent, and 70-80 percent for small scale factories.4/ In 1981, a total of 1,000 factories of various sizes were producing textile products,5/ and 1,569,862 spindles, 64,352 looms, and 39,792 knitting machines were installed for cloth production.6/ The number and production capacity of the textile industry were prohibited from expanding during the period of 1978 to 1983. The regulation was relaxed in 1983 to permit the establishment and expansion of some types of textile factories,7/ as a policy measure to encourage more exports of textile products. The textile industry is one of the few industries that grew through the period of import substitution and developed into an important export industry by the late 1970s.

The trade in textile products shows mixed characteristics. The Export value of wearing apparel has been high since 1975, while their

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1/ BOT, Monthly Economic Report, various issues.

2/ BOT, Monthly Economic Report, June 1985

3/ NESDB, National Income of Thailand, 1985

4/ BOT, Summary of Business and Industrial Situation, 1984, pp. 52-54.

5/ BOT, Summary of business and Industrial Situation, 1981, pp. 383-384

6/ Ibid.

7/ Which included activities such as synthetic fibre, spinning, weaving, bleaching and finishing, and garments.

import value remained very low. From 1975 to 1984, garment export value increased 12 times, from 1,039 to 12,283 million Baht.8/ Thai wearing apparel production covers a wide range of garments -- from designed outfits to mass produced garments such as jeans, shirts, and socks. About 73 percent of the garment export went to developed countries, of which the export value to the U.S.A. constituted 75 percent, and 7 percent went to Japan. As for the trade of fabric, and cotton fabrics, they have retained their stable trade pattern, with the export value about 3 to 5 times higher than their import value. However, their export value has increased llion Baht in 19759/ to 1,935 million Baht in 1983.
Imported cotton fabrics usually consist types of cotton materials different from thos exported by Thailand. On the other hand, the export of man-made fabrics, has just managed to surpass their import value since 1976. The export of this particular group of fabrics still has to compete heavily on the world market. During the period between 1976 to 1981, its export value ranged from 900 to 3,000 million Baht, while 500 to 2,000 million Baht of import value was recorded.10/ Between 1971-1979, the major part, about 53 percent, of the man-made fabrics total was exported to developing countries, of which 31 percent went to ASEAN and Indochinese countries, while about 42 percent of the total products went to OECD.11/ Trade of knitted fabrics has always been characterized by a much higher value in imports than in exports. For instance, between 1976 and 1981, the export values ranged from 0.18 million Baht to 9 million Baht while the range of import values was 180 to 300 million Baht.12/

While the textile industry's development, during the 1970s, has acquired the capacity to generate significant export surpluses, imports of synthetic yarn and thread and knitted fabrics remained significant in the early 1980s. Import substitution possibilities thus exist for these activitities. As for the export side, export levels have actually been restricted by non-tariff barriers to trade imposed by leading importing countries. Thailand negotiated bilateral agreements for the export of textiles with the EEC, the USA, Sweden, and Finland within the context of the Multifibre Arrangement which has been extended for the third time (MFA III) up to July 1986. Several points in the agreement put thailand in the position where its future export quota can be further cut. At present, Thailand exports most textile products at an amount less than its allocated quotas. However, the possible adoption of the Jenkins Bill in the early 1985, will substantially reduce the export to the US market.

8/ Summary of Business and Industrial Situation, op. cit., p. 65

9/ Juanjai Ajanant, Export Promotion in Process Foods and Textiles Products (A Draft Report, IMC, 1983), p. 15

10/ Ibid.

11/ Ibid., p. 17

12/ Ibid., p. 15

Despite a possible revision of the Bill, which would put Thailand in a better position, the course of textile export from Thailand to USA will be greatly disrupted. This is due to the fact that the USA is the major importer of Thai textile products. It is estimated that the passing of the Bill would cut back Thai textile exports to the US market by 65 percent which is equivalent to a cut of over 20 percent in Thailand's total textile exports or a 2.3 percent cut in total merchandise exports, which could mean a possible lay-off of a huge number of Thai workers in the industry. The situation also confirms the need for Thailand to work harder on greater market diversification for Thai textile products.

Other problems confronting the textile industry involve policy measures on the part of the Thai government. These include (i) the protective structure which is still biased against some textile items, (ii) the unsatisfactory performance of textile exporters due to the lack of adequate financing, and a shortage of qualified personnel in export marketing areas, (iii) the inappropriateness of the tax rebate system, (iv) the still time-consuming and costly export procedure, and (v) inadequate export credit facility extended to the textile industry,13/ especially with respect to indirect exporters.

Apart from revisions of government measures and some institutional rearrangements, further growth of textile industry for exports may also require assistance that will help improve the diversification of both market and product lines including product quality and style. Cotton fabrics, for example, are quite popular for summer dress and household furniture. The improvement of colors and patterns, probably by subcontracting fabric design, would help boost sales. The production of knitted fabrics should be encouraged further to cut down on their importation and reduce their average costs. Sub-contracting the production of well-known brands of knitted apparel is a prospect. Thailand has produced and marketed shirts and pants under various designers' brands. Other brands and other lines of garments such as socks, underwear, and brassiers, should this be sub-contracted without much difficulty.

Technical assistance geared to improving further development of textile industry should include:

A. in depth studies on (i) an adequate restructuring for this sector; (ii) the short and long-term prospects of an export strategy aimed at market and product line diversification and (iii) the potentiality of other textile industries in which Thailand has comparative advantage, such as the silk industry.

B. The strengthening of training and information disseminating capacities of existing institutions, and the supports for the existing and

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13/ Export Promotion in Processed Foods and Textiles Products, op. cit., pp. 19-42

the newly established institutions. At present, there are Industrial Service Centre (ISC) at the Ministry of Industry, and Export Service Centre (ESC) at the Ministry of Commerce which run training and information dissemination activities concerning the textile industry. The establishment of the Textile Intelligence Unit (TIU) has been prepared. It will need strong external technical supports. Possible major fields for future training efforts are in (a) synthetic fibre, (b) silk, (c) knitted fabric, (d) colouring and design, and (e) export marketing.