6. OPERATION AND MANAGEMENT PLAN OF THE LAEM CHABANG EPZ/GIE

6-1 SUPPORTING SERVICES AND FACILITIES OF THE LAEM CHABANG EPZ/GIE

(1) EXAMPLES OF INDUSTRIAL ESTATES

Endeavor is now being made to invite oversea firms' production sections to the Laem Chabang EPZ/GIE. The study will be conducted of the supporting service facilities, management and operation of the Laem Chabang EPZ/GIE after reviewing advanced industrial estates in Asian countries including Japan. The industrial estates in Asian countries which are inviting Japanese, European and American firms and the nations where foreign enterprises are recently making heavy investments.

1) Japan

a. Features of the latest industrial estates

In a large-scale industrial estate of a basic type in Japan, a center building is constructed to accommodate an administrative office, exhibition lots, meeting rooms, a disaster preventing center and so forth, and a rest park and sports facilities are constructed in its neighborhood.

General supporting services and facilities in an industrial estate are shown in Table 6-1 that are properly selected depending on the characteristics of their siting, features of client firms' business, and so forth. The service supporting facilities and welfare and health facilities in such a center constitute no decisive factor for large firms in moving into an industrial estate. This is because they have an enough financial power for constructing such facilities in their own buildings or on their premises. Many of the firms admitted to an industrial estate early after the start of its development tend to

install such facilities by themselves before such a center is constructed.

When firms move their research and development section, not the production section, into an industrial estate, information centers, computer centers, rental laboratories and so forth are attractive for them and constitute a determining factor in this move.

In Japan, the important factors that influence investment decisions are the availability of enough workers, the convenience of transportation and traffic and a good working and living environment, though they depend on the industry types, production scales and methods. Roadside trees are planted in most of the latest industrial estates in the nation. In some of them, firms are obliged to set up several-meter wide landscaping along the roads of their site or an agreement is made among firms to the same effect.

The management and operation body of an industrial estate prefers indirect assistances to firms, such as the invitation of various vocational schools, colleges and so forth to their neighborhood over direct services such as personnel reference and so forth. It is desired that industrial estates are surrounded by cultural and amusement facilities, commercial facilities such as shopping centers, and that employees can easily obtain their houses.

An increasing number of industrial estates opens their doors even to firms located outside the estate and neighboring people so that they can use the business supporting facilities as well as welfare and health facilities on their premises.

Table 6-1 Common Facilities to be Installed Inside and Outside Industrial Estates in Japan

Production activity-supporting facilities	Traffic	Access roads Lot roads Parking lots
	Material distribution	Truck terminals Common warehouses
	Supply, treatment	Drinking water supply pipes Industrial water supply pipes Sewerage Waste water treatment facilities Garbage treatment facilities Electric power supply facilities Gas supply facilities Heat supply facilities
	Tele-communication	Telephone, facsimile and telex communication circuits Post office
Management and operation facilities	Administration	Park center (Administrative office)
	Security	Street lighting Traffic safety facilities (signals, signs, etc.) Police box
	Disaster prevention	Regulating pondage Fire hydrant Fire station Disaster preventing center (in a management office)
Environment, welfare and health facilities	Greens, rest parks, etc.	Landscaping Damping greens Parks
	Sports facilities	Multipurpose sports parks Baseball grounds, tennis courts, etc. Gymnasiums, swimming pools, etc.
Business supporting facilities and private companies	Supply of industry-supporting information	Meeting rooms, training rooms Exhibition lot Rental laboratory Information center, Library Computer center, CAD center Vocational training school
	Issues related to official procedure	Governmental and municipal offices and agencies, Banks and other financial institutions
Residential and environment facilities	Residential facilities	Housing area (for rent and sale)
	Commercial facilities	Shops, shopping center
	Educational facilities	Schools
	Welfare and health	Clinic, hospital, nursery schools

b. General management and operation of industrial estates

The following criteria are used for determining who are to manage and operate the facilities in an industrial estate. A competent local body manages those facilities which are not expected to earn any profit in spite of considerable investments for their management and operation. A non-profitable organization is established by investments by the firms or by joint investments by the firms and the local government to manage those facilities which will earn some profits. A private enterprise manages extremely profitable facilities.

Namely, the local government's section concerned undertakes maintenance and management of the roads, regulation of ponds and waste-water treating facilities in industrial estates, and non-public utility corporation manages computer centers and rental meeting rooms whose rents can be collected (profits are anticipated).

Whether or not to collect fees for business supporting services and facilities is decided in the light of their public utility and the propriety of the benefit theory. Next, their rates are specified so that the demand may be well balanced with maintenance and management costs on the basis of self-maintained accounting.

In fact, many management bodies depend on local government's subsidy or admitted firms' share of maintenance and management costs. Few non-profit foundations have been able to maintain completely self-maintained accounting partly because the operation efficiency of facilities is lowered by raising their charges.

Many industrial estates charge for the use of business supporting facilities such as a computer center as well as sports facilities. At a certain food manufacturing estate, a management body is engaged in independent profit earning business, such as surveys and research on the quality control of foods.

2) Asian nations

Asian nations, including Thailand, have many so-called free zones (called free trade zone, free port transit zone or export processing zone in different nations) for inviting Japanese, European and North American firms. (See Table 6-2.)

Table 6-2 Asian Nations' EPZ and Other Free Zones and Their Features

Nation	Name	District	Profit, privilege	Limitation, regulation
Korea	Free export zone	Masan Iri	Import of the raw materials of export commodities not limited; decrease in value of income and corporation taxes; exemption from business, customs, commodity and foreigners' labor income taxes.	Prohibition in principle of the product recarriage into customs tax districts; investment ratio should not exceed 50% of the total amount of capital; only labor-intensive firms admitted; etc.
Taiwan	Export processing zone	Kaoshiung Nantze Taichung	Exemption from the import and commodity taxes of machinery, equipments, raw materials, fuels and partly-finished products; exemption from business tax, exemption from corporation tax; etc.	Prohibition of the product recarriage into customs tax districts; minimum investment prescribed; investment ratio not limited; only export, processing and assembling makers admitted

(Continued)

Nation	Name	District	Profit, privilege	Limitation, regulation
Hongkong	Free export area	(all over the territories)	Import and export-only notification necessary; no import permission necessary; neither export nor re-export tax imposed.	Customs tax imposed only on liquors, cigarettes and table waters; ordinary commodity regulation - only exchange
Singapore	Free trade zone	(all over the territories)	Outside customs tax and trade control minimized	Customs tax items - about 300; special import license items - about 100; import and export license certificate necessary
Malaysia	Free trade zone	Bayan Lopas Prai Sungei Why Batu Berendam Tanjong Klong	No import/export customs tax imposed except some cases; assembling, manufacturing and processing firms are mainly admitted.	Tax imposed on liquors, cigarettes, matches and petroleum products; some items require import/export license.
The Philippines	Export processing zone	Bataan Mactan Baguio	Neither customs nor domestic tax imposed; priority given to the foreign exchange allocation to import; 100% foreign capital firms can be established; investment principal, profit and dividend can be sent to investor's nation.	Only export firms and export firm support service firms admitted; minimum reference investment value, employment personnel and annual export value limited.

(Continued)

Nation	Name	District	Profit, privilege	Limitation, regulation
Indonesia	Bonded import warehouse	Kampung Bandan	Importer's cargo receiving term - about 7 days; exemption from customs and other taxes	Only the commodities imported from a producing nation that has granted a credit to Indonesia using its credit currency can be imported.
	Export processing zone (planned)	Batam Sabang	Exemdption from customs and other taxes	
Sri Lanka	Export processing zone	Katunayake	Decrease in value of income tax and exemption from it: exemption from customs and import/export port taxes, and from application of foreign exchange law; continuation of foreign firm's operation assured; no remittance limited to investor's nation.	Domestic sale of products permitted provided tax imposed; mainly export processing obligatory
India	Free trade zone	Kandla	Exemption from customs tax; no import permission necessary; manufacturing firms also admitted.	Only re-export goods can be carried in; export necessary within 6 months to 3 years
	Electric export processing	Santa Cruz	Same as above; object - electric products	Only re-export goods can be carried in.
Pakistan	Relay trade zone	Karachi	Neither tax nor import regulation applied to the commodities for Afghanistan.	

Free zones grant beneficiary rights and other privileges to admitted firms on one hand and impose limitations and restrictions on the other. They are making efforts to become attractive for admitted firms. Namely, all industrial estates (free zones) are fully equipped with firms' production supporting facilities. Introduced hereunder will be several industrial estates with unique business supporting services and facilities.

a. Hsinchu Industrial Estate

A taxation office, an aviation company's branch office and National Employment Center office are open in this unique scientific and industrial (high-tech) park in Taiwan to assist firms' business. It has an administrative center which takes care of all the administrative formalities. It also has a favorable treatment system which offers low-interest financing and 5-year exemption of land rent for specially preferred firms.

b. Masan Free Export Zone

This Korean EPZ covers the whole range of a district. The Masan Free Export Zone Management Agency is authorized to handle all the issues without contacting the Korean Government. Transportation, warehouse, cargo-handling and packaging firms, a custom clearance agency and machine repairing firms are on the premises. Apartment houses exclusively for foreign businessmen and Raw Material Information Center are located outside them.

3) Thailand

In May, June, August and September, 1988, several Japanese firms and JETRO Bangkok Center were interviewed. The purpose of the interviews was to study their opinion on the supporting facilities and the management bodies of industrial estates and on the other industrial estates which

can be competitors for Laem Chabang. As the result, it was learned that the following five issues are considered as important.

- o Sufficient maintenance and management of existing infrastructure
- o Rapid, one-stop, collective performance of administrative and official procedures
- o Rapid response to firms' requests for information supply, maintenance service, etc.
- o Establishment of business supporting institutions and non-governmental corporations inside and outside the estate
- o Establishment of good residencial environments inside and outside the estate

Sriracha Industrial Estate developed by non-governmental concerns offers good services to admitted firms. It fulfills various requests from enterprises, ranging from governmental coordination service to automobile rental service. Its educational, welfare and health facilities and working environments such as a primary school, a health care center and wide green areas are superior to other industrial estates. It is a unique estate which limits the admittance to the firms belonging to Saha Group, which developed the estate. It is, however, worth of noting that the management and operation body offers good living environments and good residencial to contribute to the growth of the firms' business.

4) Other nations

a. US FTZ

These days, 226 free zones (in 1983) called "foreign trade zones" have been established in the U.S. While developing nations' free zones attach importance to the promotion of export, they offer services for both export and import. Their features are summarized as follows:

- o Management and operation are autonomously carried out by admitted firms themselves in principle.
- o The firms by themselves constantly book incoming and outgoing cargo and inventories in compliance with the customs clearance law.
- o The tax office simply makes on-the-spot inspections. It is not stationed in the estate.
- o Incentives of FTZ for enterprises
  - i Foreign enterprises which export to U.S.A. can avoid the immediate payment of customs duties, state inventory asset tax and quantity limitation of the export to U.S.A.
  - ii The customs duties are low. This reduces the production cost. No customs duty is imposed on products to be exported to overseas countries, except the U.S.A.
  - iii Each enterprise can select either the customs duty on a finished product, or the total of the customs duties on its components, whichever is lower.

iv Each enterprise can ship to a favorable market at a favorable time by watching the market trends in the U.S.A. and other countries. No customs duty is imposed on products during their storage period. This is a great advantage for the financial situation of each enterprise.

v The disposal of defective products and parts is approved. No tax is imposed on disposed goods.

vi Each enterprise can obtain a loan by offers products being stored as a security.

vii Enterprises can safely handle expensive parts and products because the manager of FTZ provides a good security system in the zone.

Admitted firms can warehouse, store and process goods in any quantity and at any time without the presence of a customs officer. Their autonomous management has been computerized. In many cases, however, actual management jobs are commissioned to a private company.

b. Mexican Maquiladora (free trade system)

This is the "system for appointing factories as an exporter of the commodities manufactured by applying the labor force in Mexico to bonded-import machinery, equipment and raw materials". The industrial estates differ from the EPZ in Asia. The latter are surrounded with fences, and customs officers stand at their entrance for checking.

The following are the attractive features of the system that should be considered in planning the Laem Chabang EPZ/GIE.

- o Admitted firms' employees and their families are permitted to use existing houses, amusement facilities and cultural facilities of the U.S.

- o Admitted firms are permitted to use the advanced telephone and telegram facilities of the U.S.

- o Low-cost, high-quality labor forces can be obtained from Americans and Mexicans.

c. Telford New Town, Britain

This industrial estate is rather a workplace in a new town than an independent estate. It is equipped with industrial, dwelling and other urban facilities.

The following are the attractive features of the industrial estate that should be considered in planning Laem Chabang.

- o Historically, small and medium factories gather in it for the convenience of the contact with parts suppliers and subcontractors. Its large population provides a large sales market.

- o Labor force is superior both in quantity and quality.

- o Sufficient urban facilities, excellent residential environments.

- o One-stop service

(2) QUESTIONNAIRE SURVEY ON SUPPORTING SERVICES AND FACILITIES

1) Japanese firms

In September, 1988, a questionnaire survey was conducted under the title "Survey on the Progress of International Specialization and Factory Transit to Overseas and Thailand's Industrial Development". Listed below are the answers to the questionnaire regarding industrial estates' management and operation system as well as firm-supporting services and facilities which their management and operation body offers. A plurality of answers were given from each of the 149 firms which mentioned that they were interested in the Laem Chabang EPZ/GIE. The three to five highest-rate answers are cited in the order of the percentage of answers.

a. The following are noted or considered as important in connection with overseas establishment of factories.

i Labor force issues, educational level (18.7%)

ii Level of electric power supply installation (15.5%)

iii Level of telephone and other communication facility installation, access to them (11.4%)

iv Density of related industries, subcontractors, material suppliers, etc. (11.3%)

v Volume and quality of industrial water (9.2%)

b. Favorable incentives desired by firms

i Reduction or exemption of various taxes (24.8%)

ii Various deductions of corporation tax from taxable income (14.6%)

iii Subsidies and aid funds for investment (14.3%)

c. Systems in export processing zone desired by firms

i Exemption from customs official procedures (23.2%)

ii Rapid and simplified bonding and customs official procedures (17.8%)

iii Customs tax system convenient for the processing-oriented import (10.8%)

d. Supporting services which firms expect management and operation body to offer

i Unification of the contact windows of formalities (20.8%)

ii Requirement and labor issue consulting service (20.4%)

iii Introduction and reference of joint enterprising partners, subcontractors and suppliers (14.8%)

iv Preparation of sites and construction of plants, etc. (14.8%)

e. Functions, facilities, services, etc. desired to be offered inside and outside the park

i Banks and other financial institutions (8.9%)

ii Hospitals (7.9%)

iii Branches of governmental and municipal offices (6.1%)

iv Residential facilities for Japanese firm's executives (6.0%)

v Customs clearance agent (5.8%)

f. Other tele-communication services which firms desire to use besides telephones, telex units and facsimiles

i Data communication services (private lines) (32.9%)

ii Automobile telephone services (16.4%)

iii Personal computer network services (15.1%)

2) Enterprises in Thailand:

The forms used for surveying Japanese enterprises in Japan were also distributed at about the same time to firms in Thailand. This enabled the surveyors to obtain information concerning enterprise support services and plant facilities primarily with the cooperation of operational management groups within the industrial estate. The following is the result of multiple surveying of the 64 firms within Thailand that expressed interest in the Laem Chabang EPZ/GIE. The responses to the various questions have been ranked according to the rate of responses and grouped in categories ranging from the top three or five answers.

The firms expressing an interest extended across a wide variety of industries. Among the companies responding, the following were proportionally appeared in greater numbers: electricals, electronics (11 per cent of total responses), textile related (9 per cent of total), food products (8.2 per cent).

a. With regard to GIE involvement, what is the most attractive incentive for an enterprises?

   i Measures for reduction of various types of customs duties (34.3%)

   ii Low-cost financing and similar financial incentives (23.9%)

   iii Provisions for reduction of enterprise income tax (11.4%)

b. Regarding the EPZ, what are the additional or improved incentives that you would like to see implemented?

   i Custom clearance simplification and acceleration (23.0%)

   ii Speedy payment of tax refunds (18.4%)

   iii Improvement of the customs system, particularly arising from the fact that taxes on finished goods are lower than those on raw materials (16.7%)

c. What is the most important or profitable support service?

   i Negotiation support services related to

procedures for obtaining permits and approvals (17.8%)

ii Financing services (17.4%)

iii Services related to securing and fostering personnel (12.7%)

d. What type enterprise support facilities would you like to see established either within the complex or its surrounding area?

i Bank branches (9.1%)

ii Hospitals (8.1%)

iii Customs branch offices (7.2%)

iv Worker housing (7.2%)

v Restaurants (5.7%)

(3) SERVICES REQUIRED TO MANAGEMENT AND OPERATION BODY

It is learned from the examples of various nations' industrial parks that are described heretofore that Japanese firms expect overseas industrial estates' management and operation body to carry out the following five issues:

a. Rapid and one-stop formalities performance and request-respondence services

b. High-quality labor force and personnel recruiting services.

c. Quick customs clearance services

d. Implementation of good working and residential environments

e. Full implementation of business-supporting facilities, invitation of business-supporting firms.

The item a is one of the most important requirements of the firms already admitted to an industrial estate. In this connection, their management and operation body is required to establish such an organization or system that all formalities, approval and permission applications, requests and so forth may be concentrated on one contact window.

In connection with the item b, the firms' demand can be met by providing direct or indirect services to recruit and introduce workers having special skills, highly educated foremen and group leaders (rather than routine workers), as well as vocational and technological training services.

In connection with the item c, the establishment of EPZ and the taxation authority's permanent stationing in an industrial estate managed by present IEAT are effective and highly appraised among the firms in the Lat Kraban Industrial Estate. For retaining and promoting this effect in the future, the following are considered as necessary.

Customs clearance jobs are inherently controlled by the taxation authority and industrial estates' management and operation body cannot act for them. The former may however provide maximum facilities and hardware for the latter's convenience. For example, customs clearance jobs can be speeded up and smoothed if computer sets are rent to liberate customs officers from recording jobs and devote them to inspection and tax value estimation.

As for the item d, it is desired to accelerate the execution of the present plan for housing complex construction outside the industrial estate and it is important

to implement cultural, recreational, educational and other urban facilities.

The manager-operator side is requested to carefully plan how and when to use and reserve the sports facilities planned in the industrial estate.

As for the item e, it is desirable to invite, under various incentives, non-governmental corporations and public institutions' offices which are expected to offer varied supporting-services in addition to the management and operation body's direct firm-supporting services and facilities. The following would be included among effective measures in this direction: low-rate or free lending of shop spaces in the Business Center to those concerned in varied services, and management and operation body's preparation of a data base for the situation-wanted informations supplied from the colleges in Bangkok, the informations of raw material suppliers, and so forth to meet admitted firms' requirements.

(4) THE LAEM CHABANG INDUSTRIAL ESTATE'S SUPPORTING SERVICES AND FACILITIES

Almost all of what are required at the beginning of the industrial estate's operation are included in the present plan. When many firms are admitted to it, it would be necessary to add other facilities depending on their needs. In addition to the facilities currently planned, the services and facilities which are shown in Table 6-3, 6-4 are considered for admitted firms.

Table 6-3 Supporting services and facilities desired in initial stage

Service item	Service site or facility	Remarks
1 Formalities performance services	Information desk + management office section in charge	This contact window receives all formalities. It forwards those which the management and operation body can accept to its section in charge or gives advice about necessary documents and competent institutions.
2 Request receiving and fulfilling services	Information desk + management office section in charge	Receives all service requests, etc., and forwards them to management and operation body's section in charge. (It is desirable to prepare a request receiving format beforehand).
3 Information supply services (Specialists may be invited to offer them in place of the management and operation body)	Management office's section in charge	The management and operation body creates a data base of the following information and immediately supplies the information demanded by firms. o Skilled engineer situation wanted informations o Informations of raw material suppliers, subcontractors, etc. o Informations of rent houses for foreigners Preliminarily necessary for this purpose are collection of informations, purchase of hardwares and employees' training for their operation.
4 Facility offer services	Management office's section in charge	Telephone reservation of sports facilities in park, its cancellation, and indexing of unreserved hours

Table 6-4 Supporting services and facilities desired when the setting-up of firms has progressed

	Service item	Service site or facility	Remarks
5	Services for supporting Admitted Firms' Liaison Conference activities	Meeting room in Management Office or a room in Business Center	The management and operation body advises admitted firms to organize liaison conferences, and assists their activities for information exchange, etc. at the meeting room in Management Office or at a room in the Business Center.
6	Periodical opening of the liaison conference of admitted firms' liaison conference and management and operation body	Meeting room in Management Office (section in charge and liaison meeting of invited firms)	Firms' collective advance of requests, management and operation body's collective fulfilling of requests, management and operation body's determination of firms' needs for new supporting services and promotion of their information of management and operation jobs through both parties' periodical meeting, planning and organization of gatherings for promoting mutual friendship, and promotion of regional development activities Also, the distribution among firms of "Industrial Park News" with the articles on liaison meeting activities may be a significant measure in this direction.
7	Management consultation services (Specialists may be introduced to offer them in place of management and operation body.)	Management office section in charge	Consultation items: introduction of financial institution, efficient firms' asset operation method, etc.
8	Employee bus transportation services	Management office's section in charge	It may be carried out depending or request of firms concerned under an agreement between firms and management office.
9	Workshop services	Management office's section in charge	Employment of welders, sheet metal workers, etc. for the simple repair of the firms' machinery

6-2 STUDY OF MAIN SUPPORTING SERVICES AND FACILITIES IN THE LAEM CHABANG EPZ/GIE

(1) VOCATIONAL TRAINING FACILITIES

In making a study on a vocational training center, such as an ancillary facility for an industrial estate, it will be necessary to first estimate what kind of labor force and how much labor force will be required, for example, by the Laem Chabang EPG/GIE - 1) estimation of quality and quantity of labor demand. Next, based on this estimate, it will be necessary to determine how much labor force can be obtained and from where - 2) estimation of labor force supply. Further, it will be necessary to find out whether the existing setup (vocational education schools, vocational training centers and others) is fully capable of supplying the labor force in the quality and quantity conforming with the estimates 1) and 2), so as to fully comply with the labor needs of a new industrial estate - 3) determining the existing state of vocational education and training.

Should the existing setup appear inadequate, a study must be made on whether the existing setup should be supplemented or an entirely new facility should be established. And a new facility will demand studies on its contents, scale, management method and other related factors. These factors will be studied hereunder with references to examples in Korea and Japan.

1) Estimation of Quality and Quantity of Labor Demand

The estimated labor demand upon the completion of the Laem Chabang EPZ/GIE is shown in Table 6-5 of the Master Plan prepared in 1985. This estimate is made by first obtaining the mean density of employees per unit area of 18 Asian EPZs (Malaysia 6, the Philippines 3, Singapore 4, Taiwan 3, Republic of Korea 1 and Thailand 1), then dividing the density with the area of the Laem Chabang EPZ/GIE, and

by taking into consideration the situation existing in Thailand.

The survey conducted this time gave the lines of business of the tenants venturing into the Laem Chabang EPZ/GIE as shown in Table 6-6, it indicates a broad range of businesses including export-oriented types, labor-intensive types, raw material processing types and non-environmental pollution types.

Table 6-5 Number of Workers Required (Estimation)

	1st Stage (1995)	Final Stage (2000)
GIE	4,040	15,500
EPZ	5,430	19,000
TOTAL	9,470	34,500

Source: 1985 Master Plan

Table 6-7 Estimate of Unskilled Labor Force

	1st Stage (1995)		2nd Stage (2000)	
	Total Labor Force	Skilled Labor	Total Labor Force	Skilled Labor
GIE	4,040	2,830	15,500	10,850
EPZ	5,430	4,890	19,000	17,000
TOTAL	9,470	7,720	34,500	27,950

Table 6-6 Proposed Tenants in EPZ/GIE

GROUP	I	Food products, etc. 31121 Dairies 31123 Ice-cream 31139 Fruit and vegetables products 31149 Other sea foods products 31172 Biscuits 31190 Confectionery 31219 Other food products 31220 Prepared animal feeds Textile and its products 32120 Made-up textile goods 32130 Knitting mills Apparel and other textile finished products 32202 Women's, girls' and infants clothes 32209 Other wearing apparel and accessories Leather tanning and its products 32330 Leather and leather substitutes products Lumber and wood products 33120 Wooden and cane containers, etc.
	II	Pulp, paper and paper products 34120 Containers and boxes of paper and paperboard Chemicals and allied products 35210 Paints, Varnishes and lacquers 35220 Drugs and medicine 35231 Soap and cleaning preparation 35299 Other chemical products Rubber products 35510 Tyre and tube industries 35592 Rubber footwear 35599 Other rubber products Plastic products 35601 Plastic containers 35609 Other plastic products Ceramic, stone and clay products 36991 Concrete products 36992 Asbestos-cement products

	II	Fabricated products 38110 Cutlery, hand tools and general hardware 38130 Structural metal products 38191 Metal cans and shipping containers 38192 Wire and wire products 38198 Coatimg, engraving and allied services 38199 Other fabricated metal products
	III	General machinery 38220 Agricultural machinery and equipment 38292 Airconditioning machines 38298 Repair shops Electrical machinery, equipment and supplies 38310 Electrical industrial machinery and apparates 38320 Radio, televison and communication equipment and apparatus 38330 Electrical appliances and housewares 38399 Other electrical apparatus and supplies Transportation equipment 38419 Other shipbuilding and repairing 38439 Other motor vehicle industries Precision instruments and machinery 38550 Precision instruments and machinery Miscellaneous manufacturing industries 39011 Cutting and polishing of gem stones 39012 Jewellery 39030 Sporting and athletic goods 39090 Industries not eleswhere classified

GROUP I : Livelihood related
GROUP II : Raw material related
GROUP III : Processing and assembly

In categorizing the work force according to skill levels, the problem is to determine the proportion of each skill level that is required. In the EPZ, the proportion of unskilled laborers is high compared to the GIE. Although there is no survey data based on a differential study of skilled and unskilled workers in the labor force to support this comparison, it appears generally valid to consider that women account for most of the unskilled labor force. This is substantiated by higher employment rates for this group. In the example of the Masan in Korea, the proportion of women workers to the total labor force is above 70 percent. In the example of the three Taiwan EPZs, the percentage women workers is more than 80 percent, which is an extremely high proportion. Conversely, in the three Korean industrial estates (GIE), the proportion of young women workers is about 50 percent.

In the entire manufacturing industry in Thailand, woman workers account for about 45% of the total labor force. The same comparison for Korea reveals that women make up about 40 percent of the total manufacturing work force. When considering that in the GIE the proportion of women work force is about 50 percent, it can be expected that in the Thai case the proportion will likely be above the 50-percent level. In estimating the proportion of women work force for the Laem Chabang EPZ/GIE based upon the above proportions, it is probably safe to assume that it should be approximately 70 to 80 percent for EPZ and around 50 percent for GIE.

The vast majority of this women work force will be comprised of unskilled laborers. By combining the women work force proportion with unskilled laborers already present among the male work force, we can estimate that the total unskilled work force will be approximately 10 to 20 points higher than the above figures. Table 6-7 presents the total figures of the unskilled work force based upon the supposition that such workers will comprise 90 percent of

those in the EPZ and 70 percent in the GIE. The remaining proportions of 10 and 30 percent, for the EPZ and GIE, respectively, will be made up of skilled workers, office staff, managers, and those in other fields.

2) Estimation of Labor Force Supply

As Table 6-8 shows, the manufacturing industry accounts for only 7.4% of the total labor force in Thailand, while agriculture, forestry and fishery account for 68%. Henceforth, with an increasing progress in industrialization, and as viewed from the case studies in Japan and Korea, the economically active population is observed to be shifting from the primary industries to the secondary industries. Therefore, it will be necessary for industrial complexes to adopt adequate measures for securing necessary unskilled labor force.

Table 6-9 shows the composition of Thailand's labor force by regions. The figures of the central region (including three eastern Seaboard provinces) show that the active working population among the total population of 11,729,000 runs up to 5,644,000 (48.13%), the number of unemployed to 471,000 (4.02%) and the seasonally unemployed to 742,000 (6.33%).

The total population of the three eastern seaboard provinces in 1980 was 1,582,000 as shown in Table 6-10 (Chonburi Province 725,000). Assuming that the ratio of the active working population is the same as that of the central regions, then the active working labor force will run up to 761,000, the unemployed to 64,000 and the seasonally unemployed to 100,000. Incidentally, a breakdown of the unemployed by educational levels shows that, in 1984, the national average was 61.74% for elementary school graduates, 18.42% for junior high school graduates, 9.12% for non-elementary school graduates, 6.52% for vocational school graduates and 3.26% for university graduates.

Meanwhile, the school attendance percentage, according to 1984 statistics, was 98% for elementary school education (6 years), 35% for junior high school education, 26% for high school education and 6% for higher education, indicating that virtually all the persons of school age are receiving elementary school (compulsory) education. Throughout the country, about 1,200,000 children per year are enrolled in elementary schools, 400,000 youngsters are attending junior high schools, and 300,000 young men and women are entering high schools.

The unskilled workers demanded by the Laem Chabang EPZ/GIE will consist of elementary school graduates, junior high school graduates and the unemployed including the surplus workers of the agriculture, forestry and fishery industry. In view of the existing trend for unemployed people to flow out from the three eastern seaboard provinces to Bangkok and its vicinity, the ratio of local people desiring local employment is expected to be considerably high. Therefore, the matter of securing an adequate unskilled labor force should not pose any serious problem.

One of the problems encountered here concerns the matter of reemployment of the unemployed. As shown in Table 6-9, the unemployed and the seasonally unemployed combined constitute as much as 20% of the active working population. In Japan, there are public employment security offices which serve to promote reemployment of the unemployed. So, it may be advisable for Thailand to give ample study to the introduction of this system whose outline is offered in the Tables 6-11 and 6-12.

Table 6-8 Economically Active Population by Industry and by Sex: Thailand, Japan and South Korea, 1987

industry Code	Industry	THAILAND (1984)				JAPAN (1986)				KOREA (1986)			
		a. TOTAL		b. FEMALE	b/a	a. TOTAL		b. FEMALE	b/a	a. TOTAL		b. FEMALE	b/a
		(000)	%	(000)	%	(000)	%	(000)	%	(000)	%	(000)	%
1	Agriculture, including Forestry & Fishing	18,130	68.1	8,762	48.3	4,950	8.2	2,360	47.7	3,662	22.7	1,621	44.3
2	Mining & Quarrying	117	0.5	20	17.1	80	0.2	10	12.5	187	1.2	8	4.3
3	Manufacturing	1,986	7.4	889	44.8	14,440	23.9	5,700	39.5	3,826	23.7	1,538	40.2
4	Electricity, Gas & Water	533	2.0	81	15.2	320	0.6	40	12.5	40	0.3	4	10.0
5	Construction	131	0.5	16	12.2	5,340	8.8	770	14.4	889	5.5	67	7.5
6	Wholesale/Retail (Trade) Restaurant & hotels	2,213	8.3	1,172	53.0	13,390	22.3	6,390	47.7	3,480	21.6	1,826	52.5
7	Transport, storage & Commuunication	517	2.0	56	10.0	3,530	5.9	470	13.3	733	4.5	62	8.5
8	Financing, Insure, Real Estate & Business services	2,365	8.9	1,135	48.0	4,150	6.8	1,770	42.7	614	3.8	208	23.9
9	Community, Social & Personal services					12,120	20.2	5,700	47.0	2,074	12.9	831	40.1
0	Not adequately Defined	5	—	3	60.0	220	0.3	70	31.8	204	1.3	64	31.4
—	Unemployed	611	2.3	333	54.5	1,670	2.8	670	40.1	407	2.5	67	16.5
	TOTAL	266,10	100.0	12,467	46.9	60,200	100.0	23,940	39.8	16,116	100.0	6,296	39.1

Source : Year Book of Labour Statistics 1987 (ILO)

Table 6-9 Labor Force Structure in Thailand by Region, 1987

	Total Population ⑦=⑤÷⑥	Work Force ⑤=④+②'	Employable Pop. ④=①+②+③	Actual Working Pop. ①	Unemployed ②	Seasonally Unemployed ③	Work Force Population Unemployable ②'	Age 11 or less ⑥
Nationwide	52,588,888 (100.00)	38,289,888 (72.78)	23,646,888 (45.84)	18,383,588 (34.86)	2,152,888 (4.18)	3,198,588 (6.88)	14,563,888 (27.74)	14,291,888 (27.22)
Bangkok	5,371,888 (100.00)	4,444,888 (82.74)	2,612,888 (48.65)	2,838,388 (37.95)	572,188 (18.65)	2,488 (8.85)	1,831,288 (34.89)	927,888 (17.26)
Northern Region	18,517,888 (100.00)	7,966,388 (75.75)	5,194,488 (49.39)	3,984,988 (37.89)	341,888 (3.25)	867,788 (8.25)	2,771,988 (26.36)	2,558,788 (24.25)
Northeast Region	18,357,888 (100.00)	12,559,688 (68.42)	7,575,888 (41.17)	5,637,488 (38.71)	498,888 (2.72)	1,428,888 (7.74)	5,882,688 (27.25)	5,797,488 (31.58)
Southern Region	6,526,888 (100.00)	4,523,388 (69.31)	2,637,288 (48.41)	2,211,788 (33.89)	267,988 (4.18)	157,688 (2.42)	1,886,188 (28.98)	2,882,788 (38.69)
Central Region	11,729,888 (100.00)	8,715,888 (74.31)	5,644,688 (48.13)	4,431,288 (37.78)	471,488 (4.82)	742,888 (6.33)	3,871,288 (26.18)	3,813,288 (25.69)

Source: Labour Statistics

Table 6-10 Population and Labor Force of the Eastern Seaboard Region

	Total Population	Labor Force Population						
	1980	Agriculture	%	Manufacturing	%	Others	%	TOTAL
All Thailand	44,824,540	16,642	71.9	1,320	5.7	5,178	22.4	23,140
Total of Three Eastern Seaboard Province	1,582,451	-	-	-	-	-	-	
Chonburi	725,407							
Chachoengsao	498,148							
Ra Yong	358,896							
Chonburi Province								
Phanatnixhom	118,770							
	37,095							
Chonburi	160,472							
Ban Bung	75,300							
Bon Thong	24,286							
Hong Yai	16,769							
Siracha	100,129							
Bang Lamung	43,542							
Sattahip	77,796							
Chonburi Province Total	725,407	172,035	51.4	31,177	9.3	131,749	39.3	334,961

A truly serious problem concerns the matter of securing skilled workers. This problem is commonly faced by enterprises located even in the Bangkok area. One conceivable measure is to foster skilled workers by training the graduates of vocational education schools and/or technical colleges within the company. In this case, it would be effective to enhance the skills of skilled workers at vocational training schools. Specifically, training in quality control (QC) techniques, handling of factory automation (FA) systems and scheduling of equipment maintenance routines are readily conceivable training courses.

3) Existing State of Vocational Education and Training

Vocational education and training in Thailand can be classified broadly into school education and vocational education. The former is offered under the jurisdiction of the Ministry of Education and Ministry of University Affairs and, as shown in Table 6-13, it consists of various colleges relating to technology, commerce and agriculture which are under the supervision of the Department of Vocational Education (DOVE), the colleges for technical vocational education under the supervision of the Institute of Technology and Vocational Education (ITVE), the vocational technology schools under the supervision of the Office of Private Education Commission (OPEC), and the three King Mongkut Institutes of Technology (KMIT) under the supervision of the Ministry of University Affairs. The total number of students is about 544,000, among whom technical and engineering students run up to 2,464 students to comprise 45.22% of the total number.

Meanwhile, the latter (vocational education) is being offered at the arts schools and local vocational education centers under the supervision of DOVE (Ministry of Education), the vocational education centers and mobile vocational training facilities under the supervision of the

Table 6-11 An Introduction to The Japanese Public Employment Security Office System

Overview:	The system is based on the Employment Security Law. The number of Public Security Offices is as follows: Main offices, 4,482; branch offices, 134; detached offices, 47. These total 663 sites making services available to approximate 180,000 people per location.

The primary functions of the Employment Offices include:

1. Employment introduction service (introductions for general employment, day labor, and part time work).

2. Employment consultation and guidance.

3. Steps to promote employment based upon the various special measures applicable to this aim.

4. Responsibility for providing unemployment compensation, according to the Employment Insurance Law, to those seeking work.

5. According to the four purposes of employment insurance (that is, employment security, employment improvement, skill development, and employment welfare) to provide unemployment compensation and supply funds for changing jobs.

6. To provide both job-seekers and employers with all manner of employment information. This includes on-line computer display of employment information at Labor Market Centers.

Table 6-12 Information List Provided at the Labor Market Center Business Office (1/4)

(Wage Related Information)

Type of Information	Contents and/or Purpose of Use	Target	Basic data
Information from those currently employing workers on present wage conditions.	Statistics providing information by prefecture, sex, and industrial sector on starting wages. This is usually provided to employers and provides background on determining wages.	Employers and others.	Employment insurance data.
Information on starting salaries of those employing recent graduates.	Based upon information gathered on beginning salaries as determined by educational background, sex, and region. This is primarily provided to employers and is used in wage determination.	Employers, educational institutions, and others.	Employment insurance data.
Real-time wage information.	Based upon average monthly wages from effective employers as differentiated by sex, region, and other factors. This is primarily provided to employers and is used as material for determining regional wages within the greater labor market.	Employers, job-seekers, and others.	Occupational introduction data.

(Information related to employers and job-seekers)

Type of Information	Contents and/or Purpose of Use	Target	Basic data
Real target regions employment composition, information of employers and job-seekers.	Based upon effective employers and new job-seekers statistics as gathered in Employment Security offices, this material is primarily provided to employers. It serves as a guide to understanding demands for labor of specific regions within the greater labor market.	Employers, job-seekers, and others.	Occupational introduction data.

(Continued)

Table 6-12 Information List Provided at the Labor Market Center Business Office (2/4)

Type of Information	Contents and/or Purpose of Use	Target	Basic data
Bulletins on real-time employers, employment conditions.	Based on data sent from new employers and information on conditions for employment seekers differentiated by number of cases, sex, and other factors. This largely used for the compilation of Employment Security Office indices.	Employment Security agencies.	Occupational introduction data.
The state of movement of employed persons between regions based upon information provided by real-time employers.	The Employment Security agency compiles this information from reports from regional employment introducers on the state of movement of employed persons between various regions. It is primarily provided to employers to give an understanding of the trends in work force mobility.	Employers, Employment Security agencies, and others.	Occupational introduction data.
Employer contact receipt information.	This information is based upon compilation of the sex, region, seasonal differences, and other factors concerning contacts of those seeking workers. It is primarily provided to employers seeking an indirect grasp of the trends among job-seekers across broad regional areas.	Employers, Employment Security agencies, and others.	Occupational introduction data.
Information of those seeking employees and job-seekers.	This is based on the numbers of cases of employers newly seeking employees, and individuals seeking work as differentiated by region, season, and other factors. It is primarily provided to employers to better understand the regional movement and other trends among job-seekers.	Employers, Employment Secruity agencies, and others.	Statistical data.

(Continued)

Table 6-12 Information List Provided at the Labor Market Center Business Office (3/4)

Type of Information	Contents and/or Purpose of Use	Target	Basic data
Information on newly graduated job-seekers.	This information is compiled from educational records, sex, regional differences, and the groupings of the types of employment sought. It is primarily provided to employers to give an understanding of employment trends among recent graduates.	Employers, Employment Security agencies, others.	Statistical data.
Survey of conditions of the employment and job-leaving of recent graduates.	This information is compiled by each Employment Security and employment office on the situation obtaining among middle and high school graduates who have left a job after from one to three years of employment. It is primarily provided to Employment Security agencies and by educational institutions. The former uses this data to guide employers, while the latter uses it for employment counseling of students.	Employment Security agencies, educational institutions, others.	Occupational insurance data.
Employer verification information.	This information is based upon the verification of the working conditions found most compatible by job-seekers. It is primarily provided to prospective employees because it provides details on employers and is useful to job-seekers in job selection.	Job-seekers.	Occupational introduction data.
Tabular employer verification data.	The same as above, but the information is provided in the form of a handy chart.	Job-seekers.	Occupational introduction data.
Specific employer data.	Based upon the tabular information described above, this information provides details on specific employers. It is primarily made available to job-seekers and used in deciding upon employment.	Job-seekers.	Occupational introduction data.

(Continued)

Table 6-12 Information List Provided at the Labor Market Center Business Office (4/4)

Type of Information	Contents and/or Purpose of Use	Target	Basic data
Conditions among registered employers at specific enterprises.	The information is based on the details of employers in specific industries and is mainly provided to job-seekers. As it presents the situation of registered employers, it is helpful in employment selection.	Job-seekers.	Occupational introduction data.
Tabular information on new employers.	This information is based upon information from new employers on the individual general categories of licence holders, older employees, highly skilled employees, special occupational types. It is primarily provided to job-seekers. Because it gives the latest information it supplies information in helping the prospective employee in occupation selection.	Job-seekers.	Occupational introduction data.

Table 6-13 Advanced Vocational School Enrollment (1985)

	Campus (School)	Secondary School Level	Junior College Level	College Level	Total
ITVE	Technical (10)	11,061	16,580	611	28,252
	Agricultural (10)	1,079	5,472	184	6,735
	Commercial (5)	8,925	4,119	30	13,074
	Home Economics (4)	1,393	3,722	260	5,375
	Total (29)	22,458	29,893	1,085	53,436
DOVE	Field (School)				
	Technical (77)	115,461	30,714	-	146,175
	Agricultural (45)	20,442	11,898	-	32,340
	Commercial (40)	46,341	25,795	-	72,136
	Total (162)	182,244	68,407	-	250,651
OPEC	Course				
	Technical	57,341	12,372	-	69,713
	Agricultural	3,014	3,929	-	6,943
	Commercial	98,557	-	-	98,557
	Home Economics	21	189	-	210
	Industrial Arts	3,724	787	-	4,511
	Management	-	57,199	-	57,199
	Total	162,657	54,476	-	237,133
	School	(185)	(209)		(394)
KMIT	Technical (3)	982	1,607	-	2,539
Total		368,341	174,383	1,085	543,809

DOVE: Department of Vocational Education, Ministry of Education
ITVE: Institute of Technology and Vocational Education, Ministry of Education
OPEC: Office of Private Education Commission, Ministry of Education
KMIT: King Mongkut's Institute of Technology, Ministry of University Affairs
PM : Degree of Secondary Teacher Education (Normal school teacher's course)

Social Education Bureau (DONE), the institutes for science development (ISD) under the supervision of the Labor Bureau of the Ministry of Internal Affairs, and the industrial service institutes (ISI) under the supervision of the Department of Industrial Promotion (DIP) of the Ministry of Engineering.

In the case of school education, graduates of junior high schools choose either the general education course or the vocational education course. Among the 940,000 students of senior high schools, about 390,000 students (41.49%) are enrolled in the vocational education course.

Table 6-14 show the number of technical colleges and vocational colleges in the three Eastern Seaboard provinces. Thirty-eight courses are offered at technical colleges. Table 6-15 shows the number of students majoring in each of these courses.

Chonburi Technical College offers the courses indicated in Table 6-16. The total number of its students majoring in the 6 PWC (Regular Vocational Course), 7 PWS (Upper Level Vocational Course) and 6 PWT (Upper Level Technical Course) courses runs up to 1,400. Its courses are limited to the industrial field.

Regarding the latter (vocational education facilities), there are local vocational training centers supervised by ISD of the Labor Bureau, Ministry of Internal Affairs. They were established by National Institute for Skill Development (NISD) which was opened in 1968 with the cooperation of UNDP/ILO. These local vocational training centers were established successively in seven regions throughout the country.

Table 6-14 Teacher's Training Institutions in Three Eastern Seaboard Provinces

Changwat	DOVE			ITVE	KMIT	OPEC
	T	V	A	A		
Chachoengsao	1	1	1	-	-	6
Chonburi	2	1	1	1	-	15
Rayong	1			-	-	1
Total	4	2	2	1	-	22

T: Technical
V: Vocational
A: Agricultural

Table 6-15 Eastern Seaboard Technical Colleges

Changwat	College Name		Students			Total
			PWC	PWS	PWT	
Chachoengsao	Chachoengsau	T.C	1,611	316	65	1,992
Chonburi	Chonburi	T.C	1,738	579	362	2,679
	Sattahip	T.C	1,251	381	-	1,967
Rayong	Rayon	T.C	1,688	189	90	1,967
	Total		6,288	1,465	517	8,270

Table 6-16 Technical College Enrollment by Courses (1/4)

Chonburi Technical College 1988

Field of Study \ Education Level	PWC	PWS	PWT	Total	PWC	PWS	PWT	Total
Industrial Fields	93,300	17,023	7,109	117,432	600	560	240	1,400
1. Civil (Building) Construction	17,788	3,525		21,313	120	40		160
2. Surveyer	91			91				
3. Power Transmission (Electric Power)	17,808	2,602		20,410	120	40		160
4. Electronics Mechanic (Electronics)	13,596	1,751		15,347	120	40		160
5. Mechanical Drafting (Drawing)	430			430				
6. Jigger and Machine Tool	100			100	80			80
7. Welding and Sheet Metal	13,673	145		13,818	80			80
8. Machine Mechanic (Shop)	10,391			10,391				
9. Auto Mechanic	17,926	3,356		21,282	80	40		120
10. Auto Mechanic (Agriculture Mechanic)	105			105				
11. Auto Mechanic Practice	84	159		243				
12. Electrical Mechanic Practice	48			48				
13. Tool and Dies Technology		43		43				
14. Civil Technology		117		117				
15. Metal Mechanic		289		289				
16. Production Technology		1,670		1,670		40		40
17. Metal Technology		1,021		1,021		40		40
18. Industrial Technology		1,591		1,591		40		40
19. Architecture Technology	884	210	584	1,678				
20. Survey Engineering Technology			442	442				
21. Civil Engineering Technology			1,193	1,193			40	40

(Continued)

Table 6-16 Technical College Enrollment by Courses (2/4)

Field of Study \ Education Level	PWC	PWS	PWT	Total	PWC	PWS	PWT	Total
22. Petrochemical Industrial Technology			90	90				
23. Electrical Engineering Technology			2,513	2,513			40	40
24. Electronics Engineering Technology			1,231	1,231			40	40
25. Mechanical Engineering Drafting Technology			397	397			40	40
26. Production Engineering Technology			157	157				
27. Refrigeration and Airconditioning Technology			445	445				
28. Mineral Engineering Technology			57	57				
29. Vehicle Technology		154		154				
30. Boat Building	154	50		204				
31. Chemical Mechanic	37			37				
32. Boat Mechanic	185			185				
33. Piping and Welding		42		42				
34. Structure Welding		45		45				
35. Electronical Fixing and Control		71		71				
36. Electrical Machine Mechanic		50		50				
37. Airconditioning Electrical Mechanic		49		49				
38. Industrial Measurement and Control		83		83				

(Continued)

Table 6-16 Technical College Enrollment by Courses (3/4)

Field of Study \ Education Level	PWC	PWS	PWT	Total	PWC	PWS	PWT	Total
Arts and Handicrafts Field	997	173	109	1,279				
1. Fine Arts	315	66		381				
2. Handicrafts	255	12		267				
3. Applied Arts	167			167				
4. Textile Industrial	260			260				
5. Textile Technics			61	61				
6. Textile Chemistry		33	48	81				
7. Textile Technology		62		62				
Home Economics Field	5,171	1,647		6,818				
1. General Home Economics	2,918	1,110		4,028				
2. Cloth and Dress (Clothing)	889	215		1,104				
3. Food and Nutrition	1,135	322		1,457				
4. Home Economics	229			229				

Table 6-16 Technical College Enrollment by Courses (4/4)

Field of Study \ Education Level	PWC	PWS	PWT	Total	PWC	PWS	PWT	Total
Commercial Field	15,993	2,316	2,337	20,646				
1. Commerce	15,993			15,993				
2. Accounting		1,779	2,254	4,033				
3. Service Business		183		183				
4. Marketing		239	83	322				
5. Secretary		115		115				
Total	115,461	21,159	9,555	146,175				

PWC = Regular vocational course (3 years, following middle school graduation)

PWS = Upper level vocational course (2 years, upon completion of PWC)

PWT = Upper level technical course (2 years, after high school graduation).

At present, there are eight vocational training centers of this type. They are the Central Vocational Training Center (NISD) in Bangkok and those in Ratchaburi in the west, Chonburi in the east (CISD, 1976), Lampang in the north, Khonkaen in the northeast, Sonkla in the south, Nakorn Sawan in the middle and Ubon in the south part of the northeast. Among these centers, the ones at Khonkaen and Ubon were established under Japan's grant aid and technical cooperation.

These local vocational training centers aim to foster skilled and semi-skilled workers through skill improvement training their targets are local idle young people and workers, and they offer the following kinds of training programs.

Pre-employment training: Offering of necessary vocational training to enable idle young people to find employment with greater ease.

Skill up grading training: Offering of training (mostly at night) to improve skills and to prevent skilled persons from forgetting their skills.

Special skill training: Offering of training primarily to female workers in connection with secretary, receptionist and maid work.

Itinerant training: Short-term concentrated itinerant training for farming village people who cannot obtain ordinary training due to household reasons.

Foremen and supervisor training: Skill improvement training with the target placed on factory foreman and supervisor class personnel.

Skill verification test and skill competition: A system designed to improve skills.

The skill verification test system was adopted in 1967 in conformance with a recommendation by International Labor Organization (ILO) experts. It is executed by NISD.

The skill verification levels range from Class 3 to Class 1. Verification standards are established for 12 job classifications such as electric welding, lathes, electricity, gas welding, automobile maintenance, machinery finishing, freezing and air conditioning, radio/TV sets, carpentry, plumbing, brick laying and painting. These standards are common for all ILO participating countries.

Meanwhile, regarding the skill competition, a committee was established in 1968 with members from the Labor Bureau of the Ministry of Internal Affairs, the Vocational Education Bureau of the Ministry of Education, the Industrial Promotion Bureau of the Ministry of Industry and the Rotary Club. The first competition was held in the same year. While the competition was temporarily interrupted during 1973 - 1978, it was resumed, and is presently being held once a year. Its effect is very large, it not only improves skills throughout the country, but also promotes the connection and cooperation between individual vocational training centers and various private corporations. The costs of these competitions are being met through the government's budget, supported by private contributions. Incidentally, there were 1,027 participants in 13 competition items in 1984.

The vocational training center of the Eastern Seaboard region where the Laem Chabang I.E. is situated, lies in Chonburi (CISD), and the training courses available here are shown in Tables 6-17 and 6-18.

A vocational training course generally consists of 3-10 months of training, depending on the specific course, followed by 2-4 months of on-the-job training (OJT) at a factory. Any young man aged 15-25 and having graduated from

an elementary school is eligible for registration at a training center. The training is free, and each trainee is required to pay for his uniform and private training tools only.

In addition to these vocational training courses, the center also offers apprenticeship training in conformance with requests from private corporations.

Table 6-19 shows the number of trainees for each training course, and the employment ratios of the graduates.

A distinct characteristic of Chonburi Vocation Training Center is that the rate of acceptance is 100%, (except the general vocational training courses (80%)). This means that all the applicants are accepted. Another characteristic is that the employment ratio of the center's graduates is only 21.75%, which is extremely low compared with those of other centers.

As judged from both these characteristics, it appears that, at the present stage, the local enterprises which normally should be hiring these vocational training graduates still have low labor demands.

To understand the general state of vocational training in Thailand, it will be useful here to take a comparative view of conditions in Thailand and five countries (Japan, South Korea, Hong Kong, Singapore, and Malaysia). The number of vocational training students and the proportion to the secondary education level in the six countries (Thailand, Japan, South Korea, Hong Kong, Singapore, and Malaysia) are shown in Table 6-20. Their proportion of vocational training students in five countries (Thailand excluded) in 1984 shows that Korea led with 18 percent. Japan followed Korea with 13%, trailed by Hong Kong (7%), Singapore (5%), and Malaysia (2%).

Table 6-17 Eastern Institute for Skill Development (Chonburi)

Pre-Employment Courses

1. Courses of trainees who had acquired primary
1.1 Plumbling and Sanitary Working course: 6 months
1.2 Forming; Concreting and Bricklaying course: 6 months
1.3 Cabinet Making course: 6 months
1.4 Carpentry course: 6 months
1.5 Painting course: 3 months
1.6 Automotive Repairing course (Benzine Engine): 6 months
1.7 Automotive Repairing course (Diesel Engine): 6 months
1.8 Auto-Body Repeir and Repainting course: 10 months
1.9 Welding and Sheet Metal Working course: 6 months
2. Courses for trainees who had acquired secondary
2.1 Electrical Installation course: 6 months
2.2 Refrigeration and Air-Conditioning Mechanics course: 6 months
2.3 Electronics course: 10 months
2.4 Machine Shop course: 10 months
2.5 Drafting course: 10 months
2.6 Building Construction Inspecting course: 10 months

Table 6-18 The State of Skill Development Courses at Each Regional Vocational Training Center

Unit: month

Center	RISD		CISD		LISD		KISD		SISD		NSISD	
Training facility location / Type of occupational training	In center	In plant	In center	In plant	In center	In plant	In center	In plant	In center	In plant	In center	In plant
1. Machine finishing	10	3	10	2	10	2	6	2	10	2	10	2
2. Machinist	-	-	10	2	10	2	6	2	10	2	10	2
3. Lathe	10	3	10	2	10	2	6	2	10	2	10	2
4. Welding and plating	6	3	6	3	6	3	6	2	6	3	6	3
5. Machine drawing	-	-	10	2	10	4	-	-	-	-	-	-
6. Automotive	6	3	6	3	6	3	6	2	10	2	6	3
7. Agricultural machinery	-	-	-	-	-	-	6	2	-	-	6	3
8. Auto body repair	10	3	10	2	10	2	6	2	-	-	10	2
9. Electricals	6	3	6	3	6	3	6	2	10	2	6	3
10. Electronics	6	3	10	4	10	2	6	2	10	2	-	-
11. Refrigeration	6	3	6	3	6	3	6	2	10	2	6	3
12. Drafting	-	-	-	-	10	4	-	-	10	2	-	-
13. Carpentry	6	3	6	3	6	3	6	2	6	3	-	-
14. Furniture manufacture	6	3	6	3	6	3	6	2	6	3	-	-
15. Carpentry	6	3	6	3	6	3	6	2	6	3	6	3
16. Pipe laying	6	3	6	3	6	3	6	2	6	3	-	-
17. Painting	-	-	3	2	3	2	-	-	-	-	-	-
18. Building inspection	-	-	3	2	-	-	-	-	-	-	-	-

Source: NISD

Note: RISD = Ratcha Buri Vocational Training Center
CISD = Chonburi Vocational Training Center
LISD = Lampang Vocational Training Center
KISD = Khon Kaen Vocational Training Center
SISD = Songkhla Vocational Training Center
NSISD = Nakhon Sawan Vocational Training Center

Table 6-19 Enrollees, Trainee Performance, and Employment Rates for Each Vocational Course

Vocational Cource / Division Name of Center	Pre-employment Training		Skill Upgrading		Factory Training		Special Training		Skills Training		Skills Testing		Employment rate of stidents completing the pre-employment Training Cource
	Enrollees	Trainees	Enrollees	Trainees	Enrollees	Trainees	Enrollees	Trainees	Enrollees	Trainees	Enrollees	Trainees	
Ratcha Burn (RISD)	1,154	411	1,260	1,210	348	316	464	404	64	61	262	241	73.97
Chonburi (CISD)	533	426	961	961	331	331	440	440	82	82	322	241	21.75
Lampang (LISD)	1,977	423	870	659	397	397	283	283	54	54	517	382	34.0
Khon Kaen (KISD)	2,196	558	697	350	476	241	298	262	—	—	343	330	79.0
Songkhla (SISD)	985	580	476	476	420	420	559	559	75	75	407	407	65.0
Nakhon Sawan (NSISD)	703	301	480	454	186	186	276	269	94	85	—	—	62.0
Total	7,548	2,699	4,744	4,110	2,158	1,891	2,320	2,217	369	357	1,851	1,601	
	35.8%		86.6%		87.6%		95.6%		96.7%		86.5%		

Source:NISD

Compared with the figures for 1975, Japan has shown an annual reduction in such training, while the absolute number of vocational students in Korea doubled between 1975 and 1980. However, Korea has also undergone a slight reduction since 1980. Singapore and Hong Kong experienced increases between 1975 and 1980, but since then numbers virtually remained level during the 1980s. Malaysia witnessed a large drop between 1975 and 1980. From 1980, however, numbers have remained static or have shown a slight increase.

Based on the level of industrial development, vocational training undertaken in formal school curriculum is most often considered a necessity in countries in the early stage of industrialization. As the industrialization process matures, the proportion of general education in the school curriculum increases.

In Thailand, the ratio of vocational training students was as high as 20%, which is equal to South Korea. The absolute number of students increased suddenly between 1980 and 1981 as indicated in the statistical tables. This suggests the breakthrough into industrialization that has been ongoing in Thailand since 1980. It can be expected that with the advance of industrialization hereafter, the rates of vocational training students will continue to increase.

The ratio of secondary school enrollment is 31% in Thailand, which is far lower than Japan (95%) and South Korea (91%). Accompanying future social and economic development, Thailand's secondary school enrollment rate can be expected to rise. Accordingly, both the quality and the quantity of vocational training must be improved.

Table 6-20 Vocational Training

Enrolement ratios for the second levels of education

COUNTRY	YEAR	TEACHING STAFF	PUPILS ENROLLED FOR VOCATIONAL TRAINING TOTAL a	FEMALE	F%	TOTAL b	a/b V%	Enrolment ratios for the Second levels of education	Entrance Age/Duration
THAILAND	1975	9715	191066	85798	45	1193741	16	26	1st level 6
	1980	.....	297114	.....	.....	1919967	15	29	2nd leves 13y~18y
	1981	.....	416647	.....	.....	1990868	21	.....	3+2~3+3
	1982	.....	.....	.....	.....	.....	.....	.....	
	1983	19715	437825	.....	.....	2191713	20	30	
	1984	.....	.....	.....	.....	.....	.....	31	
JAPAN	1975	.....	1505032	707627	47	8795780	17	92	1st level 6y~11y
	1980	.....	1410718	660613	47	9520948	15	93	2nd level 12y~17y
	1981	.....	.....	.....	.....	9798282	.....	.....	
	1982	.....	1336200	626500	47	10036175	13	95	
	1983	.....	1333200	626300	47	10244607	13	94	
	1984	.....	1381000	636441	46	10613444	13	95	
KOREA	1975	16479	436538	142183	33	3111510	14	56	1st level 6y~11y
	1980	27208	881287	387305	44	4285889	21	76	2nd level 12y~18y 3+2
	1981	28947	813417	352852	43	4335025	19	.....	
	1982	29900	824377	362451	44	4435000	19	.....	
	1983	31185	825454	367900	45	4571459	18	87	
	1984	31555	837369	385227	46	4718225	18	91	
HONG KONG	1975	.....	21509	6322	29	368655	6	49	1st level 6y~11y 8
	1980	.....	31019	9958	32	468975	7	64	2st level 12y~18y 3+2
	1981	.....	32492	10998	34	464923	7	66	
	1982	.....	31494	10287	33	459611	7	67	
	1983	.....	30964	10270	33	453369	7	68	
	1984	.....	31688	10692	34	447813	7	69	
SINGAPORE	1975	740	7140	509	7	183364	4	52	1st level 6y~11y 8
	1980	1023	9391	2124	23	180817	5	58	2nd level 12y~17y 4+3
	1981	889	8974	.....	.....	186212	5	62	
	1982	1199	10303	2130	21	187148	6	65	
	1983	1060	10864	2753	26	193007	6	69	
	1984	1408	9419	2831	30	197183	5	71	
MALAYSIA	1975	1739	33742	.....	.....	933411	4	44	1st level 6y~10y
	1980	1483	18578	.....	.....	1094715	2	48	2nd level 12y~18y
	1981	.....	.....	.....	.....	.....	.....	.....	
	1982	1554	18078	.....	.....	1155779	2	49	
	1983	1611	16736	5069	30	1173202	1	51	
	1984	.....	20184	5798	29	1279114	2	53	

Source : Unesco Education Yearbook, 1986

4) Examination of the Vocational Training Facility at the Laem Chabang EPZ/GIE

Based upon the consideration of sections 1), 2), and 3), we have heretofore considered the issues of:

- the quality and quantity of labor needed by enterprises entering the Laem Chabang I.E,
- the possibility of labor supply in and around the Laem Chabang I.E.,
- and the present state of vocational education, training facilities, and related matters in the Laem Chabang I.E.

Following a summary of the above points, we will move to discuss the main focus here; namely, the industrial estate and the prospect for an allied vocational training facility.

More than 80 per cent of the labor force required for the Laem Chabang EPZ/GIE is unskilled labor. As recently made clear in the results of the interviews conducted by Japanese corporations that have extended into Thailand, Thai people are manually dexterous and very patient. They, therefore, demonstrate a high level of efficiency in mechanized processing assembly and similar simple work. This is a beneficial point for enterprises entering into Laem Chabing. Nevertheless, in cases where strict adherence to product precision standards is required, and on the basis of quality control, pre-employment training ("cultivation" training) and post-employment training for skill upgrading is advisable. From this standpoint, the pre-employment training courses and the skill upgrading courses at the regional vocational center under NISD will be of some help. Although the employment rate of students who have completed the pre-employment training courses at the Chon Buri

vocational training center (CISD) is the lowest nationwide (21.75 per cent), it can be expected that the news of enterprises locating in the Laem Chabang I.E. will increase the employment rate to approximately that of the Khon Kaen vocational center (KISD) (79 per cent). It can be expected that enterprises entering the Laem Chabang I.E. will be able to fully obtain the type and amount of labor required. It is essential to know the industrial types of the enterprises and organize the curriculum to meet their needs. The close exchange of information between CISD and the enterprises locating in the estate will become an essential condition for ensuring the project's success. It will therefore be necessary for companies in the estate to form an enterprise association. Arrangements should be made for this group to hold consultative meetings with the CISD at regular intervals.

Although it is one of the measures used to activate CISD and to use it effectively, this alone will not be sufficient for fulfilling the needs of the estate's enterprises. First, its capacity for 6 - 10-month courses is 400 students, which indicates the shortage of the absolute quantity. Second, because Laem Chabang is more than 40 kilometers distant from Chon Buri, it is geographically inconvenient. In undertaking skill improvement training after working hours, it is advisable for a training center to be within 20 - 15 kilometers of the estate. The technical colleges at Chon Buri and Sattahip can be expected to function fully as a source of plant engineers and candidates of the middle management positions. However, it will be necessary to establish a new vocational training facility either within or near the estate for improving the skills of already employed workers. In considering this prospect, it is useful here to examine the establishment of vocational training facilities related to industrial estates in several foreign countries.

In the case of Japanese industrial estates, such educational institutions as industrial high schools and higher vocational training centers usually had already existed in nearby cities before the industrial estates were constructed. Compared with the brief history of industrial estates elsewhere, Japan's history of vocational education and training institutions is long. As a result, educational institutions are already widely distributed throughout the country. Thus, there has been no need in Japan to build entirely new vocational training facilities near industrial estates.

According to the 1987 edition of the Guide to Industrial Sites (a survey of industrial estates nationwide as of 1987 published by JILC), of 252 industrial estates throughout Japan, the case of the Ikenogami industrial estate in Takefu City, Fukui Prefecture, provides the only example of a vocational training facility established within an industrial estates. The Takefu City Industrial Experiment Station and Takefu City Vocational Training Center were opened simultaneously. The industrial testing center, which was established to improve the basic skills used in the manufacture of Echizen region cutlery (a well-known Takefu city product), and wooden furniture and house fittings, was established along with the Ikenogami industrial estate in 1977. The center was moved to the estate itself. Of approximately 100 Echizen cutlery manufacturers, 18 companies have dropped pre-modern management practices. With the aim to improve the working environment and measures to reduce noise, they have moved to the Fukui Prefecture cutlery estate (one section of the Ikenogami estate). It was during this transition period that the city's industrial experimental station was also moved. The traditional methods were scientifically studied to improve both the manufacturing skills and product quality. As part of this process, instructions in skill development, skill improvement, proficiency advancement, retraining, supervisory ability, and related areas were

given. This was an unusual case where the traditional production of a local region was supported and promoted by moving into the industrial estate. The case also stands out as an instance in which the industrial experimental station and vocational training center were opened simultaneously. Despite the rarity of this example, the Thai Government might benefit from considering this case in developing the Laem Chabang I.E. The Thai development shares certain similarities with the Japanese case in the grouping of common industries and the modernization of traditional skills. By the way, the Japanese industrial experimental center has accepted five technical trainees, since 1984, from developing countries, such as the Technology Research Development Center of the Ministry of Agriculture & Industry Development in Sri Lanka. This has contributed to the spreading of appropriate skills in developing countries.

Looking at the South Korean case, we can see certain similarities in the Changwon machinery industrial estate. This industrial estate was established in 1973 with the aim of increasing Korea's machinery self-sufficiency rate from 45 to 70 percent. The project was targeted to 41 types of industries in seven categories, including materials, essential parts, and production machinery. (During the 1980s, the development increased the employment to the 100,000 level.) Vocational training facilities were established successfully along with the progress of the project. From 1977 to 1980 these included:

- the Changwon Machinery and Industrial High School (an institution concentrating on training in electrical, machinery, and pipe fitting among its four major training divisions and 45 grades, and training about 900 students annually);

- the Automotive Vocational Training Institute (which trains about 400 students every year, divided into 160 students in machinery operation, 120 in machine assembly, and 120 in sheet metal welding);

- the Technical College (a school with 11 educational divisions, training 860 students per year as examination-qualified technicians);

- the Changwon Machinery and Metal Experimental Research Center (a center with seven divisions, 19 fields, and 4 sections and annually educating 380 technical personnel);

- and the Changwon Electrical Machinery Research Laboratory and Research Center, as well as other institutions.

In addition, the Daitong Vocational Training Institute was established in 1977 along with the creation of the Number 2 Estate at the Daitong Industrial Estate. the institute presently trains 3,490 people annually. (The Number 1 and Number 2 Estate employ 4,200 and 12,000 workers. The total is 16,200 employees.) At the Samsung Estate (employing 6,868 people), a vocational training institute was opened with the completion of the estate and annually trains 360 technicians (qualified as secondary technical workers).

In considering the establishment of a vocational training facility for the Laem Chabang EPZ/GIE, the South Korean example provides multiple points for comparison. In the Korean case, because the industrialization in that country took place later than in Japan, the development of educational, training and other facilities did not precede the promotion of industry that stemmed from industrial estate development. Instead, the creation of training facilities and production complexes occurred simultaneously and a pace with industrial expansion. Therefore, as in the case of the Changwon machinery industrial estate, national policy demanded to stress the promotion of specific types of industry. In order to assure that the promotion of the required types would not be hindered by a lack of skilled

personnel, training institutions were simultaneously established.

In the case of Laem Chabang, the industries to be established there will be export and labor-intensive types. Since the types of industries will not be as rigorously stipulated as were those in Changwon, there will not be the need for similar intensive vocational education or the introduction of identical training facilities. Nevertheless, in surveying the overall development of Thailand's Eastern Seaboard area, in particular the heavy industrial expansion based on natural gas development centered in the Map Ta Phut complex, it is certainly worth considering the concentrated introduction of vocational training facilities, centered on petrochemical vocational education, along the lines of the Changwon formula.

Regarding the establishment of vocational training facilities annexed to the Laem Chabang I.E., the short term plan calls for new employment on the scale of about 10,000 workers in 1991 reaching 35,000 by the time the EPZ/GIE is finished. Map Ta Phut will also require additional 5,000 workers. In light of these forecasts, developmental skill training for at least 600 to 1,000 individuals will be required annually. By strengthening and expanding the existing two technical colleges at Sattahip and Chon Buri (present enrollment at 4,300 students) and the regional vocational training center at Chon Buri (present enrollment, 2,100), it might be possible to quantitatively cover the increased demands. Yet, this solution does not appear entirely satisfactory when considering the distance separating Chon Buri or Sattahip and Laem Chabang as well as the use of after working.

In actual terms, the contents of the training offered should concentrate on skill development and the upgrading of existing abilities. Although a program similar to that offered by the regional vocational training center attached

to NISD might prove worthwhile, it is important to go beyond that provided by the existing CISD center program. It is especially necessary to implement a program that will be valuable and useful to firms within the EPZ/GIE. This requires that program planners should keep in mind that the targets of the training will be those presently working at enterprises within the EPZ/GIE. In shaping the program curriculum, it is also necessary to provide training to upgrade the skills of existing workers. Finally, it should also be stressed that, proportional to other groups, the training of managers requires more attention.

In preparing facilities for incoming pre-employment trainees, and for the second step of accommodating workers who will flow in from outlying areas, the parallel construction of dormitories will likely be required. Presently, the housing capacity of CISD's dormitories is limited to 104 people. Training courses should be planned flexibly according to the industry types of the enterprises in the EPZ/GIE. Too much rigidity in decisions made at early stages can become the cause of later failures.

Table 6-21 shows the contents of the vocational trainings which are considered necessary in consideration of the industry types of the enterprises. The table's vertical axis sets out the types of industries that might be expected to enter the EPZ/GIE, while the horizontal presents the types of skill levels needed. The degree of skill level required, depicted in degrees of priority (greater to lesser), is indicated by the following symbols: ◎ → o → Δ.

As the table shows, most of the manufacturing processes demand a high proportion of simple labor, except shipbuilding and automobile manufacturing which require skilled labor and jewelry finishing, woodwork and leather goods which require specific craftmanship. Yet, in all industrial fields, plant maintenance techniques are in high

Table 6-21 Skill Levels Required at the Laem Chabang I.E.

Prospective Industries	Skill level ※OJT/※OFF-JT	Manufacturing Process: Simple operative OJT	Supervision of simple operation OFF-JT	Skilled Operative Craftsmanship OJT	Technician OFF-JT	Plant Maintenance repair: Technician OJT&OFF-JT	Engineer OFF-JT	Research & Development: Engineer OFF-JT	Designer
Food products, etc									
31121 Dairies		◎	△		△	○	△	△	
31123 Ice-cream		◎	△		△	○	△	△	
31139 Fritit and vegetables products		◎	△		△	○	△	△	
31149 Other sea foods products		◎	△		△	○	△	△	
31172 Biscuits		◎	△		△	○	△	△	
31190 Confectionery		◎	△		△	○	△	△	
31219 Other food products		◎	△		△	○	△	△	
31229 Prepared animal foods		◎	△		△	○	△	△	
Textile and its products									
32120 Made-up textile goods		◎	△		△	○	△	△	
32130 Knitting mills		◎	△		△	○	△	△	
Apparel and other textile finshed products									
32202 Women's, girls' and infants clothes		◎	△	○		○	△		△
32209 Other wearing appral and accessories		◎	△	○		○	△		△
Leather tanning and its products									
32330 Leather and leather substitutes products		◎	△	○		○	△		△
Lumber and wood products									
33120 Wooden and cane containers etc		○	△	○	○	○	○	△	△
Pulp paper and paper products									
34120 Containers and boxes of paper and paperboard		◎	△			○	△	△	
Chemicals and allied products									
35210 Paints varnishes and lacquers		◎	△		△	○	○	○	
35220 Drugs and medicine		◎	△		△	○	△	○	
35231 Soap and cleaning preparation		◎	△		△	○	△	△	
35299 Other chemical products		◎	△		△	○	△	△	
Rubber products									
35510 Tyre and tube industries		◎			△	○	△	○	
35592 Rubber footwear		◎			△	○	△	△	
35599 Other rubber products		◎			△	○	△	△	△
Plastic products									
35801 Plastic containers		◎	△		△	○	△	△	△
35609 Other plastic products		◎	△		△	○	△	△	△
Ceramic stone and clay products									
36991 Concrete products		◎	△		△	○	△	△	
36992 Assestos-cement products		◎	△		△	○	△	△	
Fabricated products									
38110 Cutlery, hand tools and general hardware		◎		△	△	○	△	△	
38130 Structural metal products		◎	△		△	○	△	△	
38191 Metal cans and shipping containers		◎	△		△	○	△	△	
38192 Wire and wire products		◎	△		△	○	△	△	
38198 Coating, engraving and allied services		○	△		◎	○	△	△	
38199 Other fabricated metal products		○	△	○	△	○	△	△	
General machinery									
38220 Agricultural machinery and equipment		◎	△	△	○	○	△	○	
38292 Airconditioning machines		◎	△		△	○	△	○	
38298 Repair shops									
Electrical machinery equipment and supplies									
38310 Electrical industrial machinery and apparatus		◎	△		○	○	△	○	
38320 Radio, television and communication equipment and apparatus		◎	△		○	○	△	○	○
38330 Electrical appliances and housewares		◎	△		○	○	△	○	○
38399 Other electrical apparatus and supplies		◎	△		○	○	△	○	○
Transportation equipment									
38419 Other shipbuilding and repairing		○	△		◎	○	△	○	○
38439 Other motor vehicle industries									
Precision instruments and machinery		○	△		◎	○	△	○	○
38500 Precision instruments and machinery									
Miscellaneous manufacturing industries									
39011 Cutting and polishing of gem stones		○	△		◎	○	△	○	△
39012 Jewelry		○		◎		△	△		
39030 Sporting and athletic goods		◎	△		○	○	△		△
39090 Industries not elsewhere classified		–	–	–	–	–	–	–	–

◎ very important ※OJT – on the job Training in Factory
○ inportant ※off-JT–off the Job Training in a Training center or Edinational Facility
△ necessary

demand and relevant to almost all fields, from materials to process assembly. Skills in research and development fields in these areas can be considered essential.

It would be advisable to have an OJT (On the Job Training) survey within each industry to determine the skill level demanded for the simple work involved in respective manufacturing processes. Here we will concentrate on the OFF-JT skill level requirements. Table 6-22-1 presents the common skill labor fields shared by companies that have moved into the Laem Chabang I.E. The table also provides the specific skills demanded by particular groups of enterprises. The "A" group, in other words those processing-assembly type enterprises, appears in higher proportion than others. In adjusting their needs to the curriculum of the vocational training center attached to the industrial estate, let us focus on the types of skill training that should be chosen.

Table 6-22-1 examines the types of vocational skills required by companies within the industrial estate. We can predict that, concomitant with the industrial estate's development, various types of service industries supporting production activities and required by enterprises within the estate will also undergo expansion. This may result in the establishment of a business center within the estate or its development in a neighboring region. Table 6-22-2 examines the varieties of occupational skills required by these service centers. As a second step, it is proposed to consider the expansion of the curriculum to develop service industry skills.

An additional point, previously mentioned in the last part of section 2), is that of initiating a system of employment introduction. This should be given full consideration in the contemplation and planning of vocational training facilities. Thailand has nothing comparable to the Japanese Public Employment Security Office, and no mediation agency to supply information to

Table 6-22-1 Skilled Workers Needed at the Laem Chabang EPZ/GIE

	Skill Categories		Applicable Training Course				
			Development	Upgrade	Special	Management	Other
Skills commonly required by all enterprises:		1. Machinery	o	o			
		2. Electricals	o	o			
		3. Electronics		o			
		4. Production management (QC skill method)		o		o	
		5. Accounting, office	o	o			
		6. Management, financial				o	Manager
Skills Considered Required by Special Enterprise Groups	I Livelihood Related Items Group: GIE 10%, EPZ 40%	1. All varieties of industrial arts design	o	o			
		2. Western tailoring, sewing	o	o			
		3. Carpentry	o	o			
		4. Molding and pattern making	o	o			
	II Materials Related Group: GIE 30% EPZ 15%	1. Welding	o	o			
		2. Metal plating	o	o			
	III Processing and Assembly Group: GIE 60% EPZ 45%	1. Mechanical drawing	o	o			
		2. Casting	o	o			
		3. Forging	o	o			
		4. Welding	o	o			
		5. Pipe laying	o	o			

Note: Group I conforms to Table 6-6's codes 31121-33120
Group II conforms to Table 6-6's codes 34120-38199
Group III conforms to Table 6-6's codes 38220-39030

Table 6-22-2 Types of Occupational Skills in Supporting Industries That Will Be Required with the Development of the Industrial Complex

Occupational Category	Skill Type	Applicable Vocational Course			
		Development	Skill Upgrade	Special	Management
Construction industry	1. Construction	o			
	2. Painting	o			
	3. Interior	o			
Automotive repair	1. Automotive repair	o			
	2. Metal plating, painting	o			
Banking	1. Accounting (present)				
	2. Office automation, clerical				
Secretarial service	1. Secretarial			o	
	2. Typing			o	
	3. English conversation			o	
Port cargo handling	1. Cargo handling	o	o		
Advertising	1. Advertising art	o		o	
	2. Design	o		o	
Real estate	1. Real estate practice	o	o		o
Taxation	1. Tax practice	o			o
Law	1. Legal practice	o			o

either those looking for work or to companies seeking workers. Thus employment introduction is an essential issue for planning the industrial estate development. In pondering the establishment of a vocational training facility closely linked to the industrial activities within the estate, planners must input such data as:

. job offer and job hunting information,

. data on both vocational students and the employment needs of companies operating within the estate,

. data of unemployment, semi-unemployment, and demand for work in neighboring regions.

Depending upon the determination of local needs, the system eventually developed might be placed within the training facility itself. In any case, recognition of the system's usefulness is also a matter of significance. (See Fig. 6-1.)

Depending upon the aims of enterprises location in the estate, the vocational training agenda and curriculum should be operated flexibly. To ensure this, representatives of both the enterprises and the center's operating main body should form an internal operations council to promote the mutual exchange of information. The various organizations pertinent to this point are illustrated in Fig. 6-2.

In implementing the aspects of this report, a special detailed F/S is necessary. In this operation, this region's labor and employment conditions should be surveyed in detail. Firms intending to be located in the estate (and those wishing to locate) should be surveyed by questionnaire and other methods. When additional news on the needs of employee training is received, it must be considered in facility planning. Nevertheless, in establishing the future attractiveness of the estate, and in creating that

attractiveness, the new construction of a vocational center should be a matter of major concern. It must be included in plans to attract firms to the EPZ/GIE. We propose to make a quick decision to establish a new vocational training center in principle in consideration of the anticipated increase of employment in the eastern seaboard region and the present capacity of the existing facilities.

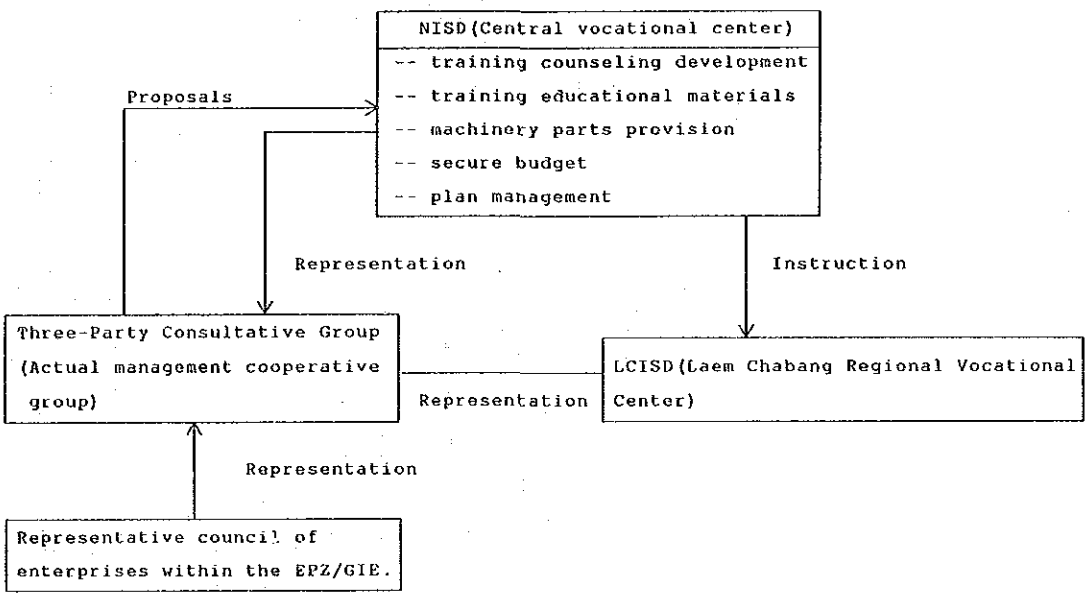

Fig. 6-2 Structure of Organization

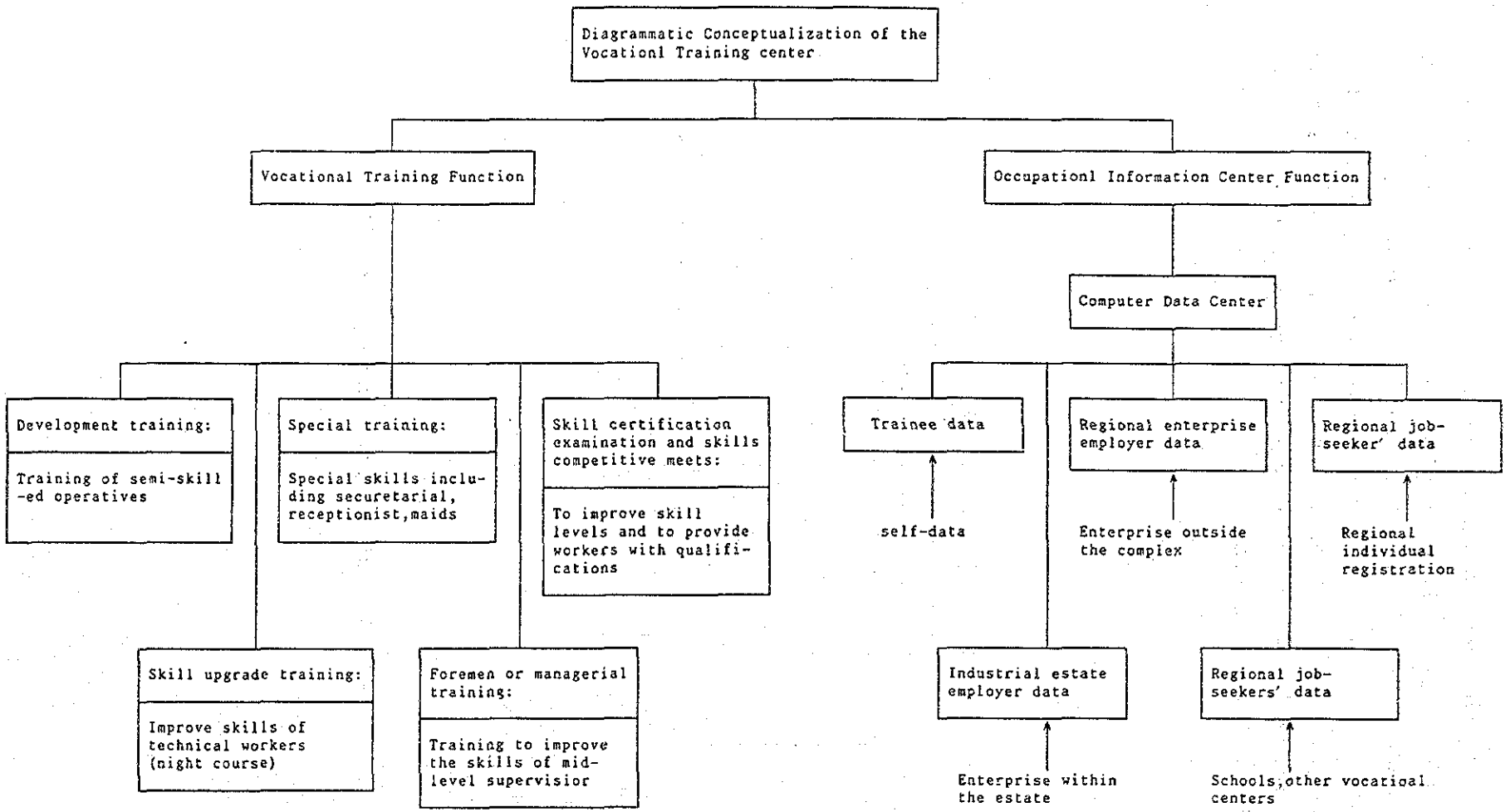

Fig. 6-1 Diagram of the Vocational Training Center

(2) REVIEW OF THE COMMUNICATION FACILITIES OF LAEM CHABANG EPZ/GIE

1) Telecommunication and Industrial Activities

There is a great trend toward free access to and dissemination of information as we approach the 21st century. As a result, the needs for telecommunication have changed; the role of telecommunication used in the industrial activities has become more important than ever before.

According to the world-wide trend, it seems that the needs for telecommunication in the field of industrial activities will continue to grow in the future.

The backgrounds of these growing needs for communications are the growing dependence of enterprises on communications and the increase in the importance of information. There is a tendency for enterprises to use communication system services provided by more than one telecommunication medium.

The needs for telecommunication are also becoming more complex and diversified. It can be presumed that the use of data communication will increase and so will the potentiality of needs for the new communication service such as image data transmission.

Therefore, it is likely that there will be an increasing number of enterprises interested in building their own communication network for the future. This phenomenon derives from the growing demand for communications within the enterprises and for the establishment of a flexible communication network of high reliability. Another factor is the expectation for more diversified and customized communication services, which go with the needs of users in regard of communicating cost and

service. In the fields of communications, it will be required to prepare services that are linked with individual interests.

It is necessary for a future communication network to be coincided with the needs of the users and to be varied so that the users themselves can choose whatever service they want.

It is important to fully acknowledge this tendency in considering the communication facilities of Laem Chabang EPZ/GIE.

2) Industrial Estate and Information Network

Free access to and dissemination of information for industries and regions are closely related with data communications. Free access to and dissemination of information in Thailand have only begun, and its development, linked with diversification of communication network, is greatly expected.

Most of the enterprises entering Laem Chabang EPZ/GIE are likely to be those of the manufacturing industry. In Thailand, the manufacturing sector is ranked third in using a great number of computers, next to the financial business and the air service industry. According to the world-wide trend, the use of computers in the manufacturing sector will increase, and there will be a growing need for the data communication to connect computers. As a result, the installation of various kinds of data communication facilities is thought to contribute to the improvement of this Industrial Estate. In other words, no industrial activity will be possible in the future without providing the necessary communication facilities.

These facts taken into account, there are two points to be stressed when considering the information network system in Laem Chabang EPZ/GIE.

a. External system - to take into consideration a network to connect the Industrial Estate with other cities and neighboring areas.

b. Internal system - to build an information network system within the Industrial Estate.

Useful services cannot be provided to the enterprises in the Industrial Estate without complete functioning of these communication and information systems of the Industrial Estate and those within each enterprise.

With regard to the external system a., the major external system of information network is between the estate and Bangkok. Bangkok is, needless to say, the center of economic and industrial activities in Thailand, and here are also gathered the head offices of major enterprises. Moreover, most of the communications with other areas is carried out via Bangkok. Therefore, it is necessary to install sufficient communication lines between Bangkok and the estate.

3) Communications between Laem Chabang EPZ/GIE and Bangkok

a. Present situation of the communication network

The present situation of communications in Thailand can be seen in Table 6-23. According to the table, the situation of communications by telephone is as follows.

a) The number of telephone lines is far short of demands, as indicated by the low rate of telephone diffusion.

b) 70% of the telephones are distributed in the metropolitan areas around Bangkok, and as a result there are few telephones in the urban areas.

c) The level and quality of telephone service are very low. This is indicated by the frequency of troubles (8 troubles/100 telephones per month) and the period required for repairing (2 or more days for 30% of the troubles).

d) There are no telephones at all in 90% of the urban areas.

e) It takes more than a year, sometimes 6 - 7 years, to have a telephone installed after making a request.

In other words, there needs a great improvement in quality and quantity of telephone network service.

To improve such a situation, the government has formulated the Fifth Five-Year Plan, the result of which is keenly anticipated. The contents of this Plan are contained in Table 6-24.

Table 6-23 Situation of Communications in Thailand (1986)

. Number of telephone subscribers	800,000 sets	
Metropolitan area	550,000 sets	
Rural areas	250,000 sets	
. Number of telephone sets	950,000 sets (1.8 sets/100 men)	60 sets/100 men in Japan
Metropolitan area	660,000 sets (9.6 sets/100 men: 70%)	Population ratio: 15%
Rural areas	290,000 sets	Population ratio: 85%
. Telephone service areas	About 700 cities, towns & villages	Of 7,000 cities, towns & villages)
. Rate of telephone diffusion	30%	50 - 60% in advanced countries
. Percentage of digital services	42%	
. Frequency of troubles	8.3 troubles/100 sets per month	
. Period required for repairing	Within 1 day 68.2%	
	2 - 7 days 25.1%	
	More than 7 days 3%	

Sources: Report of Japanese Chamber of Commerce and Industry Feb. '86

Report of Japanese Chamber of Commerce and Industry Jul. '88

Table 6-24 Outline of Fifth Five-Year Communication Network Plan

. One million new telephone lines/5 years (1.7 telephone sets/100 men = > 2.7 telephone sets/100 men)		
. The coverage of general telephone services should be extended newly to 700 cities, towns and villages.		
. Public telephone facilities should be installed in 1,900 cities, towns and villages.		
. The telephone diffusion rate should be raised from 30% to 50%.		
. Percentage of repaired troubles	Metropolitan area Rural areas	80% → 85% 95% → 96%
. Complains from subscribers	Metropolitan area Rural areas	9 → 6 cases/1,000 cases 5 → 4 cases/1,000 cases
. Period required from application to telephone installation		Within 1 year

Number of switchboards and that of telephone lines as of Sep. 30, 1985, and at the end of the 5-year plan

Number of switchboards	306	706	1,012
Crossbar	180	-63	117
Digital SPC	126	769	895
Number of telephone lines	830,480	1,144,612	1,975,092
Crossbar	479,062	-11,588	467,474
Digital SPC	351,418	1,156,200	1,507,618

Sources: Report of Japanese Chamber of Commerce and Industry Feb. '86

Report of Japanese Chamber of Commerce and Industry Jul. '88

b. Plans for installing the communication lines in Laem Chabang EPZ/GIE

The installation of the communication lines in Laem Chabang EPZ/GIE, linked with the Fifth Five-Year Communication Network Plan, is shown in Table 6-25.

Table 6-25 Installation Plan of Communication Lines to the Laem Chabang EPZ/GIE

1 1988: A maximum of 600 lines will be installed from the switchboard in Ao Vdom as temporary lines.
2 1990: A switchboard having the capacity of 936 lines will be installed in Laem Chabang.
3 1991: The line capacity will be increased to 5,000 lines.

If this plan is completed as scheduled, the communicating condition with Bangkok will be greatly improved. The population of Laem Chabang in 1991, as foreseen in the Master Plan, is about 24,000. The diffusion rate of telephones then will be 20.8 per 100 persons, which is far greater than the average of 2.7 per 100 persons in Thailand. The increase of the population in 2001, according to the Master Plan, however, is about 120,000. If there is no increase in the number of telephones after 1991, the diffusion rate of telephones in 2001 will be 4.16 per 100 persons, which cannot be said to be a great number.

Therefore, it is needed to have plans for increasing telephone lines even after 1991.

The communication lines between Laem Chabang and Bangkok mostly use the public switched telephone network.

Facsimiles and telexes that can be used through the ordinary telephone lines are useful as they are, but there should be other ways to meet the demand for a data communication service with higher speed and reliability.

Public data communication services and private line services will be needed between Laem Chabang and Bangkok. According to the questionnaire taken in Japan, more than 40% wanted to utilize the data communication service (both private lines service and packet switching service).

Data communications in Thailand are now possible by transmission through telephone lines up to the level of 2,400 bps in correspondence with CCITT. One of such services now provided is IDAR (International Database Access and Remote Computing Service). This, at the speed of 300 bps and 1,200 bps, makes it possible to reach any database abroad from Thailand and to utilize personal computer systems by using any telephone line. Therefore, it will be possible to establish the same grade of data communication service between Laem Chabang and Bangkok.

On the other hand, the data communication through the public switched telephone lines is slow and limited in its reliability. It is therefore needed to consider the utilization of a digital data communication system, which is faster and more reliable.

One of such systems, the public packet switching service, is now being planned in Thailand, and it is expected to start operations in 1989. By this service, it will be possible to carry out communications among computers, data terminal equipments, either within the country or abroad. Also, it will be possible to access database services and bulletin board services. The speed of the public packet switching service is scheduled to be from 300 to 9,600 bps. The switching facilities acting as the

nodes will be installed in Bangkok, Chiang Mai and Hardyai, and the concentrators to be connected to the nodes will be installed in other cities.

In order to utilize the public packet switching service from the Industrial Estate, the quality of communication circuits to the nearest concentrator should be fully maintained. The circuits to the concentrator are either private telephone lines of public switched telephone lines, so those lines should be in their best condition for the packet switching service to maintain its high speed, high quality and high reliability.

In short, it is necessary to plan a faster and more reliable data communication network between Industrial Estate and Bangkok, in the context of the development plan for communication network by TOT and CAT. Also the means to maintain low cost should be considered in order to accelerate the decentralization of enterprises from Bangkok.

c) The support for the establishment of the international telecommunication network

The globalization of industrial production created a need to plan the procurement of raw materials and the export of products from an international standpoint. The international division of labor is becoming more apparent in the production activities. The importance of international telecommunication is continuing to grow under any manufacturing scope of industrial goods. As the internationalization in various ways is ascertained, the plans are needed to build a data communication system to support and accelerate the connection to such an international telecommunication network from the Industrial Estate. In other words, the connection to the international telecommunication network is also important, together with the installation of the communication lines to Bangkok.

The means of international telecommunications from Thailand are the satellite communications and the submarine cables. The former is more popular.

An earth station for international satellite communication is now located in Sri Rancha, where the functioning of INTELSAT satellites has been carried out since 1970. The second facility and the fourth facility in Sri Rancha, using the Indian Ocean satellite and the Pacific Ocean satellite respectively, are providing services for Asia, Europe, and North America.

The communication service from Thailand to abroad is utilized through ISD and Demand Call, which can be connected immediately. Also the aforementioned IDAR has started its operation.

The percentage of telephones which can be used for the ISD are only 35% outside the metropolitan areas, however, and the connection of the communication circuits from Thailand to abroad is not always done smoothly. It is reported, in recent newspapers, that the oversea telephone calls and facsimiles take time to be connected during daytime.

As indicated in Table 6-26, in the past three years, the capacity of international circuits has increased by 1.7 times, whereas the number of telephone calls and the duration of calls have increased by 4.4 times and 2.6 times, respectively. These figures show the growing demand for international communications.

However, these problems relating to the connection efficiency do not derive from the circuit capacity of the international gateway switches themselves, but from the shortage of the intermediary circuits from telephones to the switches.

Table 6-26 International Telephone Services in Thailand

	Oct. 1985	Sept. 1987
No. of circuits	389 25 countries	647 69 countries
No. of calls (compared to the previous year)	1,420,000 +9.5%	6,210,000 +79.0%
Duration of calls (compared to the previous year)	10,620,000 +12%	27,710,000 +14%
Rate of circuit occupation[1)]	15%	24%

Source: Report of Japanese Chamber of Commerce, Bangkok; July, 1988 and Dec. 1985

Note: 1) The rate of circuit occupation is calculated on the assumption that all the telephone calls for a day occurred within 8 hours during the daytime.

The Laem Chabang EPZ/GIE, from its very nature, will mostly consist of factories of foreign companies. The needs for the connection to international telecommunication networks will increase after those factories start full operation. For those factories, it is essential to be able to communicate smoothly and quickly with the head offices in their home countries.

Therefore, a plan to acquire maximum connections to international cables is necessary in order to facilitate overseas telephone connections after the full operation of production in the Laem Chabang. This should be considered in discussions with TOT and CAT.

d) Preparation for the expansion and the advancement of the communication network

The means of communications have advanced and become diversified, and various kinds of demands for the communication service have arisen. These are the results of both the complication of economics and society, and the rapid development of communication technology such as the recent electronics technology.

This development of communication technology can be summarized as follows;

1st stage: the diversification and the advancement of the communication means, not only by telephones.

2nd stage: the integration of communications and computers.

3rd stage: the integration and the digitization of the communication network.

The developed countries are proceeding to the third stage now. Thailand has just stepped on the first

stage, but it is expected to proceed to the following stages within a short time. For this reason, the digitization of the network as a whole is important.

Digital micro wave circuits and optical fibers are examples of such digital communication media. It is necessary to plan the capacities of facilities with sufficient consideration of the future demand for transmission.

4) The communication and information facilities in Laem Chabang EPZ/GIE

The previous section dealt with the network connecting the Industrial Estate and the outside. This section will refer to the communication and information system within the Industrial Estate.

One of the characteristics of the Industrial Estate is that it has a commercial port named Laem Chabang Port. It is favorably located as a base not only for the domestic industrial products but also for the export and processing of goods for overseas. Therefore, the information network system of Laem Chabang should be considered from the aspects of both the industrial estate and the sea port.

a. The information network facilities of the Industrial Estate

Information is gaining its importance for the enterprises to survive in the vulnerable industrial society.

Computer applications have been expanded to materials stock control, accounting, technical calculations, personnel and production. The use of computers is now moving toward the phase of on-line systems and networks.