industry will be able to produce heavy fabrics such as sheeting, shirting, poplin, denim, towel and jeans from domestic cotton yarn.

Per capita GDP and labor wage levels will further increase toward the year 2010, and the textile and garment industry in the Hanoi area will find it difficult to count on a cheap labor force. Consequently, this sub-sector should be more and more oriented toward the production of higher value added products. In this context, the proposed "converters" will play an increasingly significant role in attaining higher value added in the textile and garment industry.

Demand for synthetic materials in this decade will not reach a level that requires its own production plants. Since tough competition and over-production of synthetic materials in ASEAN countries and China are unavoidable, the textile enterprises in the Hanoi area should be prudent in setting up synthetic material production plants in the region.

6.4 Chemical Industry

The chemical industry in the Hanoi area consists of manufacturers of fertilizers, paints, soap and detergents, medicines, pure chemicals, rubber products, plastic products, and so on. Over 40 chemical enterprises are operating in the Hanoi area. According to the questionnaire survey, the production of 22 enterprises amount 390 billion dongs. About 5,600 workers are employed in chemical enterprises. Labor productivity in this sub-sector is as low as 1/80 of the productivity in Japan (refer to Appendix-F.4).

1) Fertilizer Manufacturing

There is one fertilizer factory in the Hanoi area, manufacturing fused magnesium phosphate (FMP) and NPK fertilizer. It is noted that FMP contains only 15-16% of P_2O_5. This value is quite low if compared with triple super phosphate (TSP) with P_2O_5 content of 45-47%, diammonium phosphate (DAP) with P_2O_5 content of 53.8%, and monoammonium phosphate (MAP) with P_2O_5 content of 61.7%.

Production of fertilizer was 46,000 tons/year of nitrogen fertilizer, 86,000 tons/year of phosphate fertilizer, and no potash fertilizer, while the demand in Vietnam in 1993 was reported to be 603,000 tons/year of nitrogen fertilizer, 147,000 tons/year of phosphate fertilizer, and 25,000 tons/year of potash fertilizers. The rate of domestic supply was 8% of nitrogen, 59% of phosphate, and 0% of potash fertilizers. These

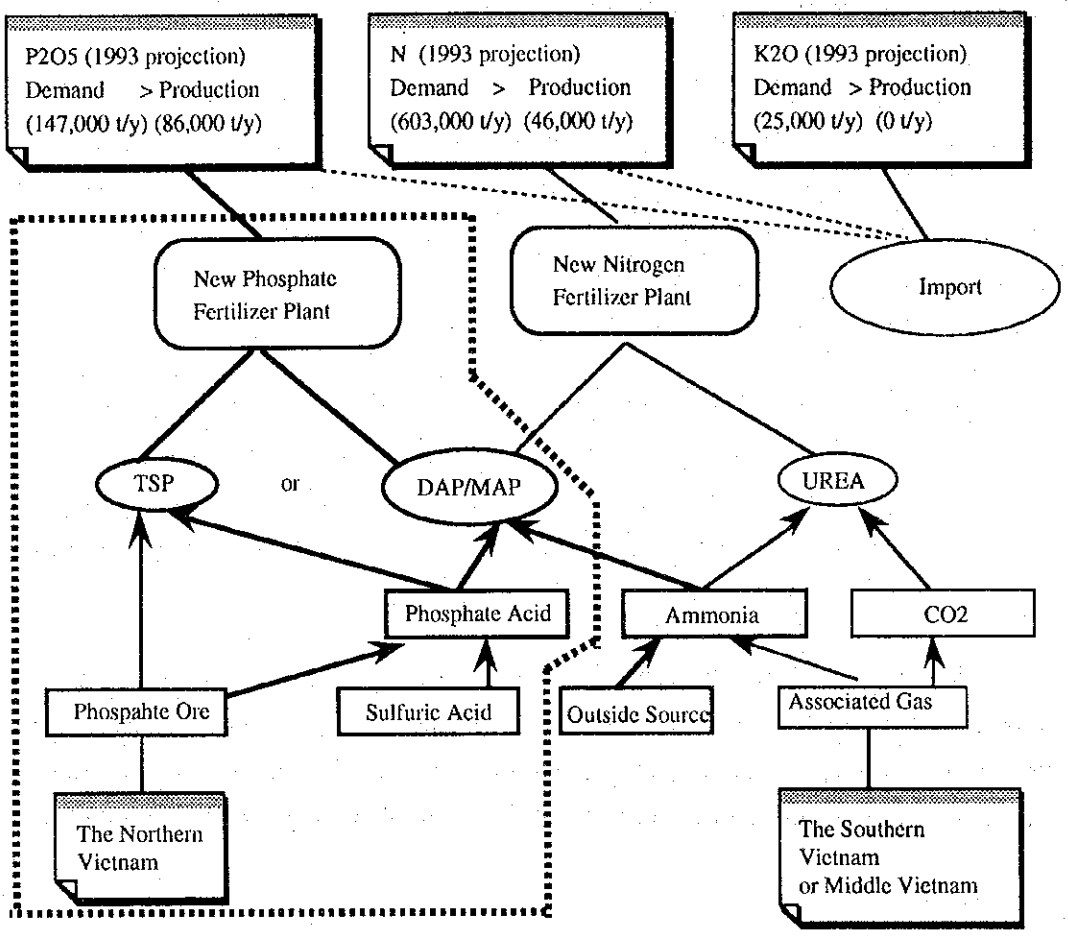
facts imply that the supply of fertilizer is qualitatively and quantitatively insufficient to meet the domestic requirements (refer to Appendix-F.4, Para. 4).

It is proposed that new fertilizer plants be set up for production of nitrogen and phosphate fertilizers. Since it is planned to utilize associated gases as raw materials for ammonia, the nitrogen fertilizer plant will preferably be located in South Vietnam. On the other hand, raw materials for phosphate, namely apatite, are produced at Lao Cai in Hoang Lien Son Province in North Vietnam, and the area around Hanoi is a candidate site for installation of a new phosphate fertilizer plant.

- In this context, it is recommended that a feasibility study be conducted for development of a new phosphate fertilizer plant at a site to be selected out of Hanoi city. The study should cover not only technical aspects but also an analysis of markets, transportation, financial evaluation, and environmental impact assessment.

The kinds of phosphate fertilizer should be further studied and selected among TSP or a combination of DAP and MAP. Higher phosphate content fertilizer is required to reduce handling and transportation weight. A general concept of development of the fertilizer industry in North and South Vietnam is illustrated below.

Fertilizer Industry Development Concept



It is added to note that the existing fertilizer factory at Van Dien in Hanoi should be closed down after the new factories satisfy the demand in the country.

2) Paint Manufacturing:

Two state enterprises are manufacturing paints and varnishes in the Hanoi area. They are mainly of alkyd resin type or amino-alkyd resin type. All products are sold in domestic markets. It has been observed that both enterprises are employing too many workers. Even paint cans are fabricated by many workers in the paint factories, because the divided work system is undeveloped. These two paint factories are inferior in production to other paint factories (8 factories in total with a total rated capacity of 20,000 tons per annum) in Vietnam. For instance, the paint factory in Haiphong is operated far more efficiently than the factories in Hanoi. Technologies for manufacturing anti-fungus paints have not been well developed. (Refer to Appendix-F.4, Para. 5)

Paint and varnish manufacturers in the Hanoi area are in small scale but they will survive under the current situations, because (i) there are many kinds of products and users of paints and varnishes; (ii) technologies and facilities are not so prominent; and (iii) batch system production is applied and no scale of merit is expectable. Improvement of the existing factories should be promoted through (a) reduction of workers; (b) inventory control; (c) introduction of anti-fungus paints; (d) development of research functions; and (e) study on manufacture of automobile paints.

- It is recommended, in this context, that excessive workers be reduced through expansion of their business in other fields, such as field painting and shop painting works, and that inventory control and research functions be strengthened to the maximum extent.

- It is also recommended to purchase licenses of advanced technologies for anti-fungus paints and automobile paints through agreements with foreign paint manufacturers.

3) Synthetic Detergent and Soap Manufacturing

Three enterprises are manufacturing detergents in the Hanoi area. In addition to detergents, they are producing some inorganic chemicals and pure pharmaceutical chemicals, as well as beauty soaps, washing soaps and tooth paste. One of these enterprises decided to set up a joint venture with UNILEVER. It is reported that the current production is 14,000 tons of powder detergents and 200 tons of beauty soaps, while the demand is predicted to be 20,000 tons of powder detergents and 3,000 tons of beauty soaps in the year 2000 (refer to Appendix-F.4, Para. 6).

Demand for powder detergents will depend on the popularization of washing machines in the urban area, encouraged by an increase in income and improvement of the water supply systems. Increase in production of beauty soaps will be promising in view of the demand and supply situation. It is noted, further, that shampoo and kitchen detergents are not produced in the Hanoi area.

- From the viewpoint of demand, it is recommended to expand the production of beauty soap, and to initiate shampoo and kitchen detergent manufacturing in the Hanoi area. Expansion of powder detergent plants should be prolonged until further acceptance of washing machines.

Through the factory inspection, it has been observed that weighing and packing are done manually in the existing enterprises. It is suggestible that the factories

introduce automatic weighing and packing systems. Further, the existing factories have no function for research and development, and have been producing and marketing the same products for long years. Factories should recognize that under a market-oriented economy research and development (R&D) is of paramount importance for developing technologies and new consumer goods.

4) Medicines and Pure Chemicals

Replying to the questionnaire survey, 10 enterprises stated that they are pharmaceutical enterprises. Through factory visits, however, it has been revealed that most of them only store or trade pharmaceutics, and only two of them are makers or mixing companies of pharmaceutical products. One of these makers purifies chemicals using small scale apparatuses, and is far from being called a manufacturer of medicines or pure chemicals (refer to Appendix-F.4, Para. 7).

It is noted that Vietnam produces a wide variety of herbs. Effects of herbs are increasingly appreciated worldwide.

- ❑ It is suggestible that a study be made on the location of herb industry in Hanoi, including a market survey for export of high quality herb products.

5) Rubber Products

In the Hanoi area, there is one rubber tire enterprise, manufacturing motorcycle tires (300,000/year), bicycle tires and tubes (3,500,000/year), and automobile tires and tubes (13,000/year). The factory is utilizing natural rubber produced in South Vietnam, as well as imported synthetic rubber and chemicals (refer to Appendix-F.4, Para. 8).

Production of bicycle tires and tubes is less promising for market expansion, while a number of constraints are observed in the production of automobile tires and tubes. For the improvement of automobile tire manufacturing lines, it appears suggestible to obtain foreign technical licenses to modernize the production lines. Since some automobile assemblers are coming to invest in the Hanoi area, modernization of tire manufacturing will be urgently required in any way.

New rubber products should be developed to diversify products in this sub-sector. It is conceived that production of industrial belts will be one of the promising products for rubber industry in the Hanoi area, since the Hanoi area has a greater number of machinery industries, as discussed in Section 6.1.

6) Plastic Products

One factory specializes in plastic molding and some factories are fabricating molded plastic parts for toys and stationery in the Hanoi area. Other factories are producing plastic bags and strings, together with other non-plastic materials (refer to Appendix-F.4, Para. 9).

The most important process in plastic production is molding, by which raw material is formed into shape. The quality of plastic products largely depends on the quality of molds. Factories are utilizing injection molding machines (no compression molding machines) for thermoplastic resins such as PVC, HDPE, LDPE, PP, PS, and ABS.

In the Hanoi area, the assembly of electric and electronic appliances by CKD will increase, as discussed in Section 6.2, and plastic part supplies as subcontractors to such assemblers will be promising when the quality of plastic products is improved.

- ❑ It is recommended, in this context, that plastic parts of better insulation be introduced, like phenolic resin and melamine-formaldehyde, and that compression molding be introduced for plastic molding. In any way, it is suggestible to carry out a study on the market and technologies for new applications of plastic products.

VII. MASTER PLAN FOR INDUSTRIAL ESTATE DEVELOPMENT

Concepts and directions for the development of industrial estates in the Hanoi area have been discussed in Chapter V, Section 5.3. A master plan for industrial estate development is formulated and proposed in this Chapter. The study on industrial estate development has been conducted in the framework agreed between HPC and JICA, particularly in evaluating the potential demand for investments in the industrial estates and in identifying and selecting possible alternative estate sites in the Hanoi area.

7.1 Potential Demand for Industrial Estates

The potential demand for investments in the industrial estates to be planned for the Hanoi area has been investigated through questionnaire surveys in Vietnam, Japan, South Korea, Hong Kong, Taiwan, Singapore, Malaysia and Thailand, as well as through interview surveys with potential investors (refer to Appendix-G).

1) Demand for Investments by Vietnamese Enterprises

Existing enterprises in the Hanoi area (291 enterprises) were requested to fill out questionnaire forms, and 234 enterprises replied in September 1994 (refer to Appendix-G.1).

Out of the 234 enterprises who replied to the questionnaire survey, 103 firms indicated their interest in locating their factories in several alternative industrial estate sites in the Hanoi area. Out of these interested firms, 51 enterprises have been evaluated as "very prospective" in investments, while 52 enterprises have been found to be "prospective" in investments. Vietnamese enterprises involved in electric machinery, textile/apparel, and food/beverage industries are eager to invest in the Hanoi area.

Subsequent interview surveys of the 35 enterprises categorized as "very prospective" for investments in the industrial estates, conducted during the period from December 1994 to January 1995, have revealed that 16 enterprises are most likely to invest in the estates, while others have intention to invest in longer terms or in other sites than those identified in this study. All of the 16 "very prospective" enterprises wish to form joint ventures with foreign enterprises in setting up new factories in the industrial estates. Consequently, it has been concluded that the potential demand of

Vietnamese enterprises for investments in the industrial estates will not be counted independently, but they will be referred to in evaluating the number of potential foreign investors.

2) Demand for Investments by Japanese Enterprises

Questionnaire forms were sent to 2,500 enterprises, and 341 were returned (response rate of 14%). Out of these enterprises, 135 firms indicated their interest in investing in Vietnam and 67 firms were evaluated as "prospective" investors. Of these 67 firms, 30 firms indicated their preference to invest in South Vietnam, and 37 firms were selected as target enterprises for further interview surveys (refer to Appendix-G.2, Para. 1).

The interview surveys of 19 enterprises in Japan revealed that 17 firms were "likely to invest" or "possible to invest" in the Hanoi area. It was presumed that a total of 33 enterprises would be prospective investors, if interview surveys covered all the 37 target enterprises.

33 prospective enterprises were selected on the basis of the sampling survey. By applying the sampling ratio adopted in selecting samples by categories of industry, it has been statistically calculated that a total of 362 enterprises in Japan would be potential investors in the industrial estates to be located in the Hanoi area. The most promising category of industry for investment from Japan is fabricated metal (ISIC 3819). Investments in transportation equipment (ISIC 3843) and electric machinery (ISIC 3831) are also evaluated as promising.

3) Demand for Investments by NIEs and ASEAN Enterprises

Questionnaire surveys were carried out in NIEs (South Korea, Hong Kong, Taiwan, and Singapore) and ASEAN countries (Malaysia and Thailand). 500 samples were selected from each country (3,000 samples in total), and filled-out questionnaire forms were returned from 522 enterprises (average response rate 17.5%). The response rate was quite high in Thailand (36.4%) and low in South Korea. Of the 522 enterprises who replied, 54 indicated they were interested in investing in Vietnam (refer to Appendix-G.2, Para. 2).

The enterprises interested in investing in Vietnam (54 firms) were further checked with respect to the possible location of industries and suitable categories of industry to be located in the proposed industrial estate sites. Consequently, 11 enterprises from the NIEs and ASEAN samples were evaluated as prospective investors in the industrial

estates in the Hanoi area. By applying the sampling ratio adopted in selecting samples by categories of industry, it was calculated that potential investors from the NIEs and ASEAN countries would total 37 enterprises.

4) Overall Potential Demand for Investments in Industrial Estates

Based on the questionnaire and interview surveys in Japan, NIEs and ASEAN countries, as well as in Vietnam, the potential demand for investments in the industrial estates to be proposed in the Hanoi area has been estimated as summarized below (refer to Appendix-G.3).

Potential Demand for Investments

Country/Region	Potential Demand
(Vietnam)	(16)
Japan	362
NIEs and ASEAN	37
Total	399

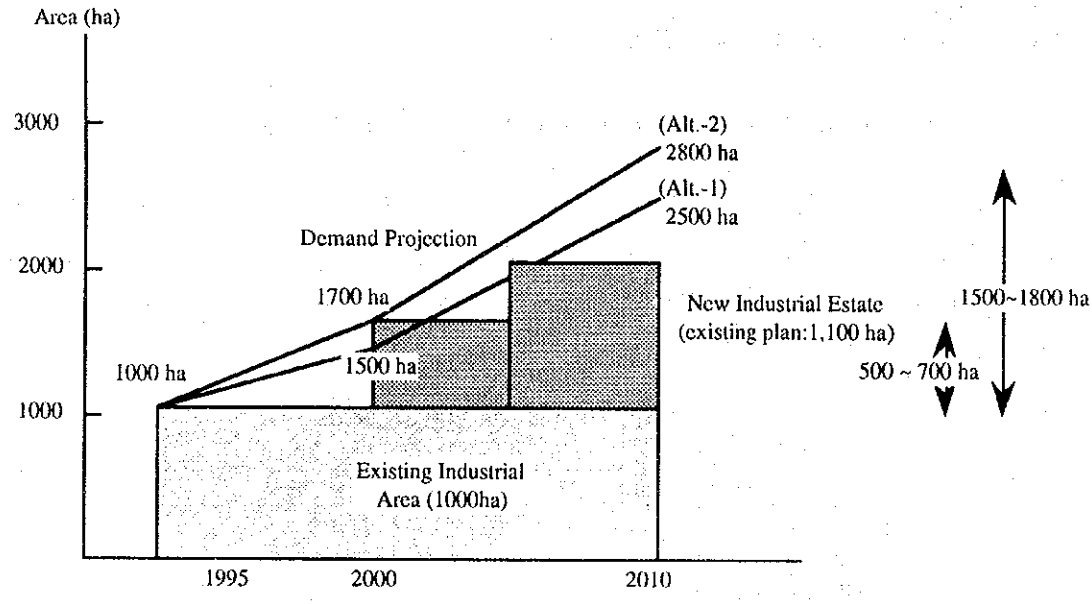
Potential investors from USA, EU and other regions have not been investigated through this Study. For the purpose of planning and evaluating the industrial estate development plan, it is estimated in a rather conservative way that the potential demand for investments in the industrial estates would be around 300 to 400 enterprises. It is further estimated that the factory area required by the potential investors would be around 400 to 800 ha, i.e. 600 ha on average.

5) Macroeconomic Estimate of Demand for Industrial Estates

In parallel with the survey on the demand for investments in the industrial estates in the Hanoi area by means of questionnaires and interviews, as explained above, a macroeconomic estimate of the demand for the industrial estates was conducted for comparison.

On the assumption that the annual growth rate of the industrial sector will be around 15% during the next 5 to 15 years, as expected by SPC, the net area required for industrial use has been estimated by referring to the available statistical data on gross output by regions, number of employed workers in industry, and the gross area for industrial use. It is estimated that the net area of industrial land required in the Hanoi area would be 500-700 ha by the year 2000, and by 1,500-1,800 ha by 2010, as illustrated below.

Macroeconomic Analysis of Demand for Industrial Land



This macroeconomic analysis showed that the industrial land requirements are similar to those estimated by means of questionnaire and interview surveys. Consequently, it has been provisionally concluded that the area to be developed for industrial estates in the Hanoi area by the year 2000 would be around 600 ha, and the area to be additionally developed during the period from 2000 to 2010 would be around 1,000 ha.

6) Prospective Categories of Industries to be Located

Through analysis of the questionnaire survey and interview survey conducted in Japan, NIEs and ASEAN countries, as well as in Vietnam, the categories of industries to be located in the industrial estates to be planned in the Hanoi area have been assessed as summarized below.

Prospective Investors by Category

(%)

ISIC	Category	Japan	NIES/ASEAN	Vietnam
31	Food, beverage & tobacco	3	9	6
32	Textile, apparel & leather	12	9	6
33	Wood & wood products	3	-	6
34	Paper products	-	9	6
35	Chemicals	6	27	6
36	Non-metallic	3	-	20
37	Basic metal products	-	9	6
38	Fabricated metal, Machinery	67	37	44
39	Others	3	-	-
71	Transport	3	-	-
	Total	100	100	100

7.2 Alternative Industrial Estate Sites

As discussed in Section 5.3, several industrial estates are to be developed in the Hanoi area toward the years 2000 and 2010. On the basis of the terms of reference agreed between HPC and JICA for this Study, the selected alternative sites for the development of industrial estates have been studied to work out a program for short-term and medium-term development .

1) Alternative Sites

HPC, through UPI, has worked out a land use plan for the Hanoi area. The plan has designated several areas primarily for industrial use. On the basis of this land use plan, HPC and JICA identified 5 alternative industrial estate sites to be planned and evaluated for development under this Study. These alternative sites include (i) Thang Long North; (ii) Thang Long South; (iii) Dong Anh; (iv) Gia Lam; and (v) Soc Son. The areas for industrial use in these alternative sites are shown below.

Areas of Alternative Sites

			(Gross Area)	Net Area)
1.	Thang Long North		280	197
2.	Thang Long South		220	164
3.	Dong Anh		92	68
4.	Gia Lam		438	276
5.	Soc Son (EPZ)		430	300
6.	Others	Taiwan IE	63	40
		Korean IE	80	55
	Total		1,603	1,100

Of these alternative sites, the Soc Son site has been decided to be developed as an export processing zone (EPZ) by a Malaysian group of investors, and it has been agreed that Soc Son shall be precluded from this Study. The development of the Korean and Taiwan industrial estates has also been agreed to be implemented separately.

It is conceivable that industrial estates would be developed along the National Routes No.5 and No.18 when the highway improvement is realized along with the improvement of Hai Phong port and Cai Lan port. As they would be located outside the Hanoi area, they have been precluded from the study on short-term development of the industrial estates in the Hanoi area.

Consequently, it has been agreed that plans for development of the industrial estates in the Hanoi area will be studied primarily for the (i) Thang Long North; (ii) Thang Long South; (iii) Dong Anh; and (iv) Gia Lam sites.

2) Functions of Industrial Estates

Industries will be collectively located in view of the characteristics of the industrial estates and the facilities to be equipped in the estates. With several EPZs being approved and developed in Vietnam, it was conceivable that a part of the industrial estates would be designated to function as EPZs. Since the Government of Vietnam and HPC are unwilling to develop EPZs in areas other than Soc Son in the Hanoi area, it has been decided not to incorporate a function of EPZ in the alternative industrial estate sites.

It has been well recognized that the freight industry will become more and more important as the level of national economy is enhanced and industrial activities are expanded (see Figure below). Freight industry or freight terminals will incorporate a transport control center, loading and unloading facilities, warehouses, packing industry, etc., and they will be located at the junctions of or along the major transportation networks. In view of the fact that some alternative industrial estates offer favorable conditions for the development of freight industry in and around the Hanoi area, it has been proposed and agreed that development of the cargo distribution centers will be planned along with the development of the industrial estates.

Increasing Role of Distribution Center

	Low-income Economics	Middle-income Economics	High-income Economics
GDP per Capita	Less than $1,300	$1,300 ~ $4,500	more than $4,500
Principal Sector	Agriculture	Industry	Service
Intensiveness	Labor	Capital	Technology
Industrial Park	EPZ	EPZ I/E	I/E
(Distribution Center)	Primary (small-scale)	Developing (medium-scale)	Well-generated (large-scale)

Relations between the location of industrial estates and residential areas have also been studied in the light of the land use plan prepared by HPC/UPI. It has been proposed and agreed that, in the event that the location of the industrial estates is far from the residential centers and that the development of a residential area is desirable not only for the industrial estates development but also for urban development as a whole, development of residential areas near the industrial estate will also be planned along with the development of industrial estates.

3) Conceptual Plan of Development at Alternative Sites

Conceptual plans have been formulated for the development of the industrial estates and their related infrastructure at the selected 4 alternative sites in the Hanoi area. The plans are outlined below.

Thang Long North Industrial Estate

The Thang Long North IE will be located along the new highway which links the center of Hanoi city and Noi Bai international airport. The site has a gross area of about 280 ha, demarcated by the Red river to the south and small villages to the west and north. The land is currently used as paddy fields. The distance between the center of Hanoi city and the Thang Long North IE is about 10 km (refer to Appendix-H.2, Para. 1).

Thang Long North is a cross point where a new highway, railroad, ring road and Route No.2 (extending to the northwest region) converge. In view of the location of Thang Long North, it has been planned and proposed that the site be developed for:

(1) Industrial estate
(2) Cargo distribution center
(3) Residential area

Thang Long North is desirable for location of (i) high value added product type industry; and (ii) machinery and parts industry. For instance, investments in this site will be promoted particularly for:

- Electronic parts (from Japan, etc.)
- Electric machinery (from Japan, NIEs, etc.)
- Electric parts (from Japan, NIEs, ASEAN)

- Transportation/car parts (from Japan)

The land use concept of the Thang Long North site has been formulated as summarized below.

Land Use Plan for Thang Long North

		Ha	(%)	Remarks
1.	Industrial estate			
	Factory lot	197	(70)	
	Roads	23	(8)	
	Utilities	21	(8)	
	Others	39	(14)	IE center, park, etc.
	(Sub-Total)	280	(100)	
2.	Cargo distribution center	50		
3.	Residential area	50		
4.	Others	17		
5.	Total	397		

Internal infrastructure to be developed inside the industrial estate will include, among others; (i) reclamation and land grading; (ii) road networks; (iii) water distribution systems; (iv) sewerage systems; (v) storm water drainage; (vi) electric power distribution; and (vi) telecommunications systems. Of these infrastructure works, land grading will require special attention, because the site should be filled to improve the bearing capacity of the ground and to improve drainage of stormwater.

External infrastructure to be developed outside the industrial estate will include the following major works:

(a) Regional road improvement (6.2 km in total length);
(b) Water purification plant (with a capacity of 33,000 m^3/day) for the factory lot, cargo distribution center, and residential area;
(c) Sewerage facility (with a capacity of 33,000 m^3/day) for the factory lot, cargo distribution center, and residential area;
(d) Electric power transmission line and substation (72 MW);
(e) Telecommunications (5,300 lines).

Thang Long South Industrial Estate

The Thang Long South IE will be located to the north of Tu Liem district, the west suburban area of Hanoi city. The site is demarcated by the Red river to the north and the Nhue river to the east. The gross area of the estate is 220 ha (refer to Appendix-H.2, Para. 2).

Since the Thang Long South site is near the residential area in suburban Hanoi, clean manufacturing industries should be promoted for location in this estate in order to avoid conflicts with residents. A research and development type estate is therefore desirable for this site. It is proposed that the following types of industries be promoted for location in the Thang Long South IE:

- Science institute (public and/or private advanced technological researches);
- Software company (computer software, LSI design);
- Data processing (information service company);
- Design company (CAD, CG, etc.);
- Precision machinery industry.

The Thang Long South IE will not require facilities for a cargo distribution center and residential area. The land use concept for this IE is summarized below.

Land Use Plan for Thang Long South

	(Ha)	(%)	Remarks
Industrial Estate:			
Institute/factory lot	164	(75)	
Roads	22	(10)	
Utilities	18	(8)	
Others	16	(7)	IE center, Park, etc.
Total	220	(100)	

Internal and external infrastructure facilities to be developed for the Thang Long South IE will include the following:

(a) Land filling and grading (approx. 4.4 million m^3);
(b) Transportation networks, including two access roads (6.0 km), two bridges (70 m and 80 m), and internal roads (8.6 km);
(c) Water supply systems (8,200 m^3/day);
(d) Sewage treatment and systems (8,200 m^3/day);
(e) Stormwater drainage;
(f) Electric power supply (33 MW);
(g) Telecommunications (800 lines).

Dong Anh Industrial Estate

The Dong Anh site is located within the Dong Anh industrial zone developed by HPC about a couple of decades ago. It is located about 20 km north of the center of Hanoi city and along the National Route No.3. The existing 22 factories, mainly state enterprises of transportation machinery, metal products, carpet weaving, printing, tile

and brick, etc., are occupying an area of about 68 ha. The land additionally available for development of the industrial estate is limited to about 92 ha. Consequently, the development of the Dong Anh site is planned to consist of the rehabilitation of infrastructure for the existing factory area (68 ha) and expansion for the new estate (92 ha) (refer to Appendix-H.2, Para. 3).

It is desirable that the Dong Anh IE be utilized for the relocation of factories from the central part of Hanoi city, once infrastructures facilities like access roads, water supply and sewerage systems, drainage systems, etc. are improved.

It is provisionally planned that the following types of industries will be promoted for location in the Dong Anh IE:

- Metalworking industry, with centralized facilities for steam and boiled water supply, toxic waste treatment, sewerage treatment;
- Foundry industry in a restructured form as proposed in Section 4.2 (2);
- Machinery industry to be incorporated under the divided work and subcontract systems.

Such functions as cargo distribution center and residential area will not be incorporated in the Dong Anh IE. The land use in the estate is therefore planned as summarized below.

Land Use Plan for Dong Anh

	(Ha)	(%)	Remarks
Industrial Estate:			
Factory lot	68	(73)	Inclusive of an Industrial Center
Roads	7	(8)	
Utilities	10	(11)	
Others	7	(8)	Parks, etc.
Total	92	(100)	

Internal and external infrastructure facilities to be developed at Dong Anh estate will include the following:

(a) Land filling and grading (460,000 m^3);
(b) Access road improvement (1.6 km) and improvement of internal road networks (10.1 km);
(c) Water supply systems (14,000 m^3/day);
(d) Sewerage facilities (14,000 m^3/day);
(e) Stormwater drainage;

(f) Electric power substation (20 MW);
(g) Telecommunications (300 lines).

Gia Lam Industrial Estate

The Gia Lam IE will be located close to the Route No.5 which links Hanoi and Hai Phong, and the Hanoi-Hai Phong railroad, as well as along the Ring Road No.3 planned to be constructed around the urban center. A gross area of 440 ha of land currently used as paddy fields is available for industrial use. An industrial park is being developed by Korean enterprises at the moment and that another industrial park has been approved for Taiwan investors at the site adjacent to the proposed Gia Lam IE (refer to Appendix-H.2, Para. 4).

As it is located at the junction of transportation networks, the Gia Lam site is planned not only as an industrial estate but also as a cargo distribution/trading center. With a distribution center at this location, traffic between Hanoi city and Hai Phong port, as well as Cai Lan port in future, will be managed more efficiently in terms of transportation costs and environmental protection in the urban area. The land in Gia Lam will be therefore developed for:

(1)	Industrial estate	(440 ha. in gross, 300 ha in net)
(2)	Cargo distribution center	(90 ha)

Various categories of industries could be located in the Gia Lam IE. However, in view of its location on the direction of wind to the center of Hanoi city, air pollution industries with gas emission should be avoided. It is desirable that the following categories of industries will be promoted in the Gia Lam IE:

Most Promising Category:

- Metal products
- Electric machinery
- Electric parts
- Transportation parts
- Precision machinery

Promising Category:

- Food/beverage
- Pharmaceutical products
- Wood furniture
- Glassware/kitchenware
- Plastic products
- Cloth dyeing and coating

The land use in Gia Lam is planned as follows:

Land Use Plan for Gia Lam

	(Ha)	(%)	Remarks
1. Industrial Estate:			
Factory lot	277	(63)	
Roads	52	(12)	
Utilities	51	(12)	
Others	58	(13)	Park, drainage canal, etc.
(Sub-Total)	438	(100)	
2. Cargo distribution center	90		
3. Others	149		Interchange, ring road, sewerage, etc.
Total	677		

Internal infrastructure to be developed inside the Gia Lam IE will include (i) land filling and grading of about 8.3 million m^3; (ii) an internal road network with a total length of about 16.9 km; (iii) a water supply system; (iv) a sewerage system; (v) a stormwater drainage system; (vi) electric power distribution; and (vii) telecommunications.

Various external infrastructure facilities are required to be developed, not only for use by the industrial estate but also for utilization by communities in the Gia Lam district. These external infrastructure will include:

(a) Partial construction of the Ring Road No.3 between the Routes No.1 and No.5 (6 km in distance)
(b) Construction of an interchange at the junction of the Ring Road No.3 and Route No.5
(c) Reconstruction of a bridge on the Route No.5 over the Cau Bay river
(d) Water purification plant (46,000 m^3/day)
(e) Sewage treatment plant (46,000 m^3/day for industrial waste water treatment)
(f) Sewage treatment plant (55,000 m^3/day for Gia Lam community waste water treatment)
(g) Stormwater drainage channel
(h) Electric power substation (305 MW)
(i) Telecommunications (1,300 lies)

An initial environmental examination has been conducted on the selected 4 alternative sites, as explained in Appendix-H.3. Each site has some environment impacts, but they have been evaluated as manageable.

7.3 Priority Sites and Development Schedule

1) Selection of Priority Sites

Four alternative industrial estate sites have been preliminarily evaluated to work out a program for the implementation of the industrial estates. The criteria for evaluating the sites have been set as summarized below (refer to Appendix-H.4):

(a) Preference for investments: Results of the questionnaire survey on preference for investments are referred to.
(b) Easiness of development: Access from a highway or inter city roads to the estate is evaluated.
(c) Development costs: Costs of land grading, roads and facilities have been evaluated on a unit cost basis, including not only internal costs but also external costs.
(d) Environmental impacts: Water contamination, wind direction, and other natural environmental impacts, as well as social environment are evaluated on the basis of the initial environmental examination.

Each alternative estate site has been evaluated as summarized below.

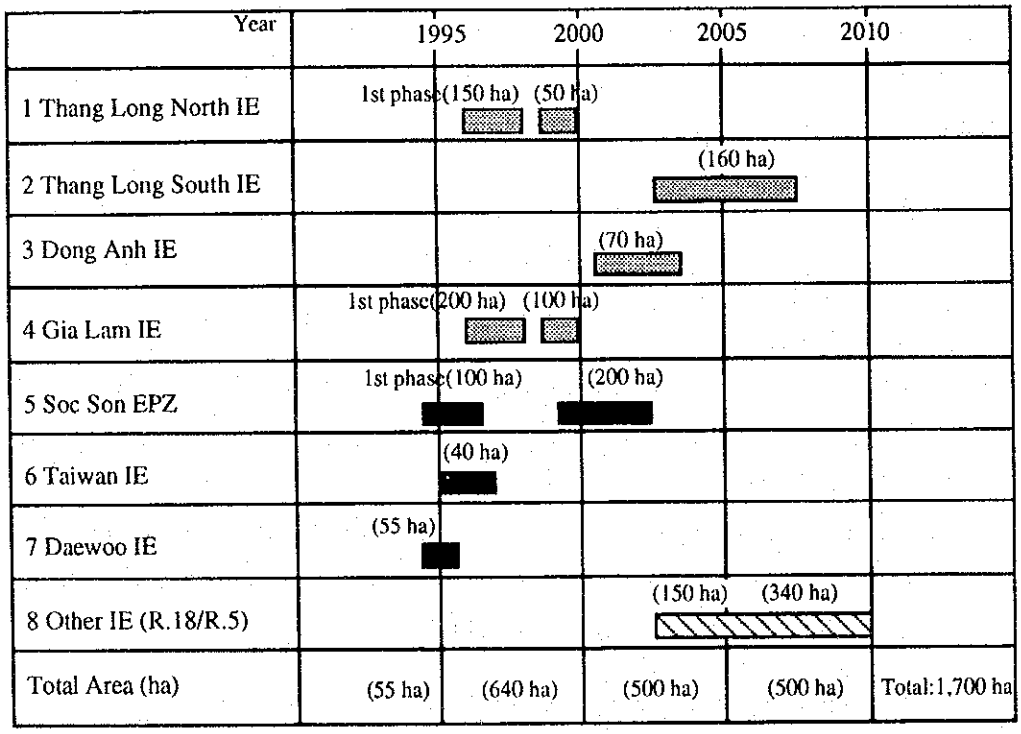
Alternative I/E site	Net Area (ha)	Preference of Development	Ease of Development	Unit Development Cost (%)	Environmental Impact		Overall Rating
					Natural	Social	
1. Thang Long North	197	O	OO	O (100)	O	O	excellent
2. Thang Long South	164	O	Δ	O (100)	Δ	O	good
3. Dong Anh	68	OO	Δ	Δ (150)	O	Δ	good
4. Gia Lam	276	OO	OO	Δ (140)	Δ	O	excellent

Based on the overall rating, it is recommended that the Thang Long North IE and Gia Lam IE be implemented preferably at the first stage of implementation up to the year 2000. The two estates have a total net factory lot of about 500 ha.

2) Development Schedule

As previously discussed, it is planned and proposed that the Thang Long North and Gia Lam estates will be developed at the first stage and completed by the year 2000. The two other estates, Thang Long South and Dong Anh, would be developed later, or during the period between 2000 and 2010. It might also be possible that other industrial estates would be developed along the National Routes No.5 and No.18 when the highway networks are improved and developed.

It is therefore proposed that the short-term and medium-term programs for implementation of the industrial estates in the Hanoi area will be mapped out schematically as follows:



7.4 Institutional and Financial Arrangements for Implementation

For the implementation of the proposed master plan for industrial estates development in the Hanoi area, it is necessary to work out institutional arrangements both at regional and national levels. Likewise, it is required to arrange the implementing body, along with the financial arrangements for the implementation.

1) Institutional Arrangements

As pointed out in Appendix-C.1, Para. 3), the Government promulgated the Regulations on Industrial Zones in December 1994. Under the Regulations, a Management Board of Industrial Zones is organized to work out plans for industrial zone development, promote investments into the zones, issue construction permits, approve land rent and service charges, control service activities in the zones, etc. The responsibility of the local governments as defined in the Regulations is generally to function as supporting agencies for the Management Board. It is understood that the

establishment, operation and management of industrial zones are centrally controlled by the Management Board, and all the revenues accrued from the industrial zones are paid into the state treasury. It is noted, however, that the function and coordination between the state and local governments, as well as the industrial zones and industrial estates are not clearly defined in the Regulations.

This centrally controlled organization would encounter some difficulties in its operations. For instance, all the procedures needed for establishment, operation and management will have to be approved by the Management Board controlled by the ministries and central governmental agencies. This is a time-consuming and inefficient procedure. Initiatives of the local governments would also be diminished. Skills and personnel for operation and management of the estates will not be accumulated at the local level. Regional development through industrial estates development will not be encouraged.

- It is therefore suggestible that a clear destination between the industrial zones and industrial estates be firstly defined. In the event that the Regulations on Industrial Zones are applicable even to the development of industrial estates of less than 500 hectares, it is recommended that the responsibility of local governments for operation and management of industrial estates be expanded, so that the local governments are entitled to take more initiatives and responsibilities for actual operation and management of the estates. In this case, the central Management Board will concentrate its functions on policy-making, guidance and coordination of the estates development, as well as on the promotion of large-scaled inter-provincial industrial zone development.

2) Initiatives for Estate Development

Various types of initiatives are conceived for the implementation of the industrial estates proposed in the master plan. They include (i) private initiative; (ii) local government initiative; and (iii) a combined private-local government initiative. Judging from the financing sources and organizational arrangements, it is recommendable that the combined private-local government initiative be adopted in the initial stage of implementation.

The combined initiative is realized by forming a joint venture between a foreign industrial estate developer and HPC or HPC's local state enterprise. The foreign developer will offer a major equity participation, while HPC or the local state enterprise

will participate in the equity and facilitate land acquisition and compensation. HPC will be able to directly or indirectly intervene in planning, operation, and management of the estate, as well as in the protection of the environment. A loan for construction will be mainly arranged through the foreign developer.

3) Financial Arrangements

For the construction and operation of the industrial estates, it is required to arrange external and internal financing sources. For financial arrangement, estate facilities are classified into (i) internal estate facilities; (ii) internal infrastructure; and (iii) external infrastructure. The internal infrastructure will cover such facilities as electric power and water supply within the estate area. On the other hand, the external infrastructure will cover the facilities which will not serve exclusively for the estates. For instance, construction of a part of the Ring Road No. 3 and an interchange for the Gia Lam estate will serve both the public and the estate.

It is proposed that the construction of the internal estate facilities and internal infrastructure will be financed by the joint venture company for the estate development. For financing of the external infrastructure, it is desirable that a loan on concessional terms be arranged through the central Government.

- ❑ It is therefore recommended that a concessional loan be arranged by the Government for the construction of the external infrastructure that will be required for the industrial estate development.

In the event that the concessional loan is unavailable timely, the joint venture estate developer will have to construct such external infrastructure as far as possible, with its own financial means. In the case of electric power supply to the estates, construction of a high voltage transmission line and substation nearby the industrial estate could be undertaken by Electricity of Vietnam (EVN) with a commercial loan to be arranged by the foreign developer.

VIII. FEASIBILITY OF SELECTED INDUSTRIAL ESTATES

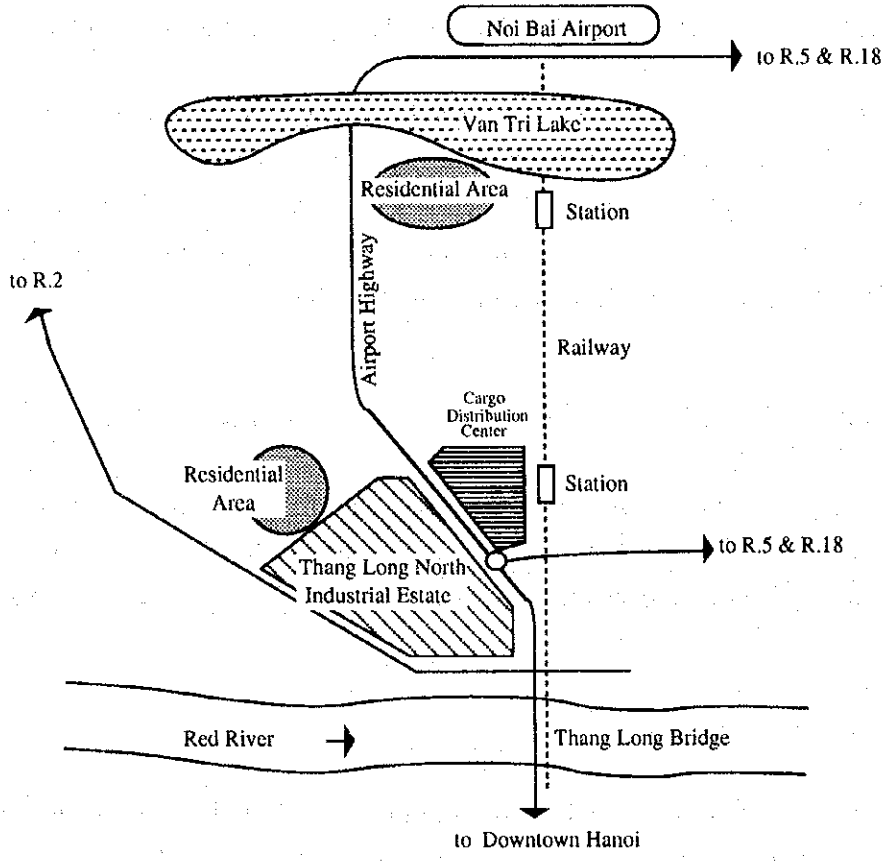
In Chapter VII, a master plan has been formulated for the development of IEs in the Hanoi area, and it has been recommended that the Thang Long North IE and Gia Lam IE be implemented at the initial stage so that they are put into operation by the year 2000. A study has been further conducted to preliminarily evaluate feasibility of the development of the selected IEs as presented in this Chapter.

8.1 Implementation of the Thang Long North Industrial Estate

The Thang Long North IE has been proposed in order to mainly attract foreign investments in the outskirts of Hanoi city. For the implementation of the estate, a preliminary design of major construction works has been prepared (refer to Appendix-I.1).

1) Basic Configurations

As outlined in Section 7.2, the Thang Long North IE will be constructed not only to serve as an IE but also as a cargo distribution center. At the same time, it is proposed to construct a residential area nearby for the employees of the IE and for any people willing to reside in the outskirts of Hanoi city. The distribution of these functions at the Thang Long North IE is illustrated below.



Industries proposed to be established in the Thang Long North IE have been outlined in Section 7.2. A land use plan for the proposed estate has been prepared as shown in Figure 8.1. Further details of basic configurations of the estate are summarized below.

Basic Configurations of the Thang Long North IE

Industrial Estate:	Gross area:	280 ha
	Net factory lot:	197 ha
	No. of lots:	50 - 110 lots
	No. of workers:	40,000
	Water demand:	33,000 m^3/day
	Power demand:	62 MW
Cargo Distribution Center:	Gross area:	50 ha
	Facilities:	Transport control center, Loading/unloading facilities, Warehouses, packing facilities, and Container yards, etc.
Residential Area:	Gross area:	50 ha
	No. of households:	2,000
	Population:	10,000 approx.

2) Major Construction Works

Major construction works of the Thang Long North IE will involve the following:

(a) Land Filling and Grading

Land filling of 2 m in thickness is planned, and fill materials will be obtained from the Red river bed or other borrow pit in the vicinity. The total fill volume is estimated as follows:

Industrial estate	(245 ha)	4,900,000
Cargo distribution center	(50 ha)	1,000,000
Residential area	(50 ha)	1,000,000
External facility area	(17.3 ha)	350,000
Total fill volume		7,250,000 m^3

The filled land is designed to have a gradient of more than 0.5% .

(b) Road Network

It is planned that the Thang Long North IE will have a road network as outlined below.

(Internal Road Network)		
Main road	(w=32.5m)	3.8 km in total
Sub-main road	(w=28.0m)	2.5 km in total
Collector road	(w=21.0m)	1.6 km in total
Traffic signals		1 set
(External/Regional Road Network)		
Public road	(w=28.0m)	2.0 km in total
Public road	(w=21.0m)	4.15 km
Traffic signal installation		1 set

(c) Water Supply Facilities

It is planned to pump and purify groundwater for distribution to the IE, as well as to the cargo distribution center and the residential area (daily maximum capacity: 33,000 m^3/day). Major works for the water supply systems will include:

Intake wells:	12 wells (350 mm dia x 80 m depth)
Conveyance pipe:	2,350 m (300 to 600 mm dia ductile cast iron pipes)
Purification plants:	2 units of aeration tanks, 2-step sand filtration, and chlorination equipment
Reservoir facilities:	2 units x 9,300 m^3, and 10 units of distribution pumps
Distribution pipes:	100 to 1,000 mm dia. ductile cast iron pipes

(d) Sewerage Facilities

Sewerage systems are planned to have a maximum capacity of 33,000 m^3/day, and the sewerage treatment plant is designed so as reduce BOD from 200 mg/l to 40 mg/l, and suspended solids from 200 mg/l to 80 mg/l. Major works for the sewerage facilities will include:

Sewer pipes:	200 to 1,300 mm dia
Relay pump station:	20 m^3/min in capacity
Sewer treatment plant:	4 units of oxidation ditch process plant

(e) Stormwater Drainage:

Drainage canals and retention ponds are planned to discharge rain water from the developed areas. Major works will include:

Drain ditches:	Open drain ditches (U-shape) (0.6 to 1.6 m width)
Retention ponds:	3 retention ponds with a total capacity of 173,600 m^3

(f) Electric Power Facilities

Power demand of the Thang Long North IE is estimated to be 72 MW including 62 MW for the IE, 5 MW for the cargo distribution center, and 5 MW for the residential area and nearby villages. Power supply systems will involve the following works:

Transmission line:	110 kV line from the Dong Anh substation
Substation:	New 72 MW substation

Distribution line: 22 kV line from the new substation

(g) Telecommunications:

About 5,300 new telephone lines will be required, and the existing Dong Anh exchange station will be expanded by Hanoi Posts and Telecoms (HPT). The IE and other areas will be connected with the Dong Anh station by means of optical fiber cables. It has been proposed that HPT will install the facilities and operate them at its own cost and management.

(h) Solid Waste Disposal Facility

Factories are responsible for sorting solid wastes and for pretreatment of toxic/hazardous wastes. Unrecyclable solid wastes will be collected by Urban Environment Company (URENCO) under contract. Due to a lack of centralized treatment facilities for toxic/hazardous wastes in the Hanoi area, the IE will provide a temporary toxic solid waste deposit site of about 35,000 m^2 in the estate.

(i) Industrial Estate Center

An industrial estate center with an operation and maintenance (O/M) office, industrial laboratory/industrial training center, business center, etc. will be a core of the new IE. Necessary facilities for the IE center are proposed below.

	Floor (m^2)	Site (m^2)
1. Administrative O/M office (inclusive of a door service center)	100	4,000
2. Industrial laboratory/industrial training center	1,000	
3. Fire station	50	
4. Business center (bank, courier serv., telecom. office, etc.)	200	
5. Governmental office (custom, local govt., police, etc.)	50	
6. Amenities (restaurant, clinic, kiosk, nursery, etc.)	100	2,000
7. Sports facilities (ball courts, etc.)	-	2,000
8. Others (car parking, etc.)	-	
Total	1,500	8,000

For further reference, a preliminary design of major construction works for the Thang Long North IE is compiled in Appendix-I.

8.2 Implementation of the Gia Lam Industrial Estate

Based on the master plan proposed in Section 7.2, a preliminary design of major construction works for the Gia Lam IE has been prepared (refer to Appendix-I.2).

1) Basic Configurations

The Gia Lam IE will be implemented to serve not only as an industrial park but also as a cargo distribution center. Industries proposed to be established in the estate have been outlined in Section 7.2. A land use plan for the proposed estate has been prepared as shown in Figure 8.2. Further details of basic configurations are summarized below.

Basic Configurations of the Gia Lam IE

Industrial Estate:	Gross area:	440 ha
	Net factory lot:	277 ha
	No. of lots:	90 - 190 lots
	No. of workers:	55,000
	Water demand:	46,000 m^3/day
	Power demand:	125 MW
Cargo Distribution Center:	Gross area:	90 ha
	Facilities:	Transport control center, Loading/unloading facilities, Warehouses, packing facilities, and Container yards, etc.

2) Major Construction Works

Major construction works of the Gia Lam IE will involve the following:

(a) Land Filling and Grading

Land filling of about 1.5 m in thickness is planned, and most of the fill materials will be obtained from the Red river bed. The total fill volume is estimated as follows:

Industrial estate:	(402 ha)	4,710,000
Cargo distribution center	(90 ha)	1,350,000
External facility area	(149 ha)	2,240,000
Total fill volume		8,300,000 m^3

(b) Road Network

Improvement of the Route No.5 is at the design stage and construction of the Ring Road No.3 is at the planning stage. This Ring Road is proposed to be partially constructed between the Routes No.1 and No.5 to serve the Gia Lam IE and as a traffic diversion between the Routes No.1 and No.5. It is also proposed to construct a flyover interchange at the junction of the Route No.5 and the Ring Road No.3. It is therefore planned that the following road network will be constructed in implementing the Gia Lam IE:

(Internal Road Network)		
Main road	(w=32.5m)	4.8 km in total
Sub-main road	(w=28.0m)	11.0 km
Collector road	(w=21.0m)	2.8 km
Traffic signals		3 sets
(External/Public Road Network)		
Ring Road No.3 (Partial)		5.4 km
Interchange at Route No.5/Ring Road		Cloverleaf type
Main road	(w=32.5m)	2.98 km
Reconstruction of bridge on Cau Bay river		20 m span
Traffic signals		7 sets

(c) Water Supply Facilities

It is planned to pump and purify groundwater for distribution to the estate and cargo distribution center (daily maximum capacity: 46,000 m^3/day). Major works for the water supply systems will be:

Intake wells:	16 wells (350mm dia x 80m depth)
Conveyance pipes:	4,000m (300-1,000mm dia ductile cast iron pipes)
Purification plant:	3 units of aeration tanks, 2-step sand filtration and chlorination equipment
Reservoir facilities:	3 reservoirs and 12 units of distribution pumps
Distribution pipes:	100 - 1,200mm dias ductile cast iron pipes

(d) Sewerage Facilities

Two sewerage facilities have been planned: one for the industrial area in and around the estate, and the other for public communities in Gia Lam district.

(Industrial Area)	
Maximum capacity:	46,000 m^3/day
Sewer pipes:	200 - 1,500 mm dia (16 km)
Relay pump station:	1 unit
Sewer treatment plant:	6 units of oxidation ditch process plant
(Community Use)	
Maximum capacity:	55,000 m^3/day
Sewer pipes:	200 - 1,000 mm dia: (49.5 km)
	200 mm dia: (325 km)
Relay pump station:	6 units
Sewer treatment plant:	7 units of oxidation ditch process plant

(e) Stormwater Drainage

Stormwater will be drained to the Cau Bay river through a new artificial drainage channel to be newly constructed.

Drainage channel:	5.8 km (w=3 - 17 m)
Drain ditches:	36.1 km
Retention ponds:	6 retention ponds (895,000 m^3 in total)

(f) Electric Power Facilities:

Power facilities are planned for power supply to the industrial estate: 125 MW, the cargo distribution center: 9 MW, as well as to the communities in Gia Lam districts: 171 MW. Power supply systems will involve the following works:

Transmission line:	25 km of 110 kV line
Substations:	New 207 MW substation
	Expansion of 98 MW of the Gia Lam s/s
Distribution line:	22 kV line from substations

(g) Telecommunications

About 1,300 new telephone lines of will be required, and the existing Gia Lam exchange station will be expanded by HPT. A new remote optical line terminal equipment (OLTE) station is planned to be connected with the Gia Lam exchange station by optical fiber cables. It has been proposed that HPT will install the facilities and operate them at its own cost and management.

(h) Temporary Solid Waste Deposit

Factories will be responsible for sorting solid wastes and for pretreatment of toxic/hazardous wastes. Unrecyclable solid wastes will be collected by URENCO under contract. A temporary toxic/hazardous waste deposit site with a capacity of 60,000 m^3 will be provided in the industrial estate for 20 years. The area required for the waste deposit will be around 5 ha.

8.3 Preliminary Environmental Impact Assessment

The Law on Environmental Protection was ratified in December 1993, and the Government Degree on Guidance for Implementation of this Law was promulgated in October 1994. According to the Environmental Protection Law and the Government Degree, all enterprises must have appropriate waste treatment facilities to meet the environmental standards and to mitigate environmental impacts, pollution and incidents. All industrial enterprises have to organize the treatment of solid, liquid and gas wastes so that effluents have a level specified by environmental standards before being discarded. Likewise, an environmental impact assessment (EIA) must be made for all projects and factories in accordance with the local environmental standards (refer to Appendix-I.3, Para. 1).

Referring to the environmental standards, as well as the Environmental Protection Law and the Government Degree, a preliminary EIA of the construction and operation of IEs at Thang Long North and Gia Lam has been conducted in the course of this Study.

1) Preliminary EIA of the Thang Long North Industrial Estate

(a) Present socio-economic status

The proposed area is divided into five communes and is mostly occupied by agricultural lands. There are no houses and villages inside the proposed area. The agricultural lands consist mostly of paddy fields, with an annual production of 2.5 ~ 2.9 tons/ha. The agricultural land per household is 0.18 ~ 0.24 ha in the whole area. The total number of households in five communes outside the proposed area is reported to be around 8,400, with a population of about 36,800.

Many families have some occupations other than farming, and young people find work in urban areas, including Hanoi city. Through interviews in the villages, it has been revealed that villagers want to live in the villages but are willing to stop farming to do something else. They wish that their children could have more education and training, and have chances to work in factories if they are set up in the vicinity of the villages.

Some of the communes were divided for the construction of the highway to the airport and dozens of houses were demolished. The interview survey revealed that villagers wish that their land be compensated in cash, not by land somewhere else.

There are no cultural buildings, like pagodas and temples in the proposed area, except for four small cemeteries which should be removed through consultation with villagers.

(b) Water and sediment quality

Water and sediment samples were taken from the existing irrigation canals in the proposed area and they were analysed. It has been revealed that BOD and COD values are low, and concentration of nutrients is quite low. Water is not polluted in the proposed area. The sampling/test also revealed that COD and nutrient values are low in sediments.

(c) Impact of project implementation

Industries proposed to be established in the Thang Long estate are mainly assembling industries of electronic parts, electric parts and machinery, as well as transportation/car parts. If assembling is the primary activity, little environmental

problems are foreseeable. In the event that condensers, coolers and other parts are manufactured, some hazardous chemicals and gas will be utilized and care should be taken when selecting the factories to be located in the estate.

The proposed waste water treatment process is conventional, but is suitable for industrial waste water. Aquasanitation or other aquatic weed related systems are not adequate for industrial waste water because of the presence of toxic substances. Attention should be paid to the operation and maintenance of the sewer treatment plant, because there has been no accumulated experience in running this type of treatment system in the Hanoi area. Pumping of treated waste water into the Red river is possible, because the dilution capacity of the river is so large that the impact of treated waste water would be negligible.

Sorting of solid wastes should be done in factories, and recyclable waste should be properly collected. A common storage of hazardous wastes, pretreated in respective factories, is proposed to be installed at a site where leakage into the ground is unforeseeable.

During the construction stage of the Thang Long North estate, there will be substantial changes in landscape, and the ecosystem in the construction area will be destroyed. It is therefore necessary to limit the changes only to the proposed area and to protect the surrounding areas. Special attention should be paid to prevent groundwater pollution and changes in groundwater tables during the construction stage. Safe use of oil and lubricants has to be guaranteed during the construction stage, as well as during the factory operation stage. Sedimentation basins should be constructed to settle soils and prevent suspended solids accumulation in the existing irrigation and drainage channels, as well as in the Red river, during the construction works.

(d) Preliminary EIA

Based on the field survey in the Thang Long North IE site, a preliminary EIA has been conducted as summarized below (refer to Appendix-I.3, Para. 2).

Preliminary EIA of the Thang Long North IE

	Low		Medium		High		No impact	
	1)	2)	1)	2)	1)	2)	1)	2)
Surface water		#			#			
Groundwater	#			#				
Solid waste			#	#				
Air	#			#				
Noise		#			#			
Increase of traffic					#	#		
Ground		#			#			
Ecological system					#	#		
People's health		#					#	
Infrastructure					0	0		
Transportation					0	0		
Landscape				0	#			
Cultural values			#	#				

1) During construction, 2) During operation
0 = Positive impact, # = Negative impact

For the implementation of the proposed Thang Long North IE, it will be required to conduct a more detailed study concerning the impact on natural resources and socio-economic conditions. Environmental monitoring programs during the operation of the estate should also be worked out.

2) Preliminary EIA of the Gia Lam Industrial Estate

(a) Present socio-economic status

The proposed area is mostly used as paddy fields, and it is surrounded by villages, factories, and small forest. Houses are constructed in a chain along the roads, particularly along the Route No. 5. The land use and socio-economic characteristics in Gia Lam are more versatile than in Thang Long North.

(b) Water and sediment quality

Sampling and analysis of water taken at Cau Bay river indicate that BOD and COD are slightly higher than in nonpolluted water, and that a small increase in nitrogen and phosphorus is detectable in the water. COD in sediments is higher, and they are slightly polluted by concentrations of nitrogen, ammonium, phosphorus, and mineral oils.

(c) Impact of project implementation

The proposed factories to be located in the Gia Lam estate will be rather versatile, i.e. metal products, electric parts and machinery, transportation parts, glassware/kitchenware, food/ beverage, etc. Most of these kinds of production will not produce large quantities of waste water or solid waste. The most problematic is food and beverage industry and cloth dyeing and coating industry, which produce harmful waste water. The proposed sewage treatment should mitigate the effluents to a level acceptable under the legislation and standards in force. The treated waste water should be discharged in such a manner that there is as little impact as possible. A discharging point where the dilution capacity is large enough has to be selected. Probably, the treated waste water will have a quite limited impact on drainage channels and rivers (refer to Appendix-I.3, Para. 3).

Retention ponds are proposed to be constructed in the middle of green belts or parks. They will create a pleasing landscape, if they are well maintained.

Sorting, collecting, recycling and storing of solid waste should be done in accordance with local standards, and pretreatment of potentially hazardous wastes should be carried out in the respective factory. A storage of toxic waste should be built so as to prevent leakages into the ground.

Since the Gia Lam estate will be located close to urban communities, attention should be paid to environmental protection during the construction stage. Particular attention has to be paid to the filling and grading of land, as well as to the construction of part of the Ring Road No.3 and the flyover interchange, because the construction volume of these works is substantial. It is required to limit the changes in landscape and ecosystem only to the proposed area of construction and to protect the surrounding areas. Protection of groundwater should be carefully managed.

The construction of a cargo distribution center at Gia Lam will have a large positive impact on the surrounding areas, as well as on traffic in the urban center of Hanoi city.

(d) Preliminary EIA

Based on the field survey, a preliminary EIA of the Gia Lam IE has been carried out as summarized below.

Preliminary EIA of the Gia Lam IE

	Low		Medium		High		No impact	
	1)	2)	1)	2)	1)	2)	1)	2)
Surface water		#	#					
Groundwater	#			#				
Solid waste			#	#				
Air	#			#				
Noise		#			#			
Increase of traffic					#	#		
Ground		#			#			
Ecological system					#	#		
People's health		#					#	
Infrastructure					0	0		
Transportation					0	0		
Landscape				0	#			
Cultural values			#	#				

1) During construction, 2) During operation
0 = Positive impact, # = Negative impact

A further detailed EIA should be conducted before a decision is taken for the implementation of the Gia Lam IE.

8.4 Development Schedule and Estimated Cost

On the basis of the plan and preliminary design proposed in Sections 8.1 and 8.2, a schedule of implementation of the Thang Long North IE and Gia Lam IE has been worked out. Likewise, the construction costs of each estate have been estimated by referring to the preliminary design and implementation schedule.

1) Implementation Schedule

For the development of the Thang Long North IE, it is tentatively programmed that a developer or a joint venture estate development company be formed upon authorization by the central and local governments (SCCI and HPC) by the end of 1995. The developer would start the detailed design and investment promotion, as soon as the authorization for development is granted. The construction works are scheduled to be executed in two stages: the first stage (210 ha) in 1997-1998, and the second stage (70 ha) in 1999-2000.

The implementation of the Gia Lam IE is programmed to follow more or less the same schedule as that for the Thang Long North IE. The Gia Lam estate will also be constructed in two stages: the first stage (290 ha) in 1997-98, and the second stage (148 ha) in 1999-2000 (refer to Appendix-I.4, Para. 1).

2) Estimated Cost of Construction

On the basis of the basic plan proposed for implementation of the Thang Long North and Gia Lam IEs, a preliminary design of major construction works has been prepared and construction costs have been estimated (refer to Appendix-I.4, Para. 2).

Construction costs of the Thang Long North estate and Gia Lam estate have been preliminarily estimated as summarized below.

Estimated Construction Costs

(US$ million)

	Thang Long N.	Gia Lam	Total
1. Industrial Estate	54.7	92.5	147.2
2. Cargo Distribution Center	14.5	13.8	28.3
3. Residential Area	24.6	-	24.6
4. External Facilities			
1) Regional Road	6.6	7.3	13.9
2) Ring Road No.3	-	24.1	24.1
3) Interchange on R 5	-	19.4	19.4
4) Drainage Main Canal	-	20.9	20.9
5) Water Purification Plant	7.5	10.8	18.3
6) Sewerage Treatment Plant	12.1	17.6	29.7
7) Electric Power Substation	5.6	24.7	30.3
8) Telecommunications	1.4	2.0	3.4
9) Others	1.3	9.9	11.2
(Sub-Total)	34.5	136.7	171.2
5. Total	128.3	243.0	371.3

Note: (1) Estimated at 1995 prices.
(2) Cost of engineering services, physical and price contingencies are included in estimated costs.

8.5 Financial Viability

Investments for the establishment of the Thang Long North IE and Gia Lam IE have been evaluated to see whether they are financially viable (refer to Appendix-I.5).

1) Method of Financial Evaluation

Financial viability has been evaluated from the viewpoints of HPC and the IE developer (J/V estate development company).

For HPC, cash outflows consist of (i) cost of land compensation, and (ii) cost of external infrastructure. Cash inflows are mainly income from land rent. For the IE developer, on the other hand, cash outflows include i) land rental fees and ii) development cost of the industrial estate, and cash inflows are income from lot sales.

Financial viability is judged in terms of "Financial Internal Rate of Return (FIRR)", based on cashflow streams of revenues and expenditures.

2) Preconditions for Financial Analysis

Financial analysis has been made on the basis of some preconditions as noted below (refer to Appendix-I.5, Para. 2).

(a) Land rental fees to be charged to the IE developer are presumed to be 0.585 US$/m^2/year. The developer will pay a 3-year advance payment at the initial year, and annual payments from the 4th to 50th years.

(b) Land compensation is presumed to be 2.0 US$/m^2.

(c) Lot sales to enterprises/investors are tentatively estimated at 60 US$/m^2 at current prices, so that the prices are competitive with those of IEs in other Asian countries (for reference, it is 45 ~ 70 US$/m^2 in Thailand, 60 ~ 80 US$/m^2 in Indonesia, and 70 ~ 90 US$/m^2 in China).

3) Financial Viability of the Thang Long North Industrial Estate

On the basis of financial cash flow, FIRR of the Thang Long North IE has been calculated separately for HPC and the IE developer, as summarized below.

Viability for HPC

Land rental (US$/m^2/year)	Infra. cost outside IE	FIRR (%)
0.585	73.6 million US$	4.5%

Viability for Industrial Estate Developer

Lot sales price (US$/m^2)	Land rental (US$/m^2/year)	IE construction	FIRR (%)
60	0.585	54.7 million US$	17.2%

The above calculation implies that the investments by HPC in the infrastructure costs would be less viable. However, in the event that the corporate income tax, turnover tax or VAT and other taxes imposed on the enterprises in the estate are circulated to HPC, financial viability would become higher for HPC.

It is noted that financial viability is sensitive to the land rental fees, both for HPC and the IE developer.

4) Financial Viability of the Gia Lam Industrial Estate

In the same way, FIRR of the Gia Lam IE has been calculated for HPC and the IE developer, as shown below.

Viability for HPC

Land rental (US$/m^2/year)	Infra. cost outside IE	FIRR (%)
0.585	150.5 million US$	3.7%

Viability for Industrial Estate Developer

Lot sales price (US$/m^2)	Land rental (US$/m^2/year)	IE construction	FIRR (%)
60	0.585	92.5 million US$	12.2%

Financial viability for HPC would also be marginal, if the corporate income tax, turnover tax or VAT and other taxes imposed on the enterprises in the estate are circulated to HPC.

8.6 Economic Feasibility

The economic effect of the IE development has been evaluated from the viewpoint of the national/regional economy, by comparing the "with project" and "without project" conditions.

1) Method and Preconditions for Economic Evaluation

Economic feasibility of the IE development has been evaluated by comparison between agricultural production ("without project") and industrial production ("with project").

The agricultural production is provisionally estimated on the basis of (i) yield of 5 tons/ha, and (ii) market price of paddy of 2,300 dongs/kg. The industrial production is estimated on the basis of net product per employee, which is defined as sales minus material cost (including labor cost, depreciation, interest, profit before tax, etc.). The value of "machine/equipment asset per employee" is provisionally estimated at 10,000 US$/employee.

2) Economic Feasibility of the Thang Long North Industrial Estate

Economic feasibility is evaluated in terms of "Economic Internal Rate of Return (EIRR)" on the basis of cashflow. Basic configurations of inflow and outflow are estimated as follows:

Outflow			
	(+)	IE construction cost	$103 million*
	(+)	Capital investment in IE factory lots	$450 million
	(-)	Agricultural production (negative value)	$585,000 / year
		* exclusive of price escalation contingency	
Inflow			
	(+)	Industrial net production from IE factory lots	$366 million / year (in 2010)

On the above assumptions, EIRR is calculated to be 39.4%. This value is far above the opportunity cost of capital in Vietnam, and it is concluded that the investment in the IE is economically feasible.

3) Indicators for Reference

The IE development at Thang Long North would bring about economic effects as preliminarily estimated and indicated below.

Investment amount	:	$450 million
Annual net product (Annual value added)	:	$366 million (= $1.9 million/ha)
Annual turnover	:	$915 million (= $4.8 million/ha)
Annual tax revenue (10% of value added)	:	$36.6 million (= $0.19 million/ha)
Annual foreign exchange earning (30% of turnover)	:	$275 million (= $1.5 million/ha)

IX. PROPOSED PROGRAMS FOR INDUSTRIAL DEVELOPMENT IN THE HANOI AREA

In previous Chapters II to VIII, a number of suggestions and recommendations have been presented for development of the industrial sector and modernization of industries in the Hanoi area. On the basis of these recommendations, a short-term program for industrial development in the Hanoi area in 1995 - 2000 and a medium- and long-term program for 2000 - 2010 have been formulated as explained in this Chapter.

9.1 Short-Term Development Program (1995 - 2000)

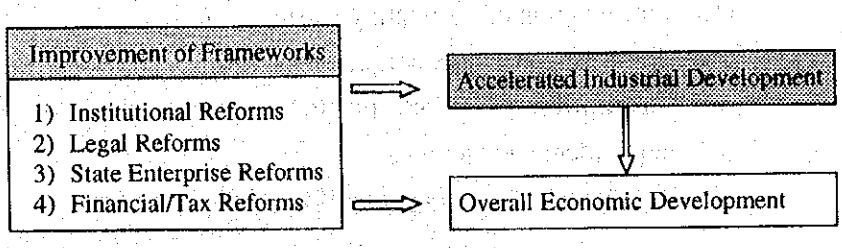
Programs to be implemented during the period from 1995 to 2000 are proposed to improve the frameworks for industrial development, to establish policies for accelerated development of industries, and to promote renovation and modernization of industries and industrial locations in the Hanoi area.

It is proposed that the short-term program be elaborated to attain the following targets:

- GDP in the industrial sector should be greatly enhanced so that it will account for more than 25% of total GDP in Vietnam by the year 2000.
- Productivity of the existing industries in the Hanoi area should double or triple by 2000 from the level in 1994.
- Foreign investments in the manufacturing sector in the Hanoi area should triple or more by 2000 from the level in 1994.
- Industrial employment in the Hanoi area should double (100,000 new jobs) by 2000.

More specifically, it is proposed that the short-term program will incorporate the following:

1) Improvement of Frameworks for Industrial Development



(1-1) Promotion of Institutional Reforms:

(a) Administrative reforms

- Formation of MOI by reorganizing MHI and MLI.
- Reinforcement of GDMCA
- Establishment of a BOI

(b) Improvement of the compilation of industrial statistics

- Establishment of systems of industrial statistics
- Promotion of the exchange of information among the authorities concerned with industrial development
- Promotion of the publication of data and information

(1-2) Promotion of Legal Reforms:

(a) Establishment of modern accounting standards

(b) Replacement of the turnover tax by VAT

(c) Reforms of other taxes, including a unified rate of profit tax, elevated rate of capital tax

(d) Lending mortgages on land use rights (state enterprises) and enactment of the Mortgage Law

(e) Enactment of the Privatization Law and State Enterprise Law

(f) Amendment of the Company Law to allow single ownership

(g) Amendment of the Foreign Investment Law to allow acquisition of shares of privatized enterprise by foreign capital

(1-3) Promotion of Equitization/Privatization:

(a) Promotion of the equitization program

(b) Promotion of privatization through restructuring of existing industries

(c) Introduction of foreign capital and technologies

(d) Establishment of a "Privatization Fund"

(1-4) Reinforcement of Financing Systems:

(a) Circulation of private domestic savings into a formal banking system

(b) Authorization of dollar bank account holding and issuance of unregistered bonds to mobilize private savings

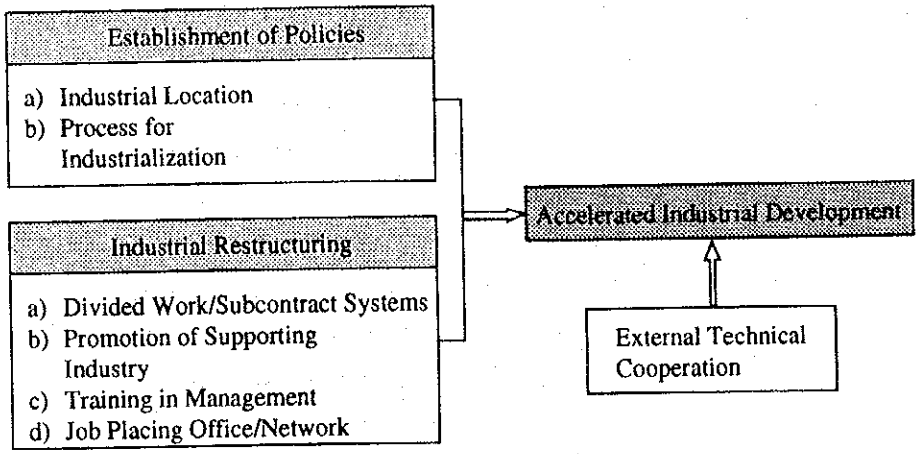
(c) Introduction of on-lending (2-step) loans

(d) Improvement of tax collection systems

(e) Promotion of financing for modernization of industrial equipment and facilities

(f) Study on full liberalization of the bank interest rate structure

2) Establishment of Policies for Accelerated Industrial Development



(2-1) Establishment of Industrial Development Policies:

(a) Establishment of a policy on nationwide industrial location

(b) Establishment of a policy on industrialization and trade

(2-2) Establishment of a Basis for Industrial Renovation and Re-structuring:

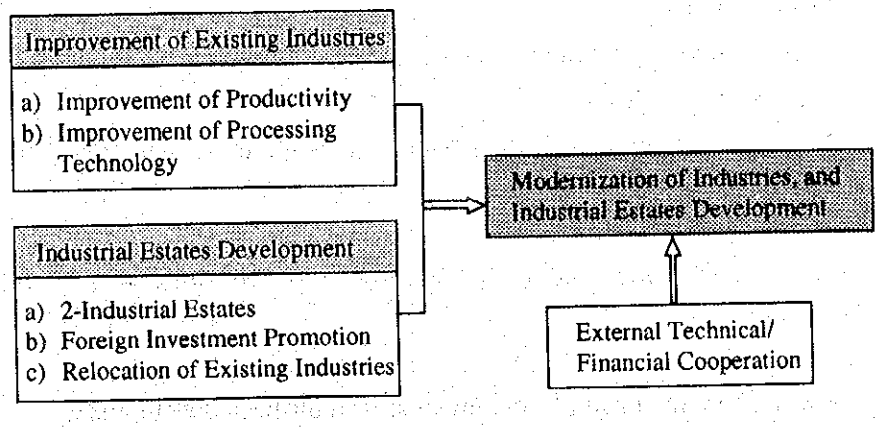
(a) Promotion of the divided work and subcontract systems, with specific attention to foundries and machine tools

(b) Promotion of supporting industries

(c) Capacity building through training in industrial enterprise management

(d) Establishment of job offering/job hunting information network and job placing office system

3) Promotion of Modernization of Industries and Industrial Location



(3-1) Improvement of Industrial Productivity in the Hanoi area
  (a) To at least double productivity in respective categories of industry
  (b) To improve processing technologies
  (c) To introduce foreign technologies and marketing
(3-2) Development of Industrial Estates
  (a) Development of the Thang Long North estate (about 200 ha)
  (b) Development of the Gia Lam estate (about 300 ha)
  (c) Promotion of foreign investments in industrial estates
  (d) Relocation of existing industries and industrial areas

The proposed programs and the organizations responsible for promotion of the programs are illustrated on a "matrix" shown in Table 9.1.

9.2 Medium- and Long-Term Development Program (2000 - 2010)

Under the medium- and long-term program up to the year 2010, it is proposed to further promote improvement of frameworks for industrial development, to further promote policies to accelerate the renovation of industries, and to further promote the modernization of industries and industrial locations. It is envisaged that the medium- and long-term program will be elaborated to attain the following targets:

- GDP in the industrial sector should be further increased, so that it will account for more than 35% of total GDP of Vietnam by 2010.
- Industrial productivity in the Hanoi area should be further enhanced (for instance, productivity in machinery industry should be increased 5 times the level in 2000).
- Foreign investments in the manufacturing sector in Hanoi should more than triple in 2000 - 2010.
- Industrial employment in the Hanoi area should more than double in 2000 - 2010.

It is proposed that the medium- and long-term programs will specifically incorporate the following:

1) Further Improvement of Frameworks for Industrial Development:

(1-1) Further Promotion of Institutional Reforms, including: administration reforms in line with the promotion of privatization of state enterprises

(1-2) Further Promotion of Legal Reforms, including: consolidation of tax reform, establishment of the auditing system

(1-3) Further Promotion of Privatization, including: privatization of central and local state enterprises, promotion of foreign participation in privatization

(1-4) Further Reinforcement of Financing Systems, including: further promotion of the bank saving systems, finance for foreign trade, introduction of trade insurance systems, and liberalization of bank interest rates

2) Strengthening of Policies for Accelerated Industrial Development:

(2-1) Strengthening of policies for industrial development, including: industrialization of the North Economic Triangle, and promotion of export-oriented industries

(2-2) Promotion of modernization of industrial management, including: further promotion of the divided work and sub-contract systems, and further promotion of supporting industries

3) Further Promotion of Modernization of Industries and Industrial Locations:

(3-1) Further improvement of productivity, including: enhancement of labor productivity, incessant improvement of processing technologies and marketing, mobilization of more local investments.

(3-2) Development of Additional Industrial Estates, including: development of the Thang Long South estate, Dong Anh estate, and other estates along the Routes No.5 and No.18.

9.3 External Cooperation

To realize the development programs as proposed in Sections 9.1 and 9.2, it is suggestible that external assistance and cooperation, either on as bilateral or multi-lateral basis, be sought by SPC and the ministries concerned for the following:

(1) Formulation of a nationwide industrial location plan (Technical Cooperation):

To formulate a nationwide industrial location plan, as suggested in this Study, it is suggested that the Government of Vietnam request external technical cooperation so that SPC and a foreign agency would jointly work out such a plan that will serve as a guideline for the future location of industries in each region of the country.

(2) Execution of a model case study on renovation of the foundry industry (Technical Cooperation):

To prepare a detailed program for renovation of the foundry industry in the Hanoi area, it is suggested that the Government of Vietnam request external technical assistance so that MHI and a foreign agency would jointly elaborate such a model renovation plan.

(3) Technical advisory services by foreign experts (Technical Cooperation):

It is suggestible that technical advisors be dispatched to accelerate the industrial development. The following advisors are required:

- Industrial development policy expert to jointly work with SPC;
- Industrial statistical expert to advise the Department of Statistics;
- Production management experts to advise MHI or other institute on the improvement of machinery and metalworking industry;
- Experts to introduce and promote the 5S Initiative in the existing industries.

(4) Technical assistance in training in industrial enterprise management (Technical Cooperation):

It is suggestible that MHI or HPC request technical assistance in training in industrial enterprise management (as proposed in Section 4.3, Para.2).

(5) Training of factory managers in advanced countries (Technical Cooperation):

It is suggestible to request foreign technical assistance agencies, bi-lateral and multi-lateral, in group training of factory managers by category of industry.

(6) Enhancement of environmental monitoring systems (Technical/Financial Cooperation):

It is suggestible that MOSTE request training of staff and facilities for environmental monitoring.

(7) Private investments in development of the industrial estates:

It is suggestible that HPC initiate discussions and conclude agreement(s) with private investor(s) for development of the Thang Long North and Gia Lam industrial estates (internal facilities).

(8) Financial cooperation for implementation of the external infrastructure for development of the industrial estates:

It is suggestible that HPC request foreign financial cooperation in constructing the external infrastructure for the Thang Long North and Gia Lam industrial estates.

(9) Financial cooperation for on-lending (2-step) loans:

It is suggestible that the Ministry of Finance and/or Incombank request financial cooperation for the pilot operation of on-lending (2-step) loans for industrial development, primarily in the Hanoi area.

(10) Financial cooperation to expedite improvement of infrastructure in the North Economic Triangle (NET):

Improvement of infrastructure in NET (including ports, highways, ring roads, bridges, power supply systems, sewerage systems, etc.) should be expedited for industrial and economic development in the North, and it is suggested to obtain financial cooperation for the earliest implementation of such infrastructure facilities.

TABLES

Table 1.1 Participants in The Study (1/2)

Position	Name	Organization
(Steering Committee)		
President	Prof. Nguyen Ngoc Le	Vice-Chairman, HPC
	Dr. Dinh Hanh	Vice-Chairman, HPC
Vice-President	Prof. Dr. Le Van Vien	General Director, HPC
Vice-President	Dr. Pham Khue	Hanoi City Planning Committee
Member	Dr. Vu Ngoc Xuan	Director, SPC
Member	Dr. Nguyen Lan	Director, HPC
Member	Mr. Dang Duy Phuc	Director, HPC
Member	Mr. Hoang Van Loan	Deputy Director, MHI
Member	Mr. Nguyen Lan Con	Deputy Director, MLI
Member	Prof. Dr. Tran Van Dac	Director, MOSTE
(Working Group under SC)		
Member	Mr. Nguyen Nhu Lai	Chief, Industrial Division, HPC
Member	Mr. Nguyen Duong Ty	Chief, Technical Division, HPC
Member	Mr. Le Van Hoc	Senior Expert, SPC
Member	Mr. Nguyen Xuan Thu	Senior Expert, SPC
Member	Mr. Nguyen Thai Long	Deputy Chief, HPC

Table 1.1 Participants in The Study (2/2)

(Counterpart Experts)	Name	Organization
Chief Counterpart	Mr. Van Tan Ho	UPI
Coordinator	Mr. Nguyen Thai Long	HPC
Counterpart	Mr. Pham Kim Son	SPC
ditto	Mr. Nguyen Xuan Thu	SPC
ditto	Mr. Le Duy Minh	MLI
ditto	Mr. Tran Van Kim	MLI
ditto	Mr. Nguyen Duc Tuan	MLI
ditto	Mr. Nguyen Van Duc	MLI
ditto	Mr. Nguyen Trong Hoan	MHI
ditto	Mr. Nguyen Danh Khien	MHI
ditto	Dr. Nguyen Dac Hy	MOSTE, NEA
ditto	Mr. Do Viet Chien	UPI
ditto	Mr. Duong Manh Quan	UPI
ditto	Mrs. Dao Thu Huong	UPI
ditto	Mr. Le Thach	UPI
ditto	Mr. Nguyen Trong Hiep	UPI
ditto	Mrs. Nguyen Minh Lien	UPI
ditto	Mr. Nguyen Nhu Lai	HPC, Planning Dept.
ditto	Mr. Nguyen Van Suu	"
ditto	Mrs. Vu Thu Huong	"
ditto	Mr. Le Van Thinh	"
ditto	Mr. Duong Xuan Ty	HPC, Industrial Dept.
ditto	Mr. Vu Lan	"
ditto	Mr. Nguyen Tien Dat	"
ditto	Mr. Do Hong Lang	"
ditto	Mr. Nguyen Van Ho	Hanoi Electric Co.
ditto	Mr. Nguyen Huu Thanh	"
(Study Team)		
Team Leader	Mr. H. Koizumi	Nippon Koei
Sub-Team Leader	Mr. M. Akagawa	Nippon Koei
Sub-Leader	Mr. K. Yamane	Tecno Consultants
Sub-Leader	Mr. I. Asakura	Nippon Koei
	Mr. M. Kaneko	Nippon Koei
	Mr. H. Takahashi	Nippon Koei
	Mr. N. Oshima	Nippon Koei
	Mr. I. Asano	Tecno Consultants
	Mr. Y. Ishii	Nippon Koei
	Mr. H. Ninomiya	Tecno Consultants
	Mr. M. Nagai	Tecno Consultants
	Mr. T. Yoshida	Tecno Consultants
	Mr. Y. Miyamoto	Tecno Consultants
	Mr. K. Seki	Pacific Consultants International
	Mr. T. Shoji	Pacific Consultants International
	Mr. M. Izawa	Nippon Koei
	Mrs. Helena Ahola	Nippon Koei
	Mr. K. Ueno	Nippon Koei

Table 9.1 Proposed Program and Responsibility Matrix (1/2)

(A) Short-Term Program

Proposed Program \ Organization	Gov. off.	SPC	SCCI	MOF	GDMCA	SBVN	MHI	MLI	MOSTE	HPC
1. Improvement of Frameworks										
1.1 Institutional Reforms:										
- Establishment of MOI	◎						○	○		
- Reinforcement of GDMCA				○	◎					
- Establishment of BOI		○	◎							
- Industrial statistics	◎						○	○		○
- Exchange of information	◎	○	○	○	○	○	○	○	○	○
- Publication of data/information	◎	○		○		○	○	○	○	○
1.2 Legal Reforms:										
- Modern accounting standards				◎	○					
- Introduction of VAT		○		◎		○				
- Other tax reforms		○		◎		○				
- Mortgage Law	○	○		◎		○				
- Privatization Law	○	○		◎						
- Amendment of Company Law	○	◎	○							
- Amend. of Foreign Invest. Law		○	◎							
1.3 Equitization/Privatization:										
- Promotion of equitization		○		◎	○		○	○		○
- Privatization thru restructuring		○		○	○		◎	◎		○
- Privatizaton fund		○		◎	○	○	○	○		○
1.4 Financing System Reinforcement:										
- Circulation of domestic savings		○		◎		○				
- Dollar account/unregistered bonds		○		○		◎				
- On-lending (2-step) loan		○		◎		○				
- Tax collection system improv.		○		◎		○				
- Liberalization of bank interests		○		◎		○				
2. Establishment of Policies										
2.1 Industrialization Policies:										
- Nationwide industrial location	○	◎					○	○	○	
- Industrialization and trade policy	○	◎					○	○		
2.2 Renovation/Restructuring:										
- Divided work & subcontract systems		○	○	○			◎	◎		○
- Supporting industries		○	○				◎	◎		○
- Industrial management training			○				◎	○	○	○
- Job information network	○	○	○				○	○		○
3. Modernization of Industries										
3.1 Productivity Improvement:										
- Doubling of productivity							◎	◎		◎
- Processing tech. improvement							◎	◎	○	◎
- Foreign technology/marketing			○				◎	◎		◎
3.2 Industrial estates:										
- Thang Long North IE			○							◎
- Gia Lam IE			○							◎
- Foreign investment promotion			◎				○	○		○
- Relocation of existing industries							○	○	◎	○

Note: ◎ Prime responsibility
○ Co-responsibility

Table 9.1 Proposed Program and Responsibility Matrix (2/2)

(B) Medium and Long-Term Programs

Proposed Program \ Organization	Gov. off.	SPC	SCCI	MOF	GDMCA	SBVN	MHI	MLI	MOSTE	HPC
1. Improvement of Frameworks										
1.1 Institutional reforms, including reforms for privatization		○		◎	○					
1.2 Legal reforms, including tax reforms, auditing system		○		◎		○				
1.3 Promotion of privatization, including foreign capital participation		○	○	◎			○	○		○
1.4 Reinforcement of financing, including bank savings, trade promotion		○		◎		○				
2. Policies for Accelerated Development										
2.1 Promotion of industrialization (export-oriented industries)		○					◎	◎	○	○
2.2 Modernization of management, including divided work, subcontract systems and supporting industries			○				◎	◎		◎
3. Modernization of Industries										
3.1 Further productivity improv., including technology/marketing							◎	◎		◎
3.2 Industrial estates development			○				○	○	○	◎