

**Feasibility Study on Bang Saphan Industrial Estate**

**(Final Report)**

**APPENDICES**

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## APPENDIX A INVESTMENT DEMAND IN BANG SAPHAN

### INDUSTRIAL ESTATE

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## APPENDIX A INVESTMENT DEMAND IN BANG SAPHAN INDUSTRIAL ESTATE

### A.1 Results of Investment Demand Survey

#### A.1.1 Questionnaire Survey Results

##### (1) Methodology of Surveys

##### i) Target Enterprises for Survey

The Study Team conducted the questionnaire survey of enterprises in Thailand, Japan, U.S.A, Taiwan, and South Korea.

The target industries were as follows.

- Industries related with iron and steel
- Industries related with regional resources

Target enterprises for survey were selected by using the following directories.

Thailand	- Factory in Industrial Estate 1995-1996 - Manufactures and Exporters 1994-1994 - Thai Industrial Machinery Equipment Directory - Directory of Thai Tool and Die Manufacturers 1993-1994 - Investment Opportunities Study Automotive and Autoparts Industries in Thailand - Japanese Overseas Investment 1995
Japan	- Cosmos; Teikoku Data Bank Ltd. - Japanese Company 2,000; Toyo Keizai Inc.
U.S.A	- Dun & Bradstreet Directory
Taiwan	- Taiwan Top 1,000 Manufacturing Industries - Taiwan Buyer's Guide
Korea	- Directory of Top 3,000 Korean Companies

As a result of selection, the number of enterprises for survey in each country is shown below.

Thailand	Japan	U.S.A	Taiwan	South Korea	Total
2,880	2,383	1,000	1,000	500	7,763

ii) Preparation of Questionnaire Form

The questionnaire included the following items to assess the possibility to invest in the Bang Saphan Industrial Estate as well as the required supporting facilities in the vicinity of the industrial estate.

- Major products
- Number of employees
- Capital amount
- Annual shipments
- Factory area
- Electric power consumption
- Water consumption
- Investment plan
- Required location conditions in BSIE
- Interest in the Bang Saphan Industrial Estate

The distribution and collection of questionnaire form were made by mail. The questionnaire form was delivered together with a pamphlet to introduce the profile of the Bang Saphan Industrial Estate.

The date of distribution and collection in each country was as follows.

	Thailand	Japan	U.S.A	Taiwan	South Korea
Distribution date	Dec.13, 95	Jan.10, 96	Jan.18, 96	Jan.10, 96	Jan.10, 96
Collection date	Jan.20, 96	Feb. 9, 96	Feb.29, 96	Feb.27, 96	Feb. 9, 96

(2) Result of Survey

i) The Rate of Response

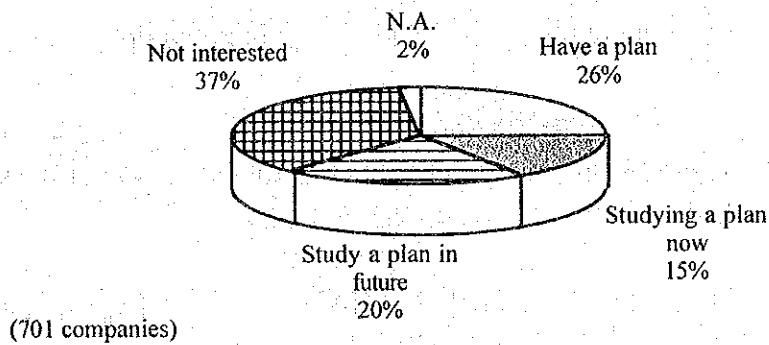
The rate of response is shown below. The average rate of the five countries was 11.6 %. The highest rate was that of Taiwan, 20.1 %, the lowest Thailand, 6.9 %.

	Thailand	Japan	U.S.A	Taiwan	South Korea	Total
No. of response	200	200	200	201	100	901
Response rate (%)	6.9	8.4	20.0	20.1	20.0	11.6

ii) Investment plan

In the survey conducted in the four countries excluding Thailand, more than 60% of enterprises showed the possibility to invest in a foreign country, such as answering “Have a plan”, “Studying a plan now” and “Study a plan in future”. This result indicated that not a few companies in each country were interested in investment abroad.

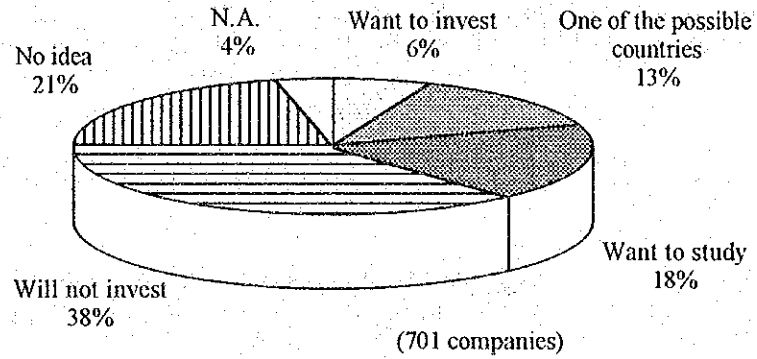
Plan to Invest Abroad in Near Future



The Study Team asked the question “What do you think of Thailand as a foreign country?”. 37% to the total replied “Want to invest”, “One of the possible countries”, or “Want to study”. This means that one third of enterprises interested in investment abroad thought of Thailand as a promising country.

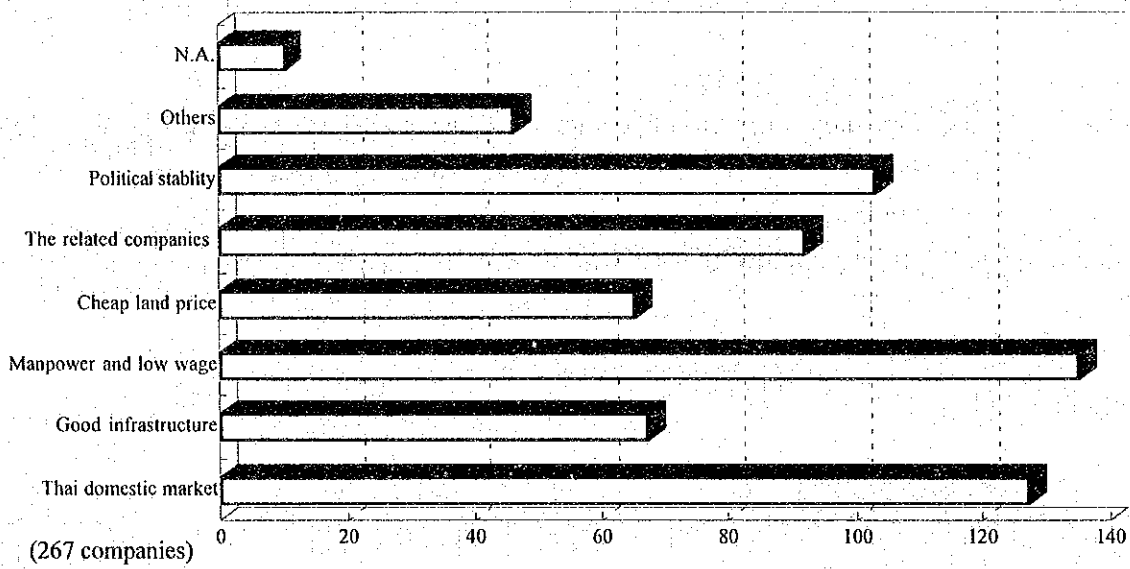


### What do you think about Thailand?

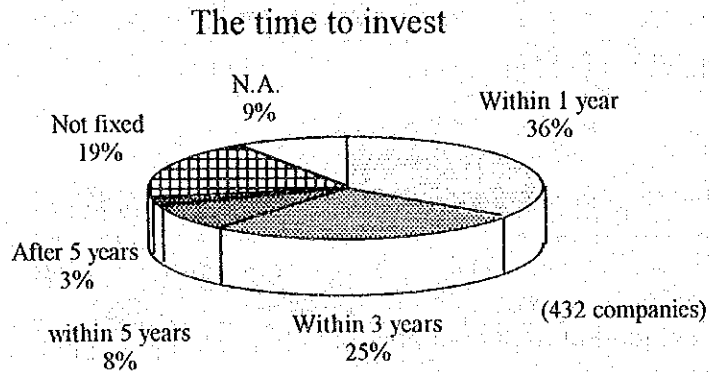


The major reasons for having an interest in Thailand were rich manpower, low wages, market scale of Thailand and political stability.

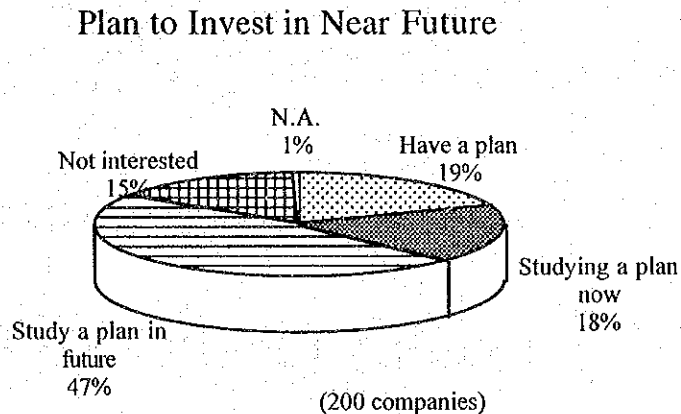
### The Reason for Interest in Thailand



As for the investment schedule, 61 % of companies answered “Within one year” or “Within three years”, that means a considerable number of enterprises wanted to invest in near future.



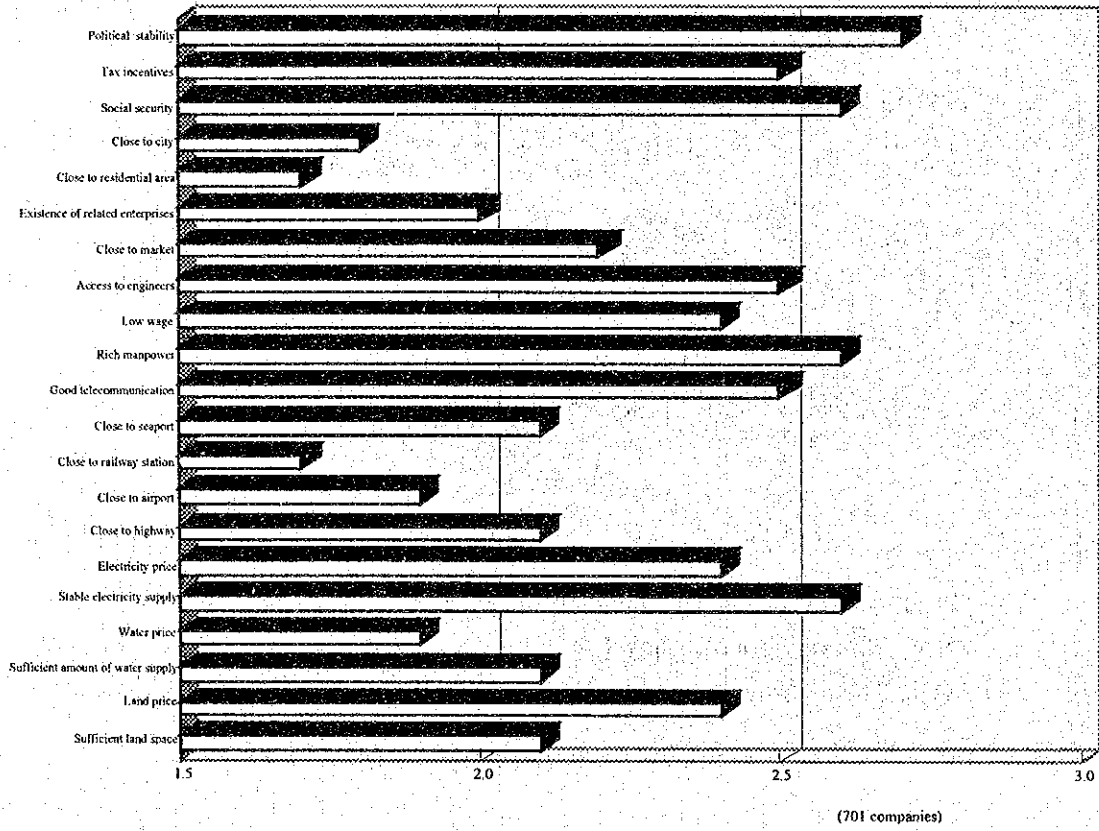
In the survey of the Thai companies, the rate of companies answering “Have a plan”, “Studying a plan now” or “Study a plan in future”, reached not less than 84%. The investment boom in Thailand is still growing as economy expands.



iii) Factors to decide factory location

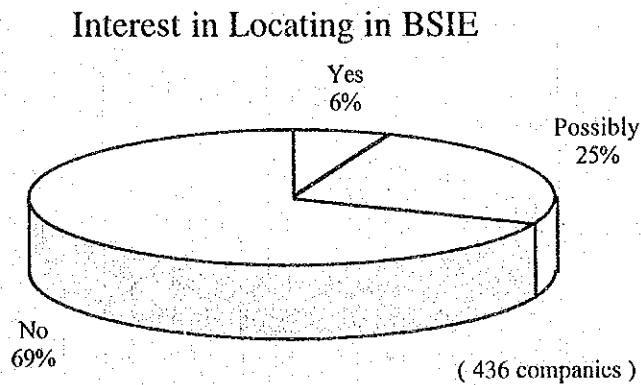
In the survey except Thai companies, the Study Team asked how important enterprises thought of factors when selecting a site. The high ranked answers were “Political stability”, “Tax incentives”, “Social security”, “Rich manpower”, “Access to engineers”, and “Stable electricity supply”.

### Location Factor

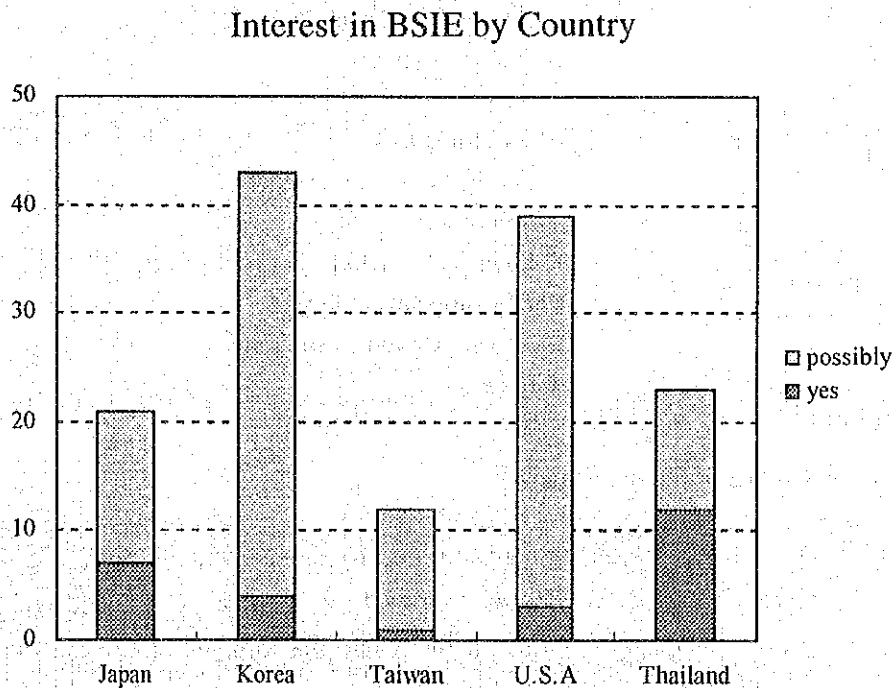


iv) The possibility of locating in the Bang Saphan Industrial Estate

The number of companies answering "Yes" was 27 and the rate was 6%, the companies answering "Possibly" was 111 and 25%. Thus a total of 138 enterprises (31%) showed some interest in investment to the Bang Saphan Industrial Estate.

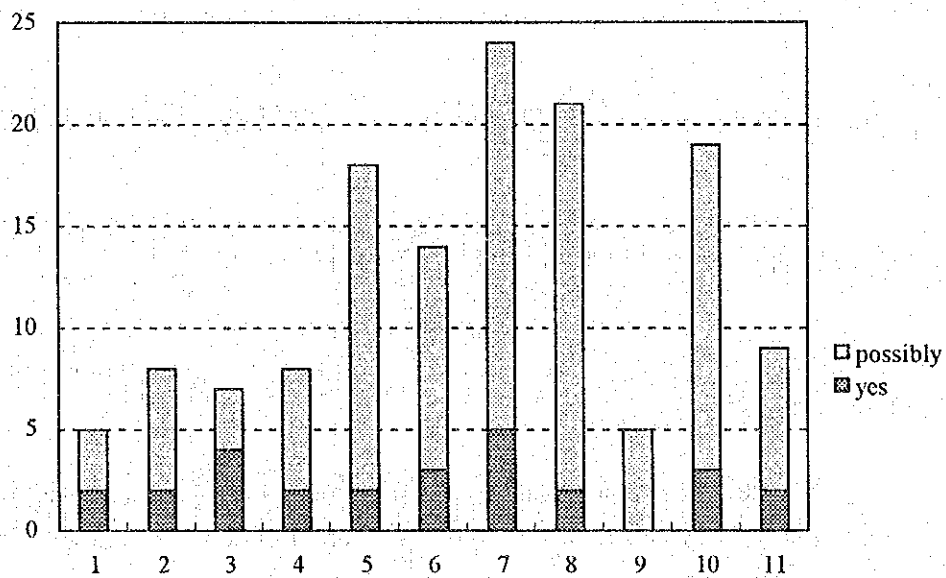


By country, Thailand had the largest number of companies answering "Yes", 12, followed by Japan with 7. If "Yes" with "Possibly" are combined, Korea had the largest number, 43 companies, followed by the U.S.A with 39.



By type of industry, machinery had the most “Yes”, 5, followed by rubber & plastic, 4. Combined “Yes” with “Possibly”, the industries showing large number were machine industries such as machinery, electric machinery and transportation equipment and iron and steel industries such as basic metal and fabricated metal.

Interest in BSIE by Type of Industry

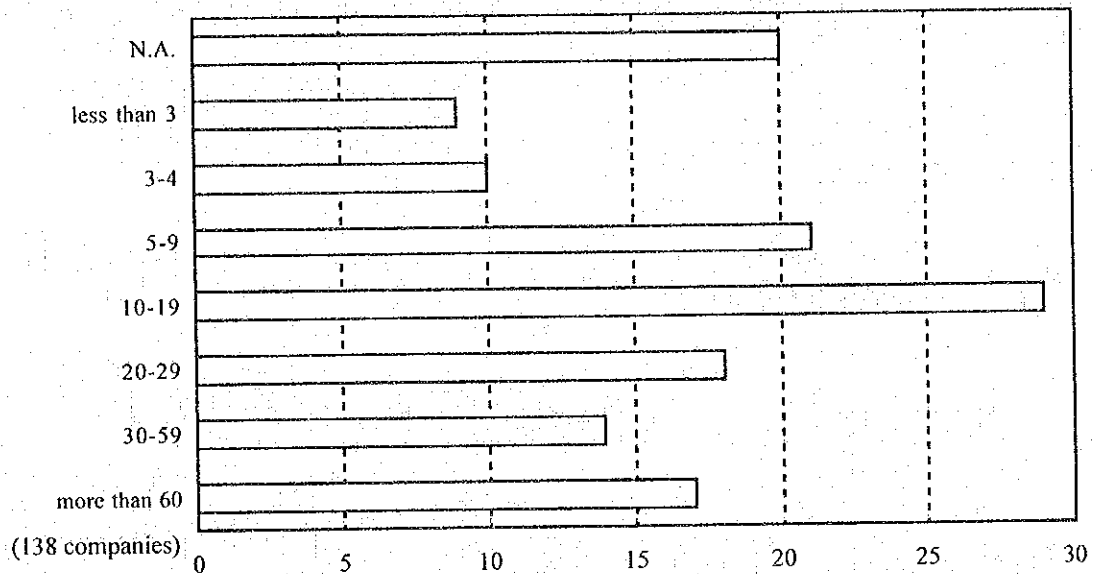


- 2 Petroleum & chemical
- 3 Rubber & plastic
- 4 Clay pot
- 5 Basic metal
- 6 Fabricated metal product
- 7 Machinery
- 8 Electrical machinery
- 9 Precision machinery
- 10 Transportation equipment
- 11 Others

v) Outline of the investment

Most answers concerning land area for investment in Bang Saphan Industrial Estate indicated 10 - 19 rai, followed by 5 - 9 rai. Compared with the average present land area, 28 rai, in the Thai questionnaire, these answered numbers seem to be small. It is remarkable that 17 companies answered “more than 60 rai”.

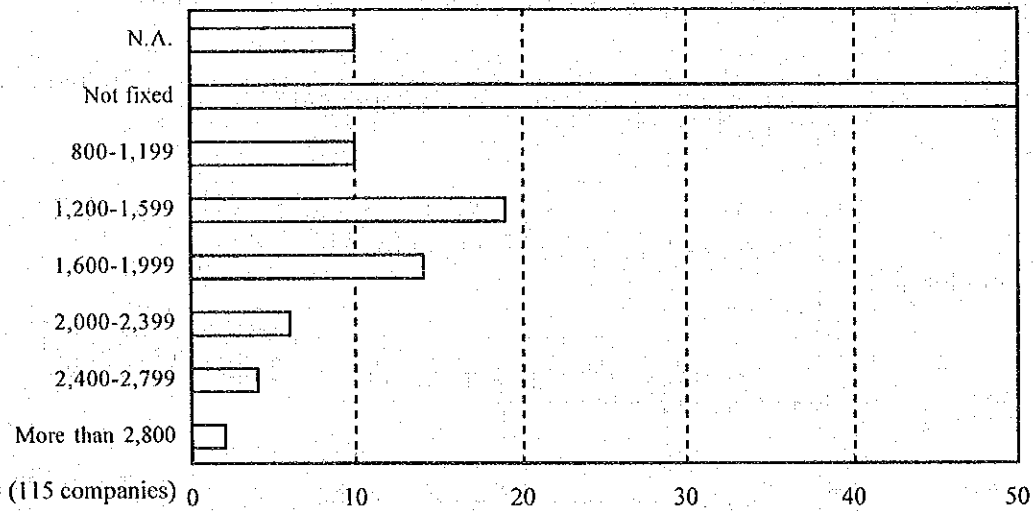
### Land Area (rai)



To estimate the demand for land area, it is necessary to get the basic unit of land area. The Study Team calculated the average by means of the medium value of answers, for example 3.5 for 3-4. As a result, 25 rai (40,000m<sup>2</sup>) is the average of 138 companies. This is not included in the 10-19 range which is answered by 29 companies. The reason is that "more than 60 rai" includes considerably larger areas such as 70 rai.

As for land price, the most prominent answer was "not fixed". Excluding this answer, 1.2 million Baht / rai - 1.6 million Baht / rai was the most selected answer. Considering that present land price in other industrial estates is 1.5 million Baht / rai - 2 million the Baht / rai, this answer was a little bit cheaper.

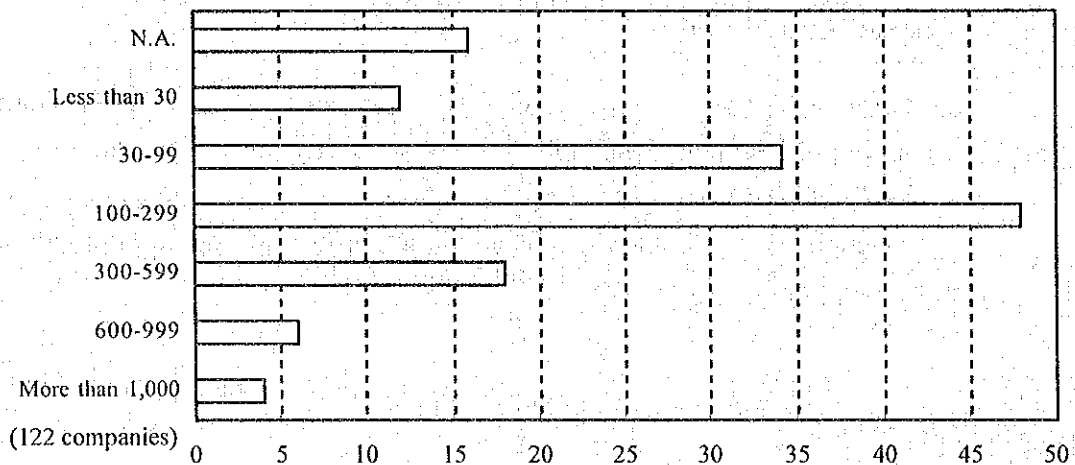
### Land Price (1,000 Baht/rai)



The Study Team calculated the average of the 55 companies which gave the figures. The result was about 1,684,000 Baht / rai (1,050 Baht / m<sup>2</sup>).

The employee scale of a new factory in Bang Saphan was assumed at 100 - 299 persons by 34.8% of investors, followed by 30 - 99, 24.6%. "More than 1,000 employees" was indicated by 4 companies, including 2 Thai companies.

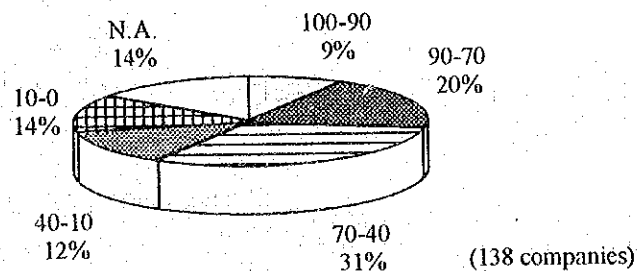
### Number of Employees



The Study Team calculated the average of 122 companies. The result was 270 persons.

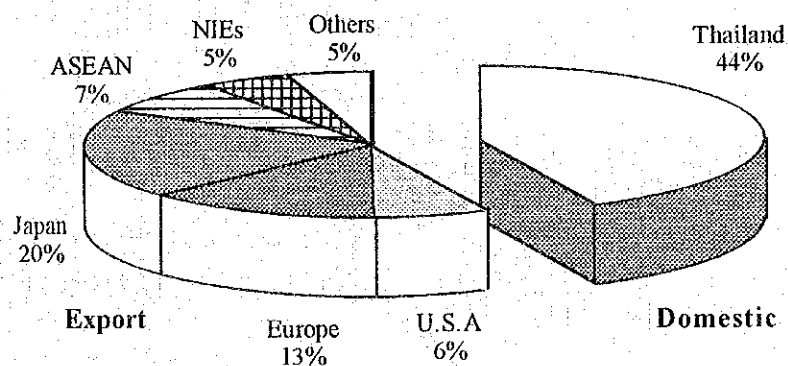
9 % of companies thought that they will export almost all the products made in Bang Saphan. Adding 70-90 to this, a third of companies belong to the export-oriented industries. 14 % of companies answered that the major market for sale is Thailand.

The Ratio of Export



To know the market of an average company, the Study Team calculated the average of 138 companies. As a result, 44% of products produced in Bang Saphan will be sold in the Thai domestic market. The rest, or 56%, will be exported, mainly to Japan, 20%, and Europe, 13%. Many companies expected Bang Saphan will be an exporting base.

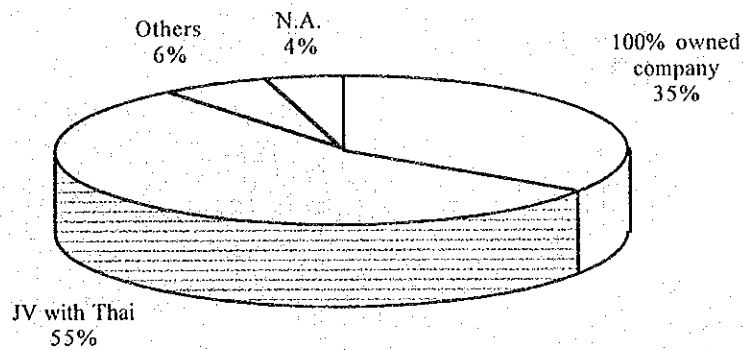
Target Countries for Sale





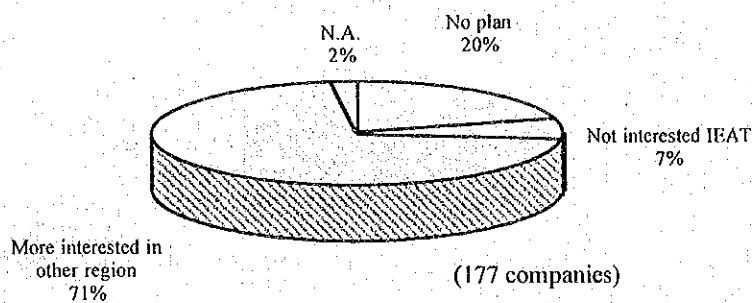
As for the type of capital, 55% foreign companies wanted to be a joint venture with a Thai company, 35% wanted to invest 100% of capital.

Type of Company by Capital



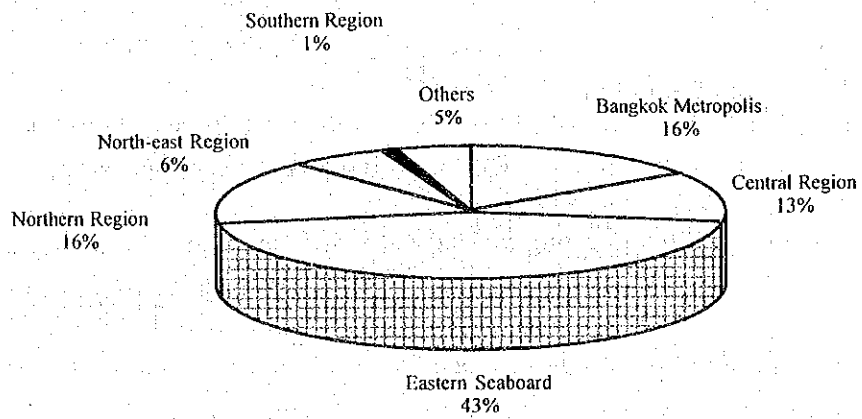
The Study Team asked Thai enterprises the reason for not showing interest in the Bang Saphan Industrial Estate. 70% of answers were “more interested in other regions”.

The Reason for Not Interested in BSIE



The Study Team asked 124 companies about “more interested other region” and 43% indicated the Eastern Seaboard. This rate exceeds the combined rate of companies that preferred Bangkok Metropolis and Central Region.

### Region Except BSIE for Investment



## A.1.2 Interview Survey Results

### (1) Methodology of Interview Survey

#### 1) Target Enterprises for Survey

To confirm the possibility of investment in the Bang Saphan Industrial Estate, the Study Team conducted interview surveys on the following three groups of companies.

- the companies which show interest in the Bang Saphan industrial estate in the questionnaire survey in Thailand (Group A : 23 companies)
- the companies locating in Thailand which show interest in the Bang Saphan industrial estate in the questionnaire survey in Japan (Group B : 3 companies)
- the companies belonging to the groups of industries selected by the theoretical approach explained in 4.2 (Group C : 38 companies)

Number of companies for interview survey

	Total	Group A	Group B	Group C
Food	3	2		1
Textile	1	1		
Furniture	3	1		2
Chemical	7	6		1
Rubber	3	3		
Ceramics	1	1		
Iron and steel	11	3		8
Fabricated metal	12	1		11
Machinery	3	1	1	1
Electrical machinery	10	1	1	8
Motor vehicle	5			5
Auto Parts	4	2	1	1
Others	1	1		
Total	64	23	3	38

## 2) Preparation for Interview Survey

The interview form includes the following items to verify the intention to invest in the Bang Saphan industrial estate as well as to know the more concrete requirements for the industrial estate.

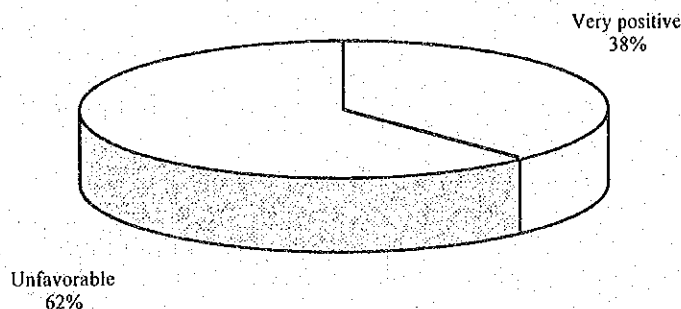
- Direction of products
- Procurement of materials
- Problems on running factories
- Possibility of interest in the Bang Saphan industrial estate
- Interest in FTZ, EPZ, and so on

## (2) Result of Interview Survey

### 1) Possibility to Build a Factory in Bang Saphan Industrial Estate

The result of interview survey of 26 enterprises showing interest in the questionnaire survey is shown below. 10 companies, or 38%, showed strong interest. In detail, 7 of 12 companies replying "yes" approved the interview survey and 3 showed interest in investment. 11 of 14 companies approved and 7 showed interest.

Interest in locating a factory in BSIE



Among these companies, those who might invest by 2001 numbered 7 (chemical 3, furniture 1, machinery 1, electric machinery 1, and auto parts 1).

The reasons for not showing interest were :

- The firm had already decided the location for new facility.
- The circumstances of management has changed after the questionnaire survey.
- The firm was no more interested in locating in the Bang Saphan Industrial Estate after reconsideration.

## 2) Requirement for the Bang Saphan Industrial Estate

A majority of enterprises wanted the following condition.

- There should be a zone such as EPZ or FTZ which is useful for import and export. It takes too long time to refund the tax and the preparation for the tax which is unnecessary to pay is a heavy burden to the operation of the company.
- Sea access to Eastern Seaboard should be ensured. The Eastern Seaboard is the center of manufacturing now and the relation with it is indispensable.
- There should be facilities which encourage engineers to live in Bang Saphan. Engineers are likely to live in Bangkok because of lack of entertainment, school, hospital, and the like a the proposed project site.

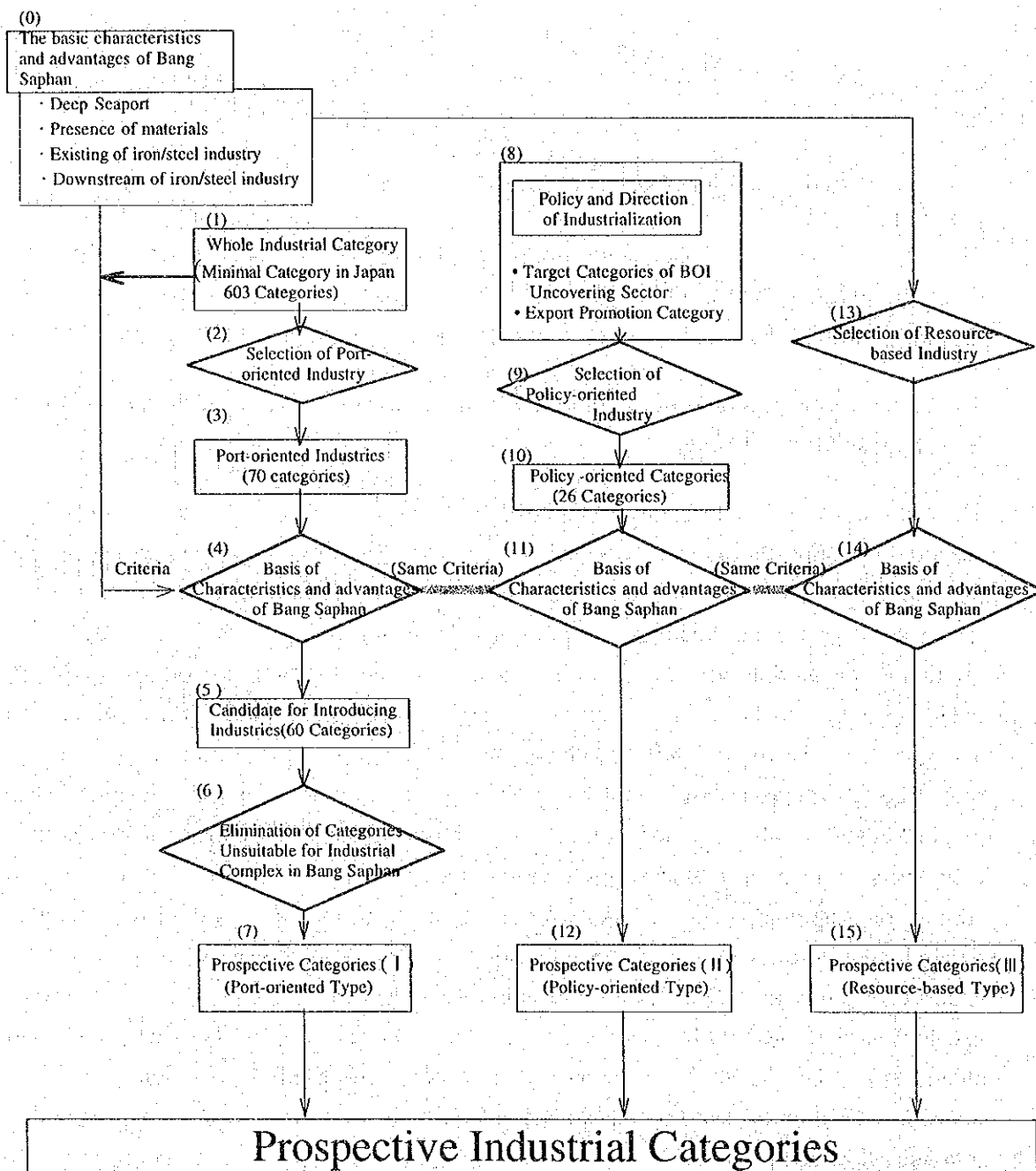
## **A.2 Promising Industrial Categories for the Bang Saphan Industrial Estate**

### **A.2.1 Theoretical Selection of Industrial Categories**

The Study Team selected target industries from the viewpoint of the industrial location theory by matching two factors, one is the location condition in Bang Saphan district, and the other is the location factors of industrial categories.

The Study Team identified the promising industrial categories based on the objectives of Bang Saphan I/E development.

The major advantage of location conditions in the Bang Saphan I/E is availability of a deep seaport. Therefore the industries which use large vessels to carry raw materials in and products in or out should be suitable for this condition. For example, the Iron & steel industries depending on the import of raw materials such as coal, iron ore, etc. consider the proximity to a deep seaport as one of the crucial conditions for site selection. Some export industries prefer to locate in a vicinity of the seaport. For example, when automobile assembly industries export their products by exclusive vessels, the proximity to a seaport would be advantageous. But in Thailand all assemblers locate in inland industrial zones except MMC (Mitsubishi Motor Corporation) in Laem Chabang. The major reason is that assemblers locating in Thailand aim at mainly the domestic market and that there is no seaport for exporting passenger cars except Bangkok Port which has insufficient hinterland to build large factories. In the near future automobile makers in Thailand should proceed to export cars and expand their factories. In this case some makers scrap the existing factory and build a new one (S&B), and others relocate to another site. In the latter case, they should select the site in the hinterland of a seaport. The Study Team identified those industries based on the seashore location condition. It is as shown in steps (0) - (7) in the following flow chart.



Work Flow for Selection of Prospective Industrial Categories for Bang Saphan

The next approach is examination of the industrial categories based on the Government Industrial Promotion Program. This is indicated in steps (8) - (12) in the following flow chart. Based on the List of Activities Eligible for Investment Promotion by BOI (the BOI List), the selection of industries was conducted. As mentioned before, the trend of FDI (Foreign Direct Investment) expanded to Zone 3, however enterprises tend to select the sites in the vicinity of Zones 1 and 2. Bang Saphan, locked from Bangkok, was felt 'far' from both markets by business men operating in the Bangkok Metropolitan area. So the Study

Team omitted the industries provided with incentives locating in Zones 1 and 2 and selected industries which 'Must be located in Zone 3' from the BOI List. Industries selected by this screen, corresponded to the location conditions such as seashore location, market-oriented location, etc. in order to eliminate the unsuitable industries.

The final approach is to select industries on the basis of the available materials. In Prachuap Khiri Khan, the major industries are in the agriculture and fishery sector, so industries based on these raw materials have a possibility of locating. This is the process of (13)-(15) in the previous flow chart. Thanks to the existence of iron & steel industries, the Bang Saphan area has potential to be the basic-metal-supply-base in Thailand. Some downstream industries prefer to locate near their material supplier. The promising industrial categories were selected by integrating the above three methods.

#### **A.2.2 Selection of Port-Oriented Industries**

##### **(1) What Are Port-Oriented Industries?**

The major advantage of location condition in Bang Saphan is availability of a deep seaport. The Study Team considered the industrial categories which enjoy the advantage of a seashore area as 'Port-oriented industrial categories'. Port-oriented industries consist of two types: the industries which need exclusive berths (narrow sense) and the industries which enjoy the advantage of locating in proximity to the port (broader sense). In addition, they include the industries which form 'complexes'; such as iron & steel complex, food complex, petrochemical complex, etc., and the industries which use ships as a means of transportation. In short, the Study Team considered port-oriented industries in the following 3 conditions.

- Industries which need exclusive berths (narrow sense)
- Industries which enjoy the advantage of locating in proximity to the port (broader sense)
- Industrial categories which take advantage of forming 'complexes'

##### **(2) First Selection Procedure (Reclaimed Land and Ship Cargo)**

The selection was begun by targeting all industries by JISC (Japanese Industrial Static Category) 4-digit (603 industries) which is similar to TISC 5-digit (the reason for using JISC 4-digit is to avoid the possibility of missing potential categories which use a great deal of TISC code). The Study Team selected industrial categories which use a lot of port cargoes, according to experience in Japan.



### Industries which Prefer to Locate in Reclaimed Land

The first selection was focused on current factories which located in seaside zones in Japan. A seaside zone is the area which faces waters in port districts and is used as one body.

A large-scale questionnaire survey had been conducted on many factories which occupied areas of more than 9,000 m<sup>2</sup> in these zones after 1980. The number of factories was 1,934. Using this result and the census of manufacture, the Study Team picked up industrial categories of which rate of using reclaimed land exceeded 10% of total land area in 1984 or 5% in 1980.

The reason why the Study Team used the old survey is that the number of industries with a seashore location in Japan peaked around 1975. The factory site area, during the period of 14 years from 1965 to 1978, was 826,350,000 m<sup>2</sup>, in which reclaimed land occupied about 17.2% or 142,260,000 m<sup>2</sup>. 165 industrial types are selected.

### Selection by Volume of Ship Cargo

Next, the Study Team checked the amount of products and raw materials carried in/out by ships. Each factory carries products and raw materials by railway, truck, ship, or pipeline. The Study Team selected the industries from the following criteria.

- Industrial categories which use ship cargo more than 50% (◎)
- Industrial categories which use ship cargo 25% - 50% (○)
- Industrial categories which use ship cargo less than 25% (△)

There were 14 industries of ◎type. There were 52 in carrying in or out. Combining this result and the industrial categories which locate in reclaimed land, we selected 195 types of industries.

### (3) Selection of Prospective Categories for the Bang Saphan I/E

The Study Team selected prospective industrial categories from the above 194 industrial subsectors. The selection criteria are as follows.

- The industrial categories which have a high rate both in reclaimed area and in transport by ship.
- The industrial categories which are marked ◎
- Some of the industrial categories which tend to locate in reclaimed areas but which don't use ships so often

As a result, 70 industrial categories were selected as the first prospective ones as shown in Table A.2.1 (industrial categories marked ● in the table).

### **A.2.3 Selection by Characteristic of the Bang Saphan Area**

The Study Team selected industries by matching the location factor with the characteristics of the Bang Saphan area. The considered items are as follows.

- Location far away from the mass-consumption area
- Possibility of using materials related with agriculture, fishery or iron and steel
- Less accumulation of the related or supporting industries

The major advantage of location in Bang Saphan is availability of a deep seaport. However, Bang Saphan is located far from Bangkok Metropolitan Area, about 400 km (location of remotest place). The commuting time between the area and the Metropolitan Area can be shortened by constructing a highway. City functions and infrastructure are steadily available. However, from the viewpoint of industrial location, we had to exclude or omit the industrial categories which need to be located in a large city or its outskirts, i.e. the so called large city-oriented industrial categories.

Generally speaking, industries are divided into two types; one is industries that enjoy locating in a large city or its outskirts, the other is industries that are affected by the other functions.

In the latter group, we selected industrial categories that prefer to locate in a portside area in a regional city. These usually have no land location factor or can locate far from large market. As a result, 10 out of 70 categories were omitted. The selected 60 prospective industrial categories are shown in Table A-2.2.

### **A.2.4 Policy-Oriented Industries**

Policy-oriented industries include two types; one is in the BOI List and the other is export-oriented industries. The industrialization policy adopted by the Government was to promote export-oriented industries until the early 1990s. The Government continues this policy and adds the policy of nurturing or promoting supporting industries. These industries aim at the domestic market.

The Study Team identified the target industries from the BOI List which covers from agriculture to service sectors, but in this study the Team focused mainly on the manufacturing sector (123 industries).

The 1st step of selection was to eliminate industries that fall within the following categories:

- Industries provided with BOI incentives without condition anywhere
- Industries provided with BOI incentives in Zone '2 or 3'.

The remaining industries after exclusion were screened by the location condition in the Bang Saphan area. In this process electronic industries and market oriented industries were selected. The selected industries were mostly the same as export-oriented industries mentioned in Section 2.2. The selected 23 industries are shown below:

**Selected Industries by Policy-Oriented Industries**

Code	Industries	Code	Industries
32	Textiles, wearing apparel, leather and leather products	382	Machinery, except electrical
321	Textiles	38291	Household machinery and appliance
32113	Spinning of cotton and man-made fibers	38292	Air conditioners
32115	Weaving of cotton and man-made fibers	383	Electrical machinery, apparatus, appliances and supplies
32119	Yarn spinning	38310	Electrical industrial machinery and apparatus
33	Wood and wood products, including furniture	38320	Radio, television and communication equipment and apparatus
332	Furniture, fixtures and floorings, except primary of metals	38330	Electrical appliances and house wares
34	Paper and paper products, printing and publishing	38392	Electric accumulators and batteries
341	Paper and paper products	384	Transport equipment
34111	Pulp, paper and paperboard by machine Paper Products	38431	Assembly of automobiles
		38432	Motor vehicle bodies
35	Chemicals & chemical, petroleum, coal, rubber & plastic products	38439	Other motor vehicle industry
35299	Other chemical products Pesticides, Herbicides, Fungicides, or Insecticides		
35510	Tire and tube industries		
35591	Rubber sheets and block rubber		

Source: Study Team Estimates

#### **A.2.5 Selection of Resource-Oriented Industries (Composition of Groups by Prospective Categories)**

One of the major industries in Prachuap Khiri Khan province is food processing as mentioned in Section 2.3. Industries using agricultural products as raw materials are thought to be prospective industries: Canning of fruit and seafood, coir fiber, coconut furniture.

These products are not considered as “resources”. Downstream industries using iron and steel products are considered as resource-based industries. (Finished goods such as automobiles, refrigerators, steel furniture, etc. and construction materials are major users of iron and steel products, however, these industries are not apt to locate in the vicinity of iron and steel factories. Therefore resource-based industries using iron and steel are considered as first processing industries and others such as automobile industry are classified as secondary processing industries.

Iron and steel industries have already located in Bang Saphan. These industries will expand and form a complex of iron and steel industries in the future. We usually call this “Kombinat” as spatial location type. These industries will be linked up and apt to form a similar industrial category for effective productivity. Iron and steel industries which compose Kombinat are the first category of basic industries.

Considering the Bang Saphan I/E as an Energy Basement Area in the future, it is important to select industries broadly from this viewpoint. An Energy Basement usually locates in a seashore area and this forms a huge development area which uses various port functions. Industrial categories located in the Energy Basement Area compose a complex too.

#### **A.2.6 Promising Industrial Categories**

The target industries or promising industrial categories are selected through the above approach. The industries selected from the resource-based approach are included in those selected by the former two approaches. The result of selection is shown in Table A.2.2.

For study of the development concept of the Bang Saphan area, the Study Team tabulated a list of model factories from the above-mentioned selected industrial categories. According to Japanese Industrial Location Basic Unit we established the scale of a model factory by JISC 4-digit and estimated two location factory types; maximum and minimum cases for the year 2006 in scenario 1, and for 2011 in scenario 2, since we considered a lot of indefinite factors of factory location in these target years.

We considered these scales by referring to the average of Japanese factories, but in the case enormous products are to be maintained in Thailand, we estimated a larger scale for Thai model factories than the average of Japanese factories. Thus we tried to prepare each scale of model factories in order to product activity in the future in Thailand. The results are shown in Table A.2.3.

## A.3 Industrial Development Demand in Bang Saphan

### A.3.1 Macroeconomic Point of View

The projection of the Thai economy for the year 2000 was conducted by NESDB to prepare for the 8th National Development Plan (Thailand 2000: A Guide to Sustainable Growth and Competitiveness, NESDB, 1994). The Thai Government also compiled a report on future perspective toward the year 2020 (this report does not present the economic frames for the year 2020).

Based on the economic performance of Thailand during the last few decades, the NESDB's study projected an average annual growth rate of 7.7% for Thai economy. By the year 2000, the GDP of Thailand is expected to be around US\$280 billion, a 3.3 times increase compared with that in 1990. The population estimated by NESDB is 64 million, therefore, the per capita GDP will be about US\$4,400 in 2000, which is the same level as that of Korea in 1988. The NESDB's study estimated the share of the industrial sector in GDP will be 32.6%. As for export, the industrial share in total export will increase from 75% in 1990 to 85% by the year 2000. The industrial export share in the total was 81% in 1994, therefore, it is possible to achieve the above share in 2000.

In the Western Seaboard Area (WSB region) including Bang Saphan District, NESDB in cooperation with the JICA Study Team (WSB Team) conducted the projection of the regional economy for the years 2001, 2006, and 2011. In this projection the GRP (Gross Regional Product) is estimated for three cases. The WSB estimates of the industry sector including mining, construction, electricity, and water supply are summarized in the following table.

**Estimated of GRP by Industry in WSB Region; 2001, 2006, and 2011**

	1994	2001	2006	2011	95-01	02-06	07-11
Low Case	48,985	88,403	134,776	205,474	8.8	8.8	8.8
Middle Case	48,985	122,575	197,408	296,833	14.0	10.0	8.5
High Case	48,985	122,575	246,541	434,490	14.0	15.0	12.0

Note: These figures are still under consideration. Therefore they will be subject to change.

Source: Western Seaboard Regional Development Master Plan Study, Interim Report.

Based on these estimates, the Study Team conducted the projection of the GPP (Gross Provincial Products) of industrial origin for 2001, 2006, and 2011. Before the projection, the current situation of industrial activities in Prachuap Khiri Khan should be described taken into consideration. In 1994, GPP by industry in Prachuap Khiri Khan amounted to 9,594 million Baht or 19.6% of that of WSB Region. As for the manufacturing sector in Prachuap

Khiri Khan, GPP amounted to 6,661 million Baht, corresponding to 69.4% of that of industry. The manufacturing sector's share in WSB Region accounted for 20.4%.

The Low Case in the WSB estimates is assumed as the trend case, therefore, the development of the Bang Saphan Industrial Estate as well as that of other industrial estates in WSB Region are excluded explicitly. As for the projection of the GPP in Prachuap Khiri Khan, the Study Team adopted the Middle Case and High Case in the WSB estimates. The assumptions in the projection are the following.

- i) The manufacture industry ratio in GPP is assumed to be 80% ( in 1994 this ratio was 70%).
- ii) During the period from 1995 to 2001 the other provinces included in WSB Region have a slightly more rapid growth compared with Prachuap Khiri Khan.
- iii) During the period from 2002 to 2006 the growth of industries in Prachuap Khiri Khan is more rapid than in other provinces because of the development of the Bang Saphan Industrial Estate and Iron & Steel Industries.
- iv) During the period from 2007 to 2011 the manufacturing sector in the Bang Saphan New Industrial City is in full operation.

Based on the above assumptions and the WSB estimates, the Study Team conducted the projection of the GPP of manufacturing sectors in the target years as shown in the following table.

**GPP of Manufacturing Sector in Prachuap Khiri Khan in 2001, 2006, and 2011**

unit: million Baht, %

	1994a	2001	2006	2011	95-01	02-06	07-11
Scenario 1(Low)	6,661	18,162	37,400	67,314	18.2	15.5	12.5
Scenario 2(High)	6,661	18,162	42,485	87,182	18.2	18.5	15.5

Note: 1994a is an actual figure. In 2001, the estimates of both High and Low cases are same.

Source: The Study Team estimates.

Based on the above estimates and the promising industries described in the previous section, the value added derived from the Bang Saphan New Industrial City (including the manufacturers in the Bang Saphan Industrial Estate and Iron and Steel Complex) was calculated. The assumptions in the projection are that the value added is similar to the GPP and that the productivity of the manufacturing sub-sectors will increase at a certain rate. The results of the projection are shown in the following tables.

YEAR 2001	Gross Output	Value Added	Area	No. of
NAME of INDUSTRIES	mill. Baht	mill. Baht	(m2)	employees
1 Food manufacture group	231.858	62.341	24,000	150
2 Wood and furniture manufacture group	179.067	78.467	73,500	230
3 Petroleum and coal (C1 chemical) group	595.144	232.157	50,000	90
4 Ceramic industry group	277.973	130.874	45,000	100
5 Steel manufacture (Basic product-line by furnace ) group	15,349.890	5,315.676	1,011,000	2,355
6 Steel processing industry (machinery products-line) group	2,983.134	1,033.054	181,500	865
7 Steel industry by processing line products group	6,145.688	4,120.074	104,000	980
General manufacture (except steel industry)	10,412.863	5,656.966	478,000	2,415
Steel industry	15,349.890	5,315.676	1,011,000	2,355
Total	25,762.753	10,972.642	1,489,000	4,770

YEAR 2006 Maximum Case	Gross Output	Value Added	Area	No. of
NAME of INDUSTRIES	mill. Baht	mill. Baht	(m2)	employees
1 Food manufacture group	1,955.846	530.685	405,500	1,030
2 Textile manufacture group	333.187	126.910	143,000	410
3 Wooden and furniture manufacture group	328.105	148.208	142,000	370
4 Paper and pulp manufacture of group	209.823	58.867	20,500	150
5 Petroleum and coal (C1 chemicals)	5,744.154	2,335.440	376,000	1,190
6 Ceramic industry group	2,735.081	1,474.034	609,000	1,220
7 Steel manufacture (Basic product-line by furnace) group	25,474.395	8,821.809	1,438,000	2,785
8 Steel processing industry (machinery products-line)group	6,738.316	2,333.493	668,000	1,670
9 Steel industry by processing line products group	25,815.097	16,932.194	577,500	3,230
10 Shipbuilding and repairing group	608.120	407.139	74,000	190
General manufacture (except steel industry)	44,467.729	24,346.969	3,015,500	9,460
Steel industry	25,474.395	8,821.809	1,438,000	2,785
Total	69,942.124	33,168.777	4,453,500	12,245

YEAR 2006 Minimum Case	Gross Output	Value Added	Area	No. of
NAME of INDUSTRIES	mill. Baht	mill. Baht	(m2)	employees
1 Food manufacture group	578.710	155.602	65,500	320
2 Wooden and furniture manufacture group	257.200	126.543	73,500	230
3 Petroleum and coal(C1 chemicals)	569.202	194.602	176,000	190
4 Ceramic industry group	1,430.990	673.714	469,000	440
5 Steel manufacture (Basic product-line by furnace) group	25,474.395	8,821.809	1,438,000	2,785
6 Steel processing industry (machinery products-line)group	6,738.316	2,333.493	668,000	1,670
7 Steel industry by processing line products group	22,084.761	14,805.649	564,000	3,010
8 Shipbuilding and repairing group	608.120	407.139	74,000	190
General manufacture (except steel industry)	32,267.300	18,696.742	2,090,000	6,050
Steel industry	25,474.395	8,821.809	1,438,000	2,785
Total	57,741.695	27,518.551	3,528,000	8,835

YEAR 2011 Maximum Case NAME of INDUSTRIES	Gross Output mill. Baht	Value Added mill. Baht	Area (m2)	No. of employees
1 Food manufacture group	3,786.204	1,042.045	483,500	1,510
2 Textile manufacture group	404.990	154.260	143,000	410
3 Wooden and furniture manufacture group	687.135	317.304	242,000	650
4 Paper and pulp manufacture group	875.639	245.709	123,700	515
5 Petroleum and coal (C1 chemicals)	11,957.198	4,763.047	949,000	2,775
6 Ceramic industry group	5,581.674	3,080.905	824,000	2,170
7 Steel manufacture (Basic product-line by furnace) group	55,264.768	19,138.210	2,590,000	4,693
8 Steel processing industry (machinery products-line) group	17,754.181	6,148.278	1,167,000	3,620
9 Steel industry by processing line products group	61,959.190	40,084.726	1,486,000	8,530
10 Shipbuilding and repairing group	739.172	494.880	74,000	190
General manufacture (except steel industry)	103,745.383	56,331.153	5,492,200	20,370
Steel industry	55,264.768	19,138.210	2,590,000	4,693
TOTAL	159,010.151	75,469.362	8,082,200	25,063

Year 2011 Minimum Case NAME of INDUSTRIES	Gross Output Mill. Baht	Value Added Mill. Baht	Area (m2)	No. of employee
1 Food manufacture group	2,490.530	681.302	405,500	1,030
2 Textile manufacture group	404.990	154.260	143,000	410
3 Wooden and furniture manufacture group	398.816	180.148	142,000	370
4 Paper and pulp manufacture group	255.041	71.553	20,500	150
5 Petroleum and coal (C1 chemicals)	9,193.914	3,698.556	676,000	1,800
6 Ceramic industry group	3,324.512	1,791.699	609,000	1,220
7 Steel manufacture (Basic product-line by furnace) group	55,264.768	19,138.210	2,590,000	4,693
8 Steel processing industry(machinery products-line) group	9,171.359	3,176.064	728,000	1,870
9 Steel industry by processing line products group	37,181.354	24,007.193	790,500	4,880
10 Shipbuilding and repairing group	739.172	494.880	74,000	190
General manufacture (except steel industry)	63,159.687	34,255.655	3,588,500	11,920
Steel industry	55,264.768	19,138.210	2,590,000	4,693
TOTAL	118,424.455	53,393.864	6,178,500	16,613

Source: The Study Team estimates.

Development frames of the Bang Saphan Industrial Estate are summarized below.

(Scenario 1 - Low Case)

Year	Gross Output (mill Baht)	Value-added (mill Baht)	Area (ha.)	Employee (person)
2001	25,763	10,973	148.9	4,770
2006	57,742	27,519	352.8	8,835
2011	118,424	53,394	617.9	16,613

Source: The Study Team Estimates.

(Scenario 2 - High Case)

Year	Gross Output (mill Baht)	Value-added (mill Baht)	Area (ha.)	Employee (person)
2001	25,763	10,973	148.9	4,770
2006	69,942	33,169	445.4	12,245
2011	159,010	75,469	808.2	25,063



### A.3.2 Results of Questionnaire Survey and Interview Survey

#### (1) Demand for Land Area in 2001

According to the interview survey, the Study Team identified that 10 of 63 companies might invest in the Bang Saphan Industrial Estate by 2001. The types of industry are as follows: Chemical 3, Iron & steel 3, Furniture 1, Machinery 1, Auto parts 1, and Electrical Machinery 1.

The demand of land area for one company is from 5 rai to 150 rai and the average is around 36 rai. The total area demand by 2001 would be 360 rai (58 ha) as shown below.

Type of industry	Need of Land area	Major product	Reason for interest							Requirement to I/E				
			1	2	3	4	5	6	7	1	2	3	4	5
Chemical	60 rai	Pharmaceutical bulk	○		○	○	○				○	○		○
Chemical	150 rai	PX, PTA	○		○					○	○	○		
Chemical	5 rai	PVC, PP, ABS, PE	○		○			○			○			○
Furniture	5 rai	Wooden furniture	○						○		○			
Machinery	30 rai	Pump	○	○						○	○	○		
Auto Parts	20 rai	Bearings	○							○	○	○		
Electrical Machinery	10 rai	Electrical equipment	○	○		○				○	○	○		
Machinery	20 rai	Hoist	○	○	○					○		○		
Iron & Steel	20 rai	Steel Service	○	○										○
Fabricated metal	40 rai	Steel Structure	○	○	○					○		○		
<b>Total</b>	<b>360 rai</b>	<b>(57.6ha)</b>	-	-	-	-	-	-	-	-	-	-	-	-

1= Beside deep seaport

2= Near iron & steel industry

3= In FTA

4= In Zone 3

5= In industrial estate

6= Raw materials can be got from near area

7= Sufficient land space

1= Good city life

2= Easy access Eastern Seaboard

3= Stable supply of raw materials

4= Land price

5= Nearby customers

The following are three major reasons for interest:

- Bang Saphan Industrial Estate is located near a deep seaport.
- Bang Saphan Industrial Estate is located in a Free Trade Area.
- Bang Saphan Industrial Estate is next to an iron & steel complex.

The main requirements for the industrial estate include the following three points.

- The industrial estate should be equipped with several facilities such as accommodation, hospital, school, amusement to enjoy city life.

- The industrial estate should be connected with the Eastern Seaboard.
- The industrial estate should be timely supplied with good and necessary raw materials from the iron & steel complex.

(2) Demand for Land Area in 2011

The Study Team estimated the land area demand by 2011 based on the results of questionnaire survey and interview survey.

On the basis of the expansion coefficient, which is equivalent to the reciprocal of the sampling ratio, the number of companies saying "yes" is 178 and saying "possibly" is 829.

	No of Samples	Total Number	Expansion Coefficient	Replied Number		Expanded Number	
	a)	b) *	1/a)/b)	Yes	Possibly	Yes	Possibly
Taiwan	1,000	12,242	12.24	1	11	12	135
South Korea	500	3,926	7.85	4	39	31	306
USA	1,000	5,205	5.21	3	36	16	188
Japan	2,389	29,047	12.16	7	14	85	170
Subtotal	4,889	50,420		15	100	144	799
Thailand	2,888	7,999	2.77	12	11	33	30
Total	7,777	58,419		27	111	177	829

Source: \* Taiwan: 1991 Taiwan-Fukien Census Report of Commerce and Service Industry, Republic of China  
 Korea: Korea Business Consultancy  
 USA: Dun & Bradstreet Directory  
 Japan: 1991 Establishment Census of Japan  
 Thailand: 1992 Industrial Survey

As known from the result of interview survey, some enterprises had lost interest. The Study Team estimated the confirmation rate as follows.

The confirmation rate of Thailand was estimated from the result of interview survey conducted in Thailand. The reason why the confirmation rate of "yes" is lower than that of "possibly" is thought to be that not a few companies saying "yes" had already determined the location for a new facility. The confirmation rate of four countries except Thailand was estimated on the basis of the result of survey conducted in Japan.

	Thailand	Other Countries
yes	25.0 %	34.3 %
possibly	36.4 %	5.5 %

source : The Study Team estimates

As the interview survey was not conducted in the U.S.A, South Korea, and Taiwan, the Study Team estimated two cases; one is the total (High case), the other is the total except the number of companies answering "possibly"(Low case).

	Thailand		Other countries	
	yes	possibly	yes	possibly
Low Case	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
High Case	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

70 - 115 companies are expected to locate in the Bang Saphan Industrial Estate in 2011 as shown in the following table.

	Thailand	Other Countries	Total
Low Case	20 companies	50 companies	70 companies
High Case	20 companies	95 companies	115 companies

$$33 \text{ companies} \times 25.0\% + 30 \text{ companies} \times 36.4\% = (19.2) = 20 \text{ companies}$$

$$145 \text{ companies} \times 34.5\% = (49.7) = 50 \text{ companies}$$

$$799 \text{ companies} \times 5.5\% = (43.9) = 45 \text{ companies}$$

The average land area demand of a company was assumed to be 50,000 m<sup>2</sup> (31 rai) from the result of questionnaire survey and interview survey. As a result, the demand of land area in 2011 would be from 350 ha (2,188 rai) to 575 ha (3,594 rai).

	Companies	Land Area
Low Case	70 companies	350 ha (2,188 rai)
High Case	115 companies	575 ha (3,594 rai)

$$70 \text{ companies} \times 50,000\text{m}^2 (31 \text{ rai}) = 350 \text{ ha} (2,188 \text{ rai})$$

$$115 \text{ companies} \times 50,000\text{m}^2 (31 \text{ rai}) = 460 \text{ ha} (3,594 \text{ rai})$$

### (3) Industrial Development Demand for the Bang Saphan Industrial Estate

In the estimates by the macroscopic approach, both land area and number of employees included those of existing and future expanding iron and steel industries. On the other hand, the estimates by the microscopic approach, or using questionnaire and interview survey approach, excluded the iron and steel industries. The difference of estimated figures between the macro and micro approaches results from the treatment of the iron and steel industries. The land area derived from the macroscopic approach except the iron and steel industries is 47.8 ha by 2001 and 259 ha by 2011.

(in Low case). These calculated by the microscopic approach are 57.6 ha by 2001 and 280 - 460 ha by 2011.

Based on the comparison between macro- and micro-approach estimates, the Study Team estimated the demands in the Bang Saphan Area including iron and steel industries to be 620 ha of industrial land area and 16,600 workers.

Table A.2.1 Selection of Port-oriented Industrial Category(1/2)

Industrial		Japanese Industrial Static Category		Industrial		Thai Industrial Static Category		Industrial		This Industrial Static Category		Carry in (%)	Carry out (%)	1981 year Port-Oriented (%)	1980 year Port-Oriented (%)
No.	Industrial	No.	Industrial	No.	Industrial	No.	Industrial	No.	Industrial	No.	Industrial	by ship	by ship	1981 year	1980 year
No.	Industrial	Japanese Industrial Static Category	Industrial	No.	Industrial	Thai Industrial Static Category	Industrial	No.	Industrial	Chemicals and chemical, petroleum, coal, rubber and plastic products	Chemicals and chemical, petroleum, coal, rubber and plastic products	by ship	by ship	(%)	(%)
32	Food, beverages and tobacco	31	Food manufacturing	22	Manufacture of chemical and allied products	35	Fertilizers and pesticides	35120	Fertilizers and pesticides	35120	Fertilizers and pesticides	△	△	1.8	1.8
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	58.0	58.0
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35111	Basic industrial chemicals, except charcoal and other chemical products	35111	Basic industrial chemicals, except charcoal and other chemical products	△	△	19.7	19.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35112	Charcoal	35112	Charcoal	△	△	20.1	20.1
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	24.9	24.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	25.6	25.6
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35300	Petroleum refineries	35300	Petroleum refineries	△	△	51.1	51.1
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35300	Petroleum refineries	35300	Petroleum refineries	△	△	21.6	21.6
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35111	Basic industrial chemicals, except charcoal and other chemical products	35111	Basic industrial chemicals, except charcoal and other chemical products	△	△	36.4	36.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	24.6	24.6
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	18.8	18.8
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	17.7	17.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	25.7	25.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	32.8	32.8
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	22.4	22.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	30.4	30.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	88.3	88.3
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35231	Soap and cleaning preparations	35231	Soap and cleaning preparations	△	△	12.8	12.8
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	22.2	22.2
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35210	Paints, varnishes and inks	35210	Paints, varnishes and inks	△	△	50.5	50.5
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35210	Paints, varnishes and inks	35210	Paints, varnishes and inks	△	△	23.9	23.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35232	Perfumes, cosmetics and other toilet preparations	35232	Perfumes, cosmetics and other toilet preparations	△	△	11.3	11.3
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35220	Drugs and medicine	35220	Drugs and medicine	△	△	10.7	10.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	14.2	14.2
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35292	Glues	35292	Glues	△	△	16.0	16.0
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	18.2	18.2
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	353	Petroleum refineries	353	Petroleum refineries	△	△	33.9	33.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35300	Petroleum refineries	35300	Petroleum refineries	△	△	54.3	54.3
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35299	Other chemical products	35299	Other chemical products	△	△	91.1	91.1
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	71.6	71.6
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35400	Miscellaneous products of petroleum and coal	35400	Miscellaneous products of petroleum and coal	△	△	16.4	16.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	355	Rubber products	355	Rubber products	△	△	44.2	44.2
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	35599	Other rubber products	35599	Other rubber products	△	△	17.3	17.3
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	39090	Industries not elsewhere classified	39090	Industries not elsewhere classified	△	△	4.9	4.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	39090	Industries not elsewhere classified	39090	Industries not elsewhere classified	△	△	67.1	67.1
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	39090	Industries not elsewhere classified	39090	Industries not elsewhere classified	△	△	24.9	24.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36999	Non-metallic mineral products not elsewhere classified	36999	Non-metallic mineral products not elsewhere classified	△	△	46.7	46.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36999	Non-metallic mineral products not elsewhere classified	36999	Non-metallic mineral products not elsewhere classified	△	△	36.0	36.0
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36999	Non-metallic mineral products not elsewhere classified	36999	Non-metallic mineral products not elsewhere classified	△	△	27.3	27.3
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	369	Other non-metallic mineral products	369	Other non-metallic mineral products	△	△	10.4	10.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36922	Lime and plaster	36922	Lime and plaster	△	△	20.9	20.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36922	Lime and plaster	36922	Lime and plaster	△	△	74.1	74.1
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36200	Glass and glass products	36200	Glass and glass products	△	△	24.9	24.9
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36910	Structural clay products	36910	Structural clay products	△	△	46.7	46.7
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36999	Non-metallic mineral products not elsewhere classified	36999	Non-metallic mineral products not elsewhere classified	△	△	22.4	22.4
31	Food, beverages and tobacco	31	Food manufacturing	31	Food manufacturing	31	Food manufacturing	36999	Non-metallic mineral products not elsewhere classified	36999	Non-metallic mineral products not elsewhere classified	△	△	10.4	10.4



Table A.2.2 Selection of Industrial Group in Bang Saphan Industrial Estate (1/2)

	1	2	3	4	Japanese Industry	Thai Industry
					<b>Manufacture of Food Group</b>	<b>Manufacture of Food Group</b>
					1211 Meat Products	31 Food Manufacturing
					1212 Dairy Products	311 Food Manufacturing
					1219 Miscellaneous Livestock Products	312 Food Manufacturing
					1222 Canned seafood and seaweed	31141 Canning of fish
					1229 Miscellaneous seafood products	31149 Other canning, preserving and processing of fish
				Δ	1242 Soy sauce "soyau" and edible amino acids	31132 Soy sauce and soy curls
					1253 Glucose, starch syrup and high-fructose corn syrup	31211 Starches
					1268 Wheat flour milling	31169 Grain flour mills
					1281 Vegetable oil and fats	312 Food products not elsewhere classified
					1285 Edible oil and fats	312 Food products not elsewhere classified
					1293 Noodle, macaroni and spaghetti	31173 Noodles and similar products
					2021 Compound fertilizers	35120 Fertilizers pesticides
					<b>Manufacture of Textile Group</b>	<b>Manufacture of Textile Group</b>
					1421 Spinning mills and cotton	32113 Spinning of cotton and man-made fibers
					1431 Twisting yarns, except bulky yarns	32119 Yarn Spinning
					1441 Fabric mills woven cotton and spun rayon	32115 Weaving of cotton and man-made fibres
					<b>Manufacture of Petroleum and Coal (C1) Chemicals Group</b>	<b>Manufacture of Petroleum and Coal (C1) Chemicals Group</b>
					2011 Nitrogenous and phosphate fertilizers	35400 Miscellaneous products of petroleum and coal
					2012 Compound fertilizers	35120 Fertilizers and pesticides
					2023 Inorganic pigments	35210 Paints, varnish and lacquers
					2024 Compressed and liquefied gases	35111 Basic industrial chemicals, except charcoal
				Δ	2031 Basic petrochemicals, including derivatives produced from an integrated process	35111 Basic industrial chemicals, except charcoal
				Δ	2032 Aliphatic intermediates, including aliphatic solvent	35111 Basic industrial chemicals, except charcoal
					2033 Methane derivatives	35111 Basic industrial chemicals, except charcoal
					2034 Fermentation industry	35299 Other chemical products
				Δ	2061 Medical material preparations	35220 Drug and medicine
					2121 Lubricating oils	35299 Other chemical products
					2122 Greases	35299 Other chemical products
					2311 Tire and tubes for automobiles	35510 Tire and tube industries
					2333 Mechanical rubber products	35591 Rubber sheets and block rubber
					2393 Rubber sheets	35591 Tire and tube industries
					<b>Manufacture of Wood and Furniture Group</b>	<b>Manufacture of Wood and Furniture Group</b>
					1617 Flooring mills	33112 Veneer, plywood and veneered panel
					1619 Sawing and planing mills, n.e.c.	33111 Sawmills and planing mills
					1624 Particle board	33113 Builders' woodwork
				Δ	1711 Wooden furniture, except Japanese	33201 Furniture, fixtures and fittings, except primary of metals or rattan
					<b>Manufacture of Paper and Pulp Group</b>	<b>Manufacture of Paper and Pulp Group</b>
					1821 Paper	34111 Pulp, paper and paperboard by machine
					1822 Paperboard	34111 Pulp, paper and paperboard by machine
					1832 Corrugated paper	34120 Containers and boxes of paper and paperboard
					1841 Office paper products	34190 Pulp, paper and paperboard articles not elsewhere classified
					<b>Steel manufacturing group (Basic products, iron and steel)</b>	<b>Steel manufacturing group (Basic products, iron and steel)</b>
				Δ	2652 Steel manufactured, with electric furnaces, including single electric furnaces, and with rolling facilities	371 Iron and steel basic industries
					2641 Hot rolling	37110 Iron and steel works and rolling mills
					2642 Cold rolling	37110 Iron and steel works and rolling mills
				Δ	2652 Galvanized steel sheets	371 Iron and steel basic industries
					2653 Galvanized steel sheets (Electrical zinc sheet)	371 Iron and steel basic industries
					2653 Galvanized steel sheets (Piled zinc sheet)	371 Iron and steel basic industries

Table A.2.2 Selection of Industrial Group in Bang Saphan Industrial Estate(2/2)

1	2	3	4	Japanese industry	This industry
				Steel processing industry group Machinery products (1)	Steel processing industry group Machinery products (1)
				2644 Steel pipes and tubes	371 Iron and steel basic industries
				2646 Cold finished steel bars	371 Iron and steel basic industries
				2648 Wire drawing	371 Iron and steel basic industries
				2653 Coated steel pipes	371 Iron and steel basic industries
				2654 Coated steel wire	371 Iron and steel basic industries
				2661 Iron castings, except cast iron pipes and malleable iron castings	371 Iron and steel basic industries
				2662 Malleable iron castings	371 Iron and steel basic industries
				2663 Steel castings	371 Iron and steel basic industries
				2664 Secondary forgings	371 Iron and steel basic industries
				2692 Iron and steel shearing and slitting	371 Iron and steel basic industries
				2693 Iron and steel scrap preparation for smelting	371 Iron and steel basic industries
				2694 Cast iron pipes	371 Iron and steel basic industries
				2841 Fabricated construction-use metal products	371 Iron and steel basic industries
				2842 Fabricated architectural metal products, except structural hard ware	371 Iron and steel basic industries
				2843 Fabricated plate work and sheet metal work	371 Iron and steel basic industries
				Ceramics industry group	Ceramics industry group
				2512 Processed flat glass	36200 Glass and glass products
				2514 Glass containers	36200 Glass and glass products
				2551 Fire bricks	36910 Structural clay products
				2559 Miscellaneous clay refractories	36999 Non-metallic mineral products not elsewhere classified
				2561 Carbonaceous electrodes	36999 Non-metallic mineral products not elsewhere classified
				Processing and Assembly industrial group	Processing and Assembly industrial group
				2911 Boilers	38299 Other machinery except electrical machinery
				2912 Steam engines, turbines and water wheels	38240 Special industrial machinery and equipment except wood and metal working machinery
				2971 Pumps and pumping equipment	38240 Special industrial machinery and equipment except wood and metal working machinery
				2972 Air compressors, gas compressors and blowers	38292 Air-conditioning machines
				2974 Conveyors and conveying equipment	38240 Special industrial machinery and equipment except wood and metal working machinery
				2977 Oil hydraulic equipment	38240 Special industrial machinery and equipment except wood and metal working machinery
				2978 Chemical machinery and its equipment	38240 Special industrial machinery and equipment except wood and metal working machinery
				2979 Miscellaneous general industry machinery and equipment	38299 Other machinery except electrical machinery
				2981 Office machines	38250 Office, computing and accounting machinery
				2982 Miscellaneous office, service industry and household machines	38292 Air-conditioning machines
				2983 Refrigerators and air conditioning apparatus	38240 Special industrial machinery and equipment except wood and metal working machinery
				3011 Generators, motors and other rotating electrical machinery	38240 Special industrial machinery and equipment except wood and metal working machinery
				3012 Power and distribution transformers, except electronic appliances transformers	38240 Special industrial machinery and equipment except wood and metal working machinery
				3021 Household electric appliances	38180 Electrical appliances and household
				3042 Radio communication equipment	38320 Radio, television and communication equipment and apparatus
				3091 Storage batteries	38302 Electric accumulators and batteries
				3112 Motor vehicle bodies and trailers	Shipbuilding and repairing
				3113 Motor vehicle parts and accessories	Shipbuilding and repairing
				Shipbuilding and repairing	Shipbuilding and repairing
				3141 Steel shipbuilding and repairing	38411 Building and repairing of steel ships
				3142 Hull blocks	38419 Other shipbuilding and repairing not elsewhere classified

Note:  
 ○ Regional, resource based industrial category  
 ● Port-oriented industrial category  
 ● Policy-oriented industrial category  
 △ Industrial category selected from result of demand survey



Table A.2.3 Selection of Industrial Category in Bang Saphan Industrial Estate (2001 year) (1/5)

Japanese Industrial Category (No. is Japanese industrial category's number)	Thai Industrial Category (No. is Thai industrial category's number)	Scale of Model Factory in Bang Saphan I/E		
		Area (m <sup>2</sup> )	No. of Employee	Water Consumption
1211 Meat products	311 Food manufacturing	8,500	50	150
1212 Dairy products	31111 Slaughtering	11,000	50	380
1229 Miscellaneous livestock products	31119 Other meat products	4,500	50	100
	31121 Dairies			
	31122 Milk factories			
	31149 Other canning, preserving and processing of fish and other sea foods			
<b>Manufacture of food group</b>	<b>Manufacture of food group</b>	<b>24,000</b>	<b>150</b>	<b>630</b>
1624 Particleboard	33112 Veneer, plywood and veneered panel	43,500	70	130
	33113 Bulkier woodwork			
1711 Wooden furniture, except Japanese	33201 Furniture, fixtures and floorings, except primary of metals and of rattans	30,000	160	60
<b>Manufacture of wooden and furniture group</b>	<b>Manufacture of wooden and furniture group</b>	<b>73,500</b>	<b>230</b>	<b>190</b>
2121 Lubricating oils	354 Miscellaneous products of petroleum and coal	30,000	30	350
2122 Greases	35400 Miscellaneous products of petroleum and coal	20,000	60	45
<b>Petroleum and coal products group</b>	<b>Petroleum and coal products group</b>	<b>50,000</b>	<b>90</b>	<b>395</b>
2551 Fire blocks	36910 Structural clay products	45,000	100	80
<b>Ceramics industry group</b>	<b>Ceramics industry group</b>	<b>45,000</b>	<b>100</b>	<b>80</b>
2632 Steel manufacture, with electric furnaces, including single electric furnaces, and with rolling facilities with rolling factors	371 Iron and steel basic industries	344,000	400	5,500
2641 Steel manufacture of hot rolling mill	37110 Iron and steel works and rolling mills	264,000	655	10,500
2642 Steel manufacture of cold rolling mill	37110 Iron and steel works and rolling mills	213,000	550	10,000
2641 Steel manufacture of hot rolling mill(Bar mill)	37110 Iron and steel works and rolling mills	105,000	300	2,500
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industries	88,000	320	2,500
2652 Canonized steel sheet(Fused zinc sheet)	371 Iron and steel basic industries	8,000	130	1,000
Ox Plant	Ox Plant			
<b>Steel manufacture(Basic product-line by furnace ) group</b>	<b>Steel manufacture(Basic product-line by furnace ) group</b>	<b>1,011,000</b>	<b>2,355</b>	<b>32,000</b>
2646 Cold finished steel bars	371 Iron and steel basic industries	45,000	250	40
2648 Wire drawing	371 Iron and steel basic industries	25,000	75	350
2692 Iron and steel sheering and shiting	371 Iron and steel basic industries	30,000	65	50
2693 Iron and steel scraping	371 Iron and steel basic industries	25,000	80	50
2811 Tin cans and other plated sheet products	371 Iron and steel basic industries	15,000	110	130
2841 Fabricated goods except structural hardware	371 Iron and steel basic industries	45,000	109	80
2843 Fabricated plate work and sheet metal work	371 Iron and steel basic industries	29,000	185	115
<b>Steel processing industry(machinery products-line) group</b>	<b>Steel processing industry(machinery products-line) group</b>	<b>214,000</b>	<b>865</b>	<b>815</b>
2972 Air compressor, and gas compressors and blowers	38292 Air-conditioning machines	25,000	260	35
2980 Office machines	38250 Office, computing and accounting machinery	35,000	90	90
2984 Refrigerators and air conditioning apparatus	382 Machinery, except electrical	25,000	370	160
2989 Miscellaneous office, surface industry and household machines	382 Machinery, except electrical	30,000	320	240
<b>Steel industry by processing line products group</b>	<b>Steel industry by processing line products group</b>	<b>115,000</b>	<b>980</b>	<b>525</b>
<b>General manufacture(except steel industry)</b>	<b>General manufacture(except steel industry)</b>	<b>521,500</b>	<b>2,415</b>	<b>2,635</b>
<b>Steel industry</b>	<b>Steel industry</b>	<b>1,011,000</b>	<b>2,355</b>	<b>32,000</b>
<b>Total</b>	<b>Total</b>	<b>1,532,500</b>	<b>4,770</b>	<b>34,635</b>

Table A.2.3 Selection of Industrial Category in Bang Saphan Industrial Estate(2006 year :Scenario-1 :Minimum-Case) (2/5)

Japanese Industrial Category (No. is Japanese industrial category's number)	Thai industrial category (No. is Thai industrial category's number)	Scale of Model Factory		
		Area (m <sup>2</sup> )	No. of Employee	Water Consumption(m <sup>3</sup> /day)
1211 Meat products	311 Food manufacturing	8.500	50	150
1212 Dairy products	31111 Slaughterhouse	11.000	50	380
	31121 Dairies			
	31122 Milk factories			
1221 Canned seafood and seaweed	31149 Other canning, preserving and processing of fish	4.500	50	230
1229 Miscellaneous seafood products		4.500	50	100
1242 soy source "Soyux" and edible acids	31132 Soy sauce and soy curds	37.000	120	700
<b>Manufacture of food group</b>	<b>Manufacture of food group</b>	<b>65.500</b>	<b>320</b>	<b>1.560</b>
1624 Particleboard	33112 Veneer, plywood and veneered panel	43.500	70	130
	33113 Builders' woodwork			
1711 Wooden furniture, except Japanese	33201 Furniture, fixtures and floorings, except primary of metals and or rattans	30.000	160	80
<b>Manufacture of wooden and furniture group</b>	<b>Manufacture of wooden and furniture group</b>	<b>73.500</b>	<b>230</b>	<b>210</b>
2034 Fermentation industry	35299 Other chemical products	85.000	70	5.500
2121 Lubricaine industry	35299 Other chemical products	65.000	60	700
2122 Greases	35299 Other chemical products	26.000	60	50
<b>Manufacture of Petroleum and coal</b>	<b>Manufacture of Petroleum and coal</b>	<b>176.000</b>	<b>190</b>	<b>6.250</b>
2551 Fire blocks	36910 Structural clay products	75.000	170	150
2559 Miscellaneous clay refractories	36910 Structural clay products	44.000	100	1.000
2561 Carbonaceous electrodes	36999 Non-metallic mineral products not elsewhere	350.000	170	4.000
<b>Ceramics industry group</b>	<b>Ceramics industry group</b>	<b>469.000</b>	<b>440</b>	<b>5.150</b>
2632 Steel manufactured, with electric furnaces, including single electric furnaces, and with facilities with rolling factories	371 Iron and steel basic industry	758.000	650	21.800
2641 Steel manufacture of hot rolling mill	37110 Iron and steel works and rolling mills	264.000	655	10.000
2642 Steel manufacture of cold rolling mill	37110 Iron and steel works and rolling mills	213.000	730	9.900
2641 Steel manufacture of hot rolling mill(Bar mill)	37110 Iron and steel works and rolling mills	105.000	300	2.500
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industry	88.000	320	2.500
2652 Galvanized steel sheet(Fused zinc sheet)	371 Iron and steel basic industry	10.000	130	3.000
Ox Plant	Ox Plant			300
<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>1,438,000</b>	<b>2,785</b>	<b>50,000</b>
2644 Steel pipes and tubes	371 Iron and steel basic industry	220.000	180	1.300
2646 Cold finished steel bars	371 Iron and steel basic industry	39.000	50	40
2648 Wire drawing	371 Iron and steel basic industry	42.000	130	650
2650 Coated steel	371 Iron and steel basic industry	38.000	120	750
2660 Ferrous metal machine parts and tooling	371 Iron and steel basic industry	35.000	110	400
2661 Iron castings, except cast iron pipes and	371 Iron and steel basic industry	120.000	300	1.360
2662 Malleable iron castings	371 Iron and steel basic industry	47.000	150	650
2694 Causation pipe	371 Iron and steel basic industry	35.000	170	500
2692 Iron and steel shearing and slitting	371 Iron and steel basic industry	46.000	200	120
2693 Iron and steel scrap preparation for smelting	371 Iron and steel basic industry	20.000	80	40
2811 tin cans and other plated sheet products	371 Iron and steel basic industry	15.000	110	140
2843 Fabricated plate work and sheet metal work	371 Iron and steel basic industry	11.000	70	40
<b>Steel processing industry(machinery products- group)</b>	<b>Steel processing industry(machinery products- group)</b>	<b>668,000</b>	<b>1,670</b>	<b>5,990</b>
2911 Boilers	382 Machinery except electrical	130.000	470	180
2912 Steam engines, turbans and water wheels, except machine engines	382 Machinery except electrical	220.000	800	3.200
2972 Air compressors, gas compressors and blowers	38292 Air-conditioning machinery	25.000	200	30
2974 Conveyors and conveying equipment	382 Machinery except electrical	27.000	130	50
2978 Chemical machinery and its equipment	382 Machinery except electrical	25.000	120	100
2981 Office machines	38250 Office, computing and accounting machinery	60.000	330	370
2984 Refrigerators and air conditioning apparatus	382 Machinery except electrical	60.000	800	300
2989 Miscellaneous office, service industry and household machines	382 Machinery except electrical	17.000	160	120
<b>Steel industry by processing line products group</b>	<b>Steel industry by processing line products group</b>	<b>564,000</b>	<b>3,010</b>	<b>4,350</b>
3141 Steel shipbuilding and repairing	38411 Building and repairing of steel ships	67.000	140	180
3142 Hull blocks	38419 Other shipbuilding and repairing not elsewhere classified	7.000	50	10
<b>Shipbuilding and repairing group</b>	<b>Shipbuilding and repairing group</b>	<b>74,000</b>	<b>190</b>	<b>190</b>
<b>General manufacture(except steel industry)</b>	<b>General manufacture(except steel industry)</b>	<b>2,090,000</b>	<b>6,050</b>	<b>23,700</b>
<b>Steel industry</b>	<b>Steel industry</b>	<b>1,438,000</b>	<b>2,785</b>	<b>50,000</b>
<b>Total</b>	<b>Total</b>	<b>3,528,000</b>	<b>8,835</b>	<b>73,700</b>

Table A.2.3. Selection of Industrial Category in Bang Saphan Industrial Estate(2006 year: Scenario-2 :Maximum-Case) (3/5)

Japanese Industrial Category (No. is Japanese industrial category's number)	Thai Industrial Category (No. is Thai industrial category's number)	Scale of Model Factory		
		Area (m <sup>2</sup> )	No. of Employee	Water Consumption(m <sup>3</sup> /day)
1211 Meat products	311 Food manufacturing	8,500	50	150
1212 Dairy products	31111 Slaughtering			
	31121 Dairies	11,000	50	380
	31122 Milk factories			
1221 Canned seafood and seaweed	31149 Other canning, preserving and processing of fish	4,500	50	230
1229 Miscellaneous seafood products		4,500	50	100
1242 soy source "soy" and edible acids	31132 Soy sauce and soy curds	37,000	120	700
1253 Glucose, starch syrup and high-fructose corn syrup	31211 Starches	35,000	80	4,250
1263 Wheat flour milling	31163 Grain flour mills	20,000	70	100
	31169 Grain mill products			
1281 Vegetable oil and fats	31151 Oil and fats	45,000	100	1,800
1283 Edible oil and fats	31151 Oil and fats	40,000	180	900
1293 Noodles, macaroni and spaghetti	31173 Noodles and similar products	10,000	80	150
1361 Balanced compound feeds	31120 Prepared animal feeds	190,000	200	350
<b>Manufacture of food group</b>	<b>Manufacture of food group</b>	<b>405,500</b>	<b>1,030</b>	<b>9,310</b>
1421 Spinning mills and cotton	32112 Cotton ginning	100,000	250	4,500
1431 Twisting yarns, except bulky yarns	32113 Spinning of cotton and man-made fibers	11,000	60	250
1441 Fabric mills, woven cotton, spun rayon	32100 Textile not elsewhere classified	32,000	100	1,300
<b>Manufacture of textile group</b>	<b>Manufacture of textile group</b>	<b>143,000</b>	<b>410</b>	<b>6,050</b>
1617 Flooring mills	33190 Wood and cork products not elsewhere classified	30,000	100	160
1619 Sawing and planing mills	33111 Sawmills and planing mills	27,000	70	40
1624 Particleboard	33112 Veneer, plywood and veneered panel	70,000	120	200
	33113 Builders woodwork			
1711 Wooden furniture, except Japanese	33201 Furniture, fixtures and fittings, except primary of metals and or rattans	15,000	80	40
<b>Manufacture of wooden and furniture group</b>	<b>Manufacture of wooden and furniture group</b>	<b>142,000</b>	<b>370</b>	<b>440</b>
1841 Office paper products	34190 Pulp, paper and paperboard articles not elsewhere classified	8,500	90	30
1851 Sacks for heavy weight shipping	34120 Containers and boxes of paper and paperboard	12,000	60	50
<b>Manufacture of paper and pulp group</b>	<b>Manufacture of paper and pulp group</b>	<b>20,500</b>	<b>150</b>	<b>80</b>
2033 Methane derivatives	35111 Basic industrial chemicals, except charcoal	200,000	900	2,700
2034 Fermentation industry	35299 Other chemical products	85,000	100	5,500
2121 Lubricating industry	35299 Other chemical products	65,000	100	700
2122 Greases	35299 Other chemical products	26,000	90	50
<b>Manufacture of Petroleum and coal(C, chemicals)</b>	<b>Manufacture of Petroleum and coal(C, chemicals)</b>	<b>376,000</b>	<b>1,190</b>	<b>8,950</b>
2512 Processed flat glass	36200 Glass and glass products	100,000	600	1,850
2514 Glass containers	36200 Glass and glass products	40,000	180	400
2531 Fire blocks	36910 Structural clay products	75,000	170	150
2559 Miscellaneous clay refectories	36910 Structural clay products	44,000	100	1,000
2561 Carbonaceous electrodes	36999 Non-metallic mineral products not elsewhere classified	350,000	170	4,000
<b>Ceramics industry group</b>	<b>Ceramics industry group</b>	<b>609,000</b>	<b>1,220</b>	<b>7,400</b>
2632 Steel manufactured, with electric furnaces, including single electric furnaces, and with rolling	371 Iron and steel basic industry	758,000	650	21,800
2641 Steel manufacture of hot rolling mill	37110 Iron and steel works and rolling mills	264,000	655	10,000
2642 Steel manufacture of cold rolling mill	37110 Iron and steel works and rolling mills	213,000	730	9,900
2641 Steel manufacture of hot rolling mill(Bar mill)	37110 Iron and steel works and rolling mills	105,000	300	2,500
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industry	88,000	320	2,500
2652 Galvanized steel sheet(Fused zinc sheet)	371 Iron and steel basic industry	10,000	120	3,000
<b>Os Plant</b>	<b>Os Plant</b>			<b>300</b>
<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>1,438,000</b>	<b>2,785</b>	<b>50,000</b>
2644 Steel pipes and tubes	371 Iron and steel basic industry	230,000	180	1,300
2646 Cold finished steel bars	371 Iron and steel basic industry	39,000	50	40
2648 Wire drawing	371 Iron and steel basic industry	42,000	130	650
2650 Coated steel	371 Iron and steel basic industry	38,000	120	750
2660 Ferrous metal machine parts and tooling products	371 Iron and steel basic industry	35,000	110	400
2661 Iron castings, except cast iron pipes and malleable	371 Iron and steel basic industry	120,000	300	1,360
2662 Malleable iron castings	371 Iron and steel basic industry	47,000	150	650
2694 Cast iron pipe	371 Iron and steel basic industry	35,000	120	500
2692 Iron and steel shearing and slitting	371 Iron and steel basic industry	46,000	200	120
2693 Iron and steel scrap preparation for smelting	371 Iron and steel basic industry	20,000	80	40
2811 Tin cans and other plated sheet products	371 Iron and steel basic industry	15,000	110	140
2843 Fabricated plate work and sheet metal work	371 Iron and steel basic industry	11,000	70	40
<b>Steel processing industry(machinery products-line)group</b>	<b>Steel processing industry(machinery products-line)group</b>	<b>668,000</b>	<b>1,670</b>	<b>5,990</b>
2911 Boilers	382 Machinery except electrical	130,000	470	180
2912 Steam engines, turbans and water wheels, except machine engines	382 Machinery except electrical	220,000	800	3,200
2972 Air compressors, gas compressors and blowers	38292 Air-conditioning machinery	25,000	200	30
2974 Conveyors and conveying equipment	382 Machinery except electrical	27,000	130	50
2978 Chemical machinery and its equipment	382 Machinery except electrical	25,000	120	100
2979 Miscellaneous general industry machinery and equipment	382 Machinery except electrical	20,000	100	370
2984 Refrigerators and air conditioning apparatus	382 Machinery except electrical	60,000	800	120
3011 Generators, motors and other rotating electrical machinery	38310 Electrical industrial machinery and apparatus	30,000	250	150
3041 Communication equipment (wired)	38320 Radio and television and communication equipment	5,500	70	25
3091 Storage batteries	38392 Electric accumulators and batteries	35,000	260	450
<b>Steel industry by processing line products group</b>	<b>Steel industry by processing line products group</b>	<b>577,500</b>	<b>3,330</b>	<b>4,675</b>
3141 Steel shipbuilding and repairing	38411 Building and repairing of steel ships	67,000	140	180
3142 Hull blocks	38419 Other shipbuilding and repairing not elsewhere classified	7,000	50	10
<b>Shipbuilding and repairing group</b>	<b>Shipbuilding and repairing group</b>	<b>74,000</b>	<b>190</b>	<b>190</b>
<b>General manufacture(except steel industry)</b>	<b>General manufacture(except steel industry)</b>	<b>3,015,500</b>	<b>9,460</b>	<b>43,085</b>
<b>Steel industry</b>	<b>Steel industry</b>	<b>1,438,000</b>	<b>2,785</b>	<b>50,000</b>
<b>Total</b>	<b>Total</b>	<b>4,453,500</b>	<b>12,245</b>	<b>93,085</b>

Table A.2.3 Selection of Industrial Category in Bang Saphan Industrial Estate(2011 year; Scenario-1 (Minimum-Case) (4/5)

Japanese Industrial Category (No. is Japanese industrial category's number)	Thai Industrial Category (No. is Thai industrial category's number)	Scale of Model Factory		
		Area (sq.m)	No. of Employee	Water Consumption
1211 Area products	311 Food manufacturing	8,500	50	150
	31111 Slaughter			
1212 Dairy products	31121 Dairies	11,000	50	380
	31122 Milk factories			
1221 Canned seafood and seaweed	31149 Other canning, preserving and processing of fish	4,500	50	230
1229 Miscellaneous seafood products		4,500	50	100
1242 Soy sauce "Shoyu" and edible acids	31132 Soy sauce and soy curds	37,000	120	700
1253 Glucose, starch syrup and high-fructose corn syrup	31211 Starches	35,000	80	4,250
1263 Wheat flour milling	31163 Grain flour mills	20,000	70	100
	31169 Grain mill products			
1281 Vegetable oil and fats	31151 Oil and fats	45,000	160	1,800
1283 Edible oil and fats	31151 Oil and fats	40,000	150	900
1293 Noodles, macaroni and spaghetti	31173 Noodles and similar products	10,000	80	150
1361 Balanced compound feeds	31120 Prepared animal feeds	190,000	200	550
<b>Manufacture of food group</b>	<b>Manufacture of food group</b>	<b>405,400</b>	<b>1,030</b>	<b>9,310</b>
1421 Spinning mills and cotton	32112 Cotton ginning	190,000	250	4,500
1431 Twisting yarns, except bulky yarns	32113 Spinning of cotton and man-made fibers	11,000	60	250
1441 Fabric mills, woven cotton-rayon	32190 Textile not elsewhere classified	32,000	100	1,300
<b>Manufacture of textile group</b>	<b>Manufacture of textile group</b>	<b>133,000</b>	<b>410</b>	<b>6,050</b>
1617 Flooring mills	33190 Wood and cork products not elsewhere classified	30,000	100	160
1619 Sawing and planing mills	33111 Sawmills and planing mills	27,000	70	40
1624 Particleboard	33112 Veneer, plywood and veneered panel	70,000	130	200
	33113 Bidders woodwork			
1711 Wooden furniture, except Japanese	33261 Furniture, fixtures and fittings, except primary of metals and of rattans	15,000	80	30
<b>Manufacture of wooden and furniture group</b>	<b>Manufacture of wooden and furniture group</b>	<b>142,000</b>	<b>370</b>	<b>430</b>
1841 Office paper products	34190 Pulp, paper and paperboard articles not elsewhere classified	8,500	90	30
1851 Sacks for heavy weight shipping	34120 Containers and boxes of paper and paperboard	12,000	50	40
<b>Manufacture of paper and pulp group</b>	<b>Manufacture of paper and pulp group</b>	<b>20,500</b>	<b>150</b>	<b>70</b>
2011 Nitrogenous and phosphatic fertilizers	35120 Fertilizers and pesticides	100,000	50	4,500
2012 Compound fertilizers	35120 Fertilizers and pesticides	65,000	50	3,700
2023 Inorganic pigments	35299 Other chemical products	70,000	140	7,000
2024 Compressed and liquefied gases	35299 Other chemical products	25,000	80	1,000
2033 Methane derivatives	35111 Basic industrial chemicals, except charcoal	100,000	900	2,700
2034 Fermentation industry	35299 Other chemical products	35,000	100	5,500
2123 Lubricating industry	35299 Other chemical products	65,000	100	700
2122 Greases	35299 Other chemical products	26,000	90	50
2210 Industrial plates, bars and rods, pipes and tubes, of plastic	356 Plastic products elsewhere classified	20,000	140	540
2230 Industrial plastic products	356 Plastic products elsewhere classified	11,000	90	150
<b>Manufacture of Petroleum and coal(C, chemicals)</b>	<b>Manufacture of Petroleum and coal(C, chemicals)</b>	<b>676,000</b>	<b>1,800</b>	<b>25,840</b>
2512 Processed flat glass	36290 Glass and glass products	100,000	600	1,850
2514 Glass containers	36290 Glass and glass products	40,000	180	400
2551 Fire blocks	36910 Structural clay products	35,000	170	150
2559 Miscellaneous clay refractories	36910 Structural clay products	44,000	300	1,000
2561 Carbon/graphite electrodes	36992 Non-metallic mineral products not elsewhere classified	350,000	170	4,000
<b>Ceramics Industry group</b>	<b>Ceramics Industry group</b>	<b>699,000</b>	<b>1,370</b>	<b>7,400</b>
2631 Steel manufactured with electric furnaces, including single electric furnaces, and with rolling facilities with rolling factories	371 Iron and steel basic industry	1,234,000	2,468	21,800
	37110 Iron and steel works and rolling mills	602,000		
2641 Steel manufacture of hot rolling mill	37110 Iron and steel works and rolling mills	264,000	655	34,900
2642 Steel manufacture of cold rolling mill	37110 Iron and steel works and rolling mills	264,000	800	9,900
2641 Steel manufacture of hot rolling mill(Bar mills)	37110 Iron and steel works and rolling mills	105,000	300	25,000
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industry	88,000	320	3,240
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industry	18,000	150	3,000
2652 Galvanized steel sheet(Electrical zinc sheet)	371 Iron and steel basic industry			200
<b>Ox Plant</b>	<b>Ox Plant</b>	<b>2,575,000</b>	<b>4,693</b>	<b>98,600</b>
<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>Steel manufacture (Basic product-line by furnace) group</b>	<b>2,575,000</b>	<b>4,693</b>	<b>98,600</b>
2644 Steel pipes and tubes	371 Iron and steel basic industry	220,000	180	1,300
2646 Cold finished steel bars	371 Iron and steel basic industry	32,000	50	40
2648 Wire drawing	371 Iron and steel basic industry	42,000	130	75
2650 Coated steel	371 Iron and steel basic industry	38,000	120	500
2660 Ferrous metal machine parts and tooling products	371 Iron and steel basic industry	35,000	110	400
2661 Iron castings, except cast iron pipes and malleable	371 Iron and steel basic industry	120,000	200	1,300
2694 Cast iron pipe	371 Iron and steel basic industry	47,000	150	650
2662 Malleable iron casting	371 Iron and steel basic industry	35,000	170	500
2692 Iron and steel shearing and shiving	371 Iron and steel basic industry	46,000	200	110
2693 Iron and steel scrap preparation for smelting	371 Iron and steel basic industry	20,000	80	40
2811 Tin cans and other plated sheet products	371 Iron and steel basic industry	15,000	110	140
2841 Fabricated construction-use metal products	371 Iron and steel basic industry	35,000	100	50
2842 Fabricated architectural metal products, except zinc	371 Iron and steel basic industry	25,000	100	130
2843 Fabricated plate work and sheet metal work	371 Iron and steel basic industry	11,000	70	30
<b>Steel processing industry(machinery products-line)group</b>	<b>Steel processing industry(machinery products-line)group</b>	<b>728,000</b>	<b>1,870</b>	<b>5,495</b>
2911 Boilers	382 Machinery except electrical	130,000	470	180
2912 Steam engines, turbines and water wheels, except machine engines	382 Machinery except electrical	230,000	800	3,200
2972 Air compressors, gas compressors and blowers	38292 Air-combusting machinery	25,000	200	35
2974 Conveyors and conveying equipment	382 Machinery except electrical	27,000	130	170
2978 Chemical machinery and its equipment	382 Machinery except electrical	25,000	120	60
2979 Miscellaneous general industry machinery and tools	382 Machinery except electrical	20,000	100	180
2980 Office, service industry and household machines	382 Machinery except electrical	60,000	330	370
2984 Refrigerators and air conditioning apparatus	382 Machinery except electrical	60,000	800	390
2989 Miscellaneous office, service industry and household machines		17,000	160	130
3011 Generators, motors and other rotating electrical machinery	38310 Electrical industrial machinery and apparatus	39,800	280	150
3021 Household electric appliances		58,000	620	450
3041 Communication equipment(wired)	38320 Radio and television and communication equipment	5,500	70	25
3091 Storage batteries	38302 Electric accumulators and batteries	35,000	260	450
3113 Motor vehicle bodies and trailers	38432 Motor vehicle bodies	50,000	360	410
3113 Motor vehicle parts and accessories	38474 Other motor vehicle industry	28,000	150	180
<b>Steel industry by processing line products group</b>	<b>Steel industry by processing line products group</b>	<b>728,000</b>	<b>4,880</b>	<b>5,495</b>
3841 Steel shipbuilding and repairing	38411 Building and repairing of steel ships	65,000	140	180
3842 Hull blocks	38419 Other shipbuilding and repairing not elsewhere classified	7,000	50	10
<b>Shipbuilding and repairing group</b>	<b>Shipbuilding and repairing group</b>	<b>74,000</b>	<b>190</b>	<b>190</b>
<b>General manufacture(except steel industry)</b>	<b>General manufacture(except steel industry)</b>	<b>2,559,500</b>	<b>11,920</b>	<b>61,065</b>
<b>Steel industry</b>	<b>Steel industry</b>	<b>2,575,000</b>	<b>4,693</b>	<b>98,600</b>
<b>Total</b>		<b>6,163,500</b>	<b>16,613</b>	<b>159,665</b>

Table A.2.3 Selection of Industrial Category in Bang Saphan Industrial Estate (2011 year (Scenario-2 (Maximum-Case) (5/5))

Japanese Industrial Category (No. is Japanese industrial category's number)	Thai Industrial Category (No. is Thai industrial category's number)	Scale of Model Factory		
		Area (m <sup>2</sup> )	No. of Employee	Water Consumption (m <sup>3</sup> /day)
1211 Meat products	311 Food manufacturing	8,300	50	150
1212 Dairy products	31111 Meat processing	11,000	50	380
1219 Miscellaneous live-stock products	31122 Milk products	10,000	40	120
1221 Canned seafood and preserved	31149 Other meat products	13,500	150	600
1229 Miscellaneous red-meat products	31152 Soy sauce and soy cond.	13,500	150	300
1242 Soy source "soybean" and edible seeds	31153 Starches	67,000	120	700
1253 Glucose, starch syrup and high-fructose corn	31163 Grain flour mills	35,000	80	4,250
1263 Wheat flour milling	31164 Oil and fats	50,000	140	250
1243 Edible oil and fats	31174 Noodles and similar products	48,000	180	1,800
1293 Noodles, macaroni and spaghetti	31211 Starches	80,000	250	450
1253 Glucose, starch syrup and high-fructose corn	31228 Prepared animal feeds	190,000	200	550
1261 Balance compound feeds	Manufacture of food group	483,400	1,510	10,500
1421 Spinning mills and cotton	32112 Cotton spinning	100,000	250	4,500
1431 Twisting yarns, except bulky yarns	32113 Spinning of cotton and man-made fibers	11,000	60	250
1441 Fabric mills, woven cotton and spun rayon	32190 Textile not elsewhere classified	32,000	100	1,100
Manufacture of textile group	Manufacture of textile group	143,000	410	6,050
1617 Flooring mills	33100 Wood and cork products not elsewhere	30,000	100	160
1619 Sawing and planing mills	33111 Sawmills and planing mills	27,000	70	40
1624 Particleboard	33112 Veneer, plywood and veneered panel	140,000	240	400
1711 Wooden furniture, except Japanese	33115 Builders woodwork	45,000	240	90
Manufacture of wooden and furniture group	Manufacture of wooden and furniture group	342,000	650	600
1821 Paper	34111 Paper and paperboard by machine	50,000	85	13,000
1831 Coated paper	34190 Pulp, paper and paperboard articles not	30,000	110	1,300
1832 Corrugated board	elsewhere classified	30,000	70	260
1841 Office paper products	34192 Pulp, paper and paperboard articles not	1,700	180	5
1851 Stacks for heavy weight shipping	elsewhere classified	12,000	60	50
Manufacture of paper and pulp group	Manufacture of paper and pulp group	123,700	518	14,618
2011 Nitrogenous and phosphate fertilizers	35120 Fertilizers and pesticides	100,000	80	4,500
2012 Compound fertilizers	35120 Fertilizers and pesticides	65,000	80	3,700
2023 Inorganic pigments	35299 Other chemical products	140,000	260	14,000
2024 Compressed and liquefied gases	35299 Other chemical products	50,000	150	2,000
2033 Methane derivatives	35111 Basic industrial chemicals, except starched	200,000	1,000	2,700
2034 Fermentation industry	35299 Other chemical products	75,000	35	5,500
2121 Lubricating industry	35299 Other chemical products	65,000	60	700
2122 Greases	35299 Other chemical products	26,000	60	50
2210 Industrial pipes, bus and rods, pipes and tubes, pipe fittings and profile extrusions	355 Plastics products elsewhere classified	58,000	280	1,700
2211 Tires and tubes for automobiles	35510 Tire and tube machines	170,000	750	2,800
Manufacture of Petroleum and coal(C, chemicals)	Manufacture of Petroleum and coal(C, chemicals)	949,000	2,775	37,250
2512 Processed flat glass	36200 Glass and glass products	200,000	1,200	3,700
2514 Glass containers	36200 Glass and glass products	80,000	700	800
2551 Fire blocks	36010 Structural clay products	150,000	140	325
2550 Miscellaneous clay refractories	36010 Structural clay products	44,000	100	915
2561 Carbonaceous electrodes	36099 Non-metallic mineral products, not elsewhere classified	85,000	170	4,000
Ceramics industry group	Ceramics industry group	824,000	2,170	8,710
2631 Steel manufactured, with electric furnaces including single electric furnaces and with rolling facilities with rolling histories	371 Iron and steel basic industry	1,234,000	2,408	21,800
2641 Steel manufacture of hot rolling mill	37110 Iron and steel works and rolling mills	264,000	655	34,900
2642 Steel manufacture of cold rolling mill	37110 Iron and steel works and rolling mills	264,000	800	9,000
2643 Steel manufacture of hot rolling mill with mill	37110 Iron and steel works and rolling mills	155,000	390	25,000
2652 Galvanized steel sheet/Electric zinc sheets	371 Iron and steel basic industry	88,000	420	3,300
2652 Galvanized steel sheet/Electric zinc sheets	371 Iron and steel basic industry	18,000	150	3,000
On Plant	On Plant			700
Steel manufacture (basic product-line by furnace) group	Steel manufacture (basic product-line by furnace) group	2,575,000	4,693	98,600
2644 Steel pipes and tubes	371 Iron and steel basic industry	220,000	180	1,300
2645 Cold finished steel bars	371 Iron and steel basic industry	76,000	100	80
2648 Wire drawing	371 Iron and steel basic industry	84,000	260	1,000
2650 Coated steel	371 Iron and steel basic industry	115,000	360	2,340
2650 Ferrous metal machine parts and tooling products	371 Iron and steel basic industry	35,000	110	400
2661 Iron castings, except cast iron pipes and malleable	371 Iron and steel basic industry	120,000	300	1,560
2694 Cast iron pipe	371 Iron and steel basic industry	47,000	150	650
2692 Malleable iron casting	371 Iron and steel basic industry	35,000	170	500
2692 Iron and steel casting and slitting	371 Iron and steel basic industry	90,000	400	110
2693 Iron and steel casting preparation for smelting	371 Iron and steel basic industry	60,000	240	120
2811 Tin cans and other closed sheet products	371 Iron and steel basic industry	45,000	150	420
2841 Fabricated construction-use metal products	371 Iron and steel basic industry	70,000	260	160
2842 Fabricated architectural metal products, except structural hardware	371 Iron and steel basic industry	100,000	400	680
2842 Fabricated plate work and sheet metal work	371 Iron and steel basic industry	66,000	470	210
Steel processing industry (machinery products)	Steel processing industry (machinery products)	1,161,000	3,650	9,500
2911 Bldgs.	382 Machinery except electrical	130,000	470	180
2912 Steam engines, turbines and water wheels, except turbine engines	382 Machinery except electrical	220,000	800	4,200
2971 Pumps and pumping equipment	382 Machinery except electrical	100,000	580	350
2972 Air compressors, gas compressors and blowers	38292 Air-conditioning machinery	30,000	400	65
2974 Conveyors and conveying equipment	382 Machinery except electrical	27,000	140	50
2977 Oil hydraulic equipment	382 Machinery except electrical	34,000	210	150
2978 Chemical machinery and its equipment	382 Machinery except electrical	246,000	520	630
2979 Miscellaneous general industry machinery and	382 Machinery except electrical	60,000	300	180
2983 Office, service industry and household machines	382 Machinery except electrical	60,000	330	370
2984 Refrigerators and air conditioning apparatus	382 Machinery except electrical	60,000	300	300
2989 Miscellaneous office, service industry and household machines	382 Machinery except electrical	34,000	150	200
3011 Generators, motors and other rotating electrical machinery	38310 Electrical industrial machinery and apparatus	30,000	380	150
3012 Power and distribution transformers, except electric appliance transformers	38310 Electrical industrial machinery and apparatus	44,000	240	160
3021 Household electric appliances	38330 Electric appliances and housewares	58,000	620	450
3041 Communication equipment (wired)	38320 Radio and television and communication equipment and apparatus	48,000	260	240
3091 Storage batteries	38332 Electric accumulators and batteries	35,000	520	450
3112 Motor vehicle bodies and trailers	38432 Motor vehicle bodies	150,000	1,000	1,200
3113 Motor vehicle parts and accessories	38434 Other motor vehicle industry	100,000	670	650
Steel industry by processing line products group	Steel industry by processing line products group	1,436,000	4,530	8,815
3141 Steel shipbuilding and repairing	38411 Building and repairing of steel ships	68,000	140	180
3142 Hull blocks	38419 Other shipbuilding and repairing not elsewhere classified	7,000	50	10
Shipbuilding and repairing group	Shipbuilding and repairing group	74,000	190	190
General manufacture(except steel industry)	General manufacture(except steel industry)	5,492,200	30,210	96,800
Steel industry	Steel industry	2,575,000	4,693	98,600
Total		8,067,200	35,063	195,400

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