

CHAPTER 2

OVERALL VIEW OF THE INDUSTRIAL PATTERN IN THAILAND

Before embarking on an analysis of the cement industry in Thailand, it would be useful to examine briefly the overall situation of industrial development in the country. In this Chapter, we shall present a summary description of the industrial development pattern and attempt to isolate some of the major factors affecting locational decisions. These factors will provide a generalized frame of reference for the analysis of the cement industry in the following chapter.



I. Historical Industrial Development

In 1850 the main manufacturing activities were home industries such as rice milling, spinning, weaving and sugar processing. Local materials were used in these industries. Before 1932 there were changes in these activities, consisting mainly of a decline in the home industries. This decline was partly due to an increase in the import of processing materials. The Thai manufacturing industries, such as the sugar industry were beginning to meet competition from Europe and thus the decline in the Thai home industries continued. Cotton also grown in India was now imported into Bangkok instead of being locally grown and processed. The increase in demand for cotton could not be met by Thai producers.

In the non-urban regional sectors where the home industries were more traditional and where there was less influence from imported products (since the transportation system from Bangkok was not developed) there was less decline and change. However, due to the establishment of railways there was a regional growth of paddy mills since produce could now be transported to Bangkok and then exported.

The development of manufacturing enterprises in Thailand began slowly, since local entrepreneurs hesitated to make private investments in manufacturing. In the case of foreign entrepreneurs, one cause of a lack of interest was the Bowring Treaty which gave so many

concessions to foreign importers that it limited their interest in local economic activities.

Before 1930 there were only a few privately owned factories, mainly Chinese-owned which used family members as their labour force. However, after 1932, the private sector developed for two main reasons: firstly the manufacturing grew because of a general boost in the country's economy; and secondly, autonomy over tariffs was restored to the Thai Government.

One outstanding example of this growth was the Siam Cement company which grew because of the demand for its product, plus the availability of raw materials for manufacturing and heavy import duties on imported cement. At the same time, there was also a growth of nationalism which led to an increase in government activity in establishing government enterprises in 1942. In 1952 the economy seemed to be dominated by the agricultural sector, rather than the commercial and services sectors.

II The Present State of Manufacturing Industries

In working out the distribution by number of establishments, in 1964, the Ministry of Industry used its own system of classification which contained 110 categories of industries. An attempt has been made to convert this system to the International Standard Industrial Classification under which the Census data was compiled. The conversion results in a very different picture of the structure of Thai industries (Table 2.1). Food manufacturing accounted for 59.4 per cent

of all registered factories, followed by metal products with 10.8 per cent, furniture with 4.9 per cent and textiles with a mere 3.5 per cent (Table 2.1).

Table 2.1 Manufacturing Establishments by Major Industrial

Industries	Industrial Census ^(a) (1963)		Factories Registered ^(b) (1964)	
	No.	%	No.	%
Food except beverage	23,773	14.5	16,896	59.4
Beverages	110	0.1	140	0.5
Tobacco and Snuff	142	0.1	223	0.8
Textiles	68,722	41.9	1,043	3.5
Wearing apparel and made up textile goods	21,079	12.8	98	0.3
Wood and cork	23,863	14.6		
Furniture and Fixtures	1,345	0.8	1,423	4.9
Paper and paper products	642	0.4	172	0.6
Printing, publishing and allied industries	789	0.5	849	3.0
Leather and leather products and footwear	349	0.2	100	0.3
Rubber and rubber products	261	0.2	368	1.3
Chemical and Chemical products	639	0.4	776	2.7
Non-metallic mineral products	7,766	4.9	956	2.3
Metal products not machinery and transport equipment	5,293	3.2	3,087	10.8
Manufacturing and repairing non-electrical machinery	1,119	0.7	530	1.8
Electrical machinery and supplies	700	0.4	607	2.1
Transport equipment	3,526	2.2	706	2.4
Miscellaneous not elsewhere classified	3,758	2.3	651	2.3
Total	164,002	100.0	28,624	100.0

Table 2.1 (continued)

Source: Isarangkun Chirayu, Manufacturing in Thailand
(A thesis submitted for the degree of Phd. Anu. 1969)
p. 60.

Original data: (a) National Statistical Office, Report of the 1964
Industrial Census Volume I, Bangkok, (1967),
Volume II, Bangkok, (1968); Volume III Bangkok,
(1968).
(b) Ministry of Industry, Registered Factories,
Bangkok, 1966.

The Ministry's data served only as a rough indication of the relative importance of various industries. The distribution by size of employment, which we will consider next, is a more relevant indicator of the relative importance of Thai industries. The 1963 data on employment indicates the combined importance of textiles, wood and cork, food and wearing-apparel and made-up textile goods industries (Table 2.2). These four industries accounted for 73.3 per cent of employment compared to 82.8 per cent of the establishments. The differences in the relative size of these four industries can be described as follows; the textile industry, which still accounting for about one-third of the total manufacturing employment recorded, declined in importance together with the wood and cork and the wearing-apparel and fabricated textile goods industries. Food manufacturing, on the other hand, accounted for only 14.5 per cent of the total number

of manufacturing workers. The relative significance of other industries also increased with this criterion. The tobacco and the beverage industries, for instance, each accounted for only 0.1 per cent of the number of establishments (Table 2.2) but 2.6 and 1.6 per cent of employment respectively.

Table 2.2 Manufacturing Workers by Major Industrial Group 1960 - 1963

Industries	Population ^(a)		Industrial ^(b)	
	Census 1960		Census 1963	
	No.	%	No.	%
Food except beverage	71,085	24.2	93,542	19.4
Beverages	5,008	1.7	7,616	1.6
Tobacco and Snuff	8,436	2.9	12,360	2.6
Textiles	13,421	4.6	160,351	33.3
Wearing apparel and made-up textile goods	29,621	10.1	35,961	7.5
Wood and cork	93,366	25.0	63,085	13.1
Furniture and fixture	3,027	1.0	4,251	0.9
Paper and paper products	1,504	0.5	3,067	0.6
Printing, publishing and allied industries	7,731	2.6	7,740	1.6
Leather and leather products not foot wear	1,010	0.3	1,519	0.3
Rubber and rubber products	3,405	1.2	3,645	0.8
Chemicals and chemical products	3,506	1.2	9,515	1.9
Non-metallic mineral products	16,013	5.4	28,634	5.9
Metal products not machinery and transport equipment	13,064	4.5	17,830	3.7
Manufacturing and repairing non-electrical machinery	4,521	1.5	6,316	1.3
Electrical machinery and supplies	2,149	0.7	3,299	0.7
Transport equipment	25,240	8.6	11,815	2.5
Miscellaneous not elsewhere classified	11,502	3.9	10,666	3.2
Total	293,820	100	481,213	100

Table 2.2 (continued)

Source: Isarangkun Chirayu Ibid.63

- (a) The 1960 Population Census included only those whose main occupations were in manufacturing in the year 1960.
- (b) In the 1964 Industrial Census, all workers engaged, paid and unpaid, working at the end of the period on or nearest to December 31st, 1963 were included.

Despite the fact that both the 1960 and 1964 population censuses included manufacturing employment data with the same classifications, great difficulties arise in comparing the data. The figures would seem to suggest a 1,000% increase in textile employment, from 13,421 to 160,351, which seems obviously impossible. Admittedly, some growth occurred but it seems necessary to find some other explanation for this difference. It is found in a discrepancy concerning the definition of manufacturing employment. Only those people were included in the Population Census whose primary occupation was manufacturing, while in the Industrial Census all of those connected with the establishments surveyed at a definite time period in 1963, were included. Hence it seems that many of those included in the Industrial Census as textile workers were listed in the Population Census as farmers.

This happened because although some people were in fact farmers, they were employed in textile manufacture during the non-farming season.

Therefore there was an estimation of the real range of employment offered by manufacturers in the Population Census. On the other hand, there is an over estimation of the importance of part-time manufacturing activities in the Industrial Census. Thus an attempt was made to adjust the employment figures for the principal industries in those instances where part-time employment was obviously an important factor in total employment. This was done to show the actual importance of part-time employment without doing what the Industrial Census seems to do i.e. causes distortion by equating part-time and full-time employment.

These adjustments affected the employment figures in rice and sugar milling as part of the food manufacturing industry, and also the figures for cotton textile, silk, mats and other similar products as part of the textile industry.

According to Dr. Chirayu Israngul, the 1965 Census revealed a further characteristic of present Thai industries. The distribution of establishments by size of employment showed that 97.8 per cent of the undertakings had less than 10 workers. Those accounted for 67.8 per cent of all manufacturing workers. This put the average number of workers in these 'cottage' undertakings at about 2 per establishment. When the adjustment were made in the same way as previously, to take into account the difference of part-time and full-time employment, it was estimated that the share of 'real' employment of these establishments declined to about 60 per cent.

Thus we can conclude that 2.2% of activities provide work for 32.2% of all manufacturing workers and furthermore this involves, as

an estimate, 40% of real employment. Also this 2.2% of manufacturing units, accounted for 86.8% of manufacturing gross receipts.

Table 2.3 Distribution of Workers and Estimated Distribution of
'real' Employment Generated in Manufacturing Industries, 1963

Industries	Industrial Census 1963		Estimates	
	(a) No. of Workers	%	(b) Real Employment	%
Food except beverages	93,542	19.4	67,394	18.1
Beverages	7,616	1.6	7,616	2.1
Tobacco and snuff	11,784	2.6	11,784	3.2
Textiles	160,351	33.3	78,057	20.9
Wearing apparel and made up textile goods	35,961	7.5	35,961	9.6
Wood and Cork	63,085	13.1	63,085	16.9
Furniture and Fixtures	4,251	0.9	4,251	1.2
Paper and paper products	3,067	0.6	3,067	0.8
Printing, publishing and allied industries	9,140	1.6	7,740	2.1
Leather and Leather products not footwear	1,519	0.3	1,519	0.4
Rubber and rubber products	3,645	0.8	3,645	1.0
Chemicals and chemical products	9,516	1.9	9,516	2.6
Non-metallic mineral products	28,634	5.9	28,634	7.7
Metal product not machinery and transport equipment	17,830	3.9	17,850	4.8
Manufacturing and repairing non-electrical machinery	6,316	1.3	6,316	1.7
Electrical machinery and supplies	3,299	0.7	3,299	0.9
Transport equipment	11,815	2.5	11,815	3.2
Miscellaneous not elsewhere classified	10,666	2.2	10,666	2.8
Total	481,213	100	392,751	100

Table 2.3 (continued)

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- (a) It is assumed that workers employed by rice-mills having less than 10 workers were employed for 6 months of the year only. It is also assumed that workers employed by sugar-mills as recorded in the Census were only employed for 5 months of the year. In the other 7 months, it assumed that only a quarter of this number were retained.
- (b) Assuming that all workers in undertakings with less than 10 workers were employed for only 3 months of the year.

Source Ibid. p. 68

III Factors effecting the Development of Manufacturing Industries

1. Capital Investment and Entrepreneurship

(i) Local Enterprises

Most of the local enterprises which have a problem regarding capital investment are large and medium sized firms, with more than ten employees. In particular more than 50 firms are looking for loans and investment funds from the public. Problems arise owing to the lack of financial institutions in this country; the absence of a capital market leads to the inefficient allocation of investment funds to private concerns. In spite of the fact that the number of commercial banks established has increased during the past ten years, the commercial banks are still inactive in providing loans for capital investment in the private sector. Most

of the activities of commercial banks have involved import and export transactions rather than making medium or long term industrial loans. Under these financial circumstances, the local private enterprises obtain their capital investment loans from three sources: first, profit of their commercial activities; second, collections from family members; and third, that supplied by the businessman personally.

However, during 1962 - 1972, some remarkable financial institutions began to operate. These are the Industrial Finance Corporation of Thailand (IFCT), Thai Investment and Securities Co. Ltd. (TISCO), and the Bangkok Stock Exchange. These financial institutions are mostly joint efforts by foreign and local leading banks. The functions they perform include loan services, financial consulting, and promoting the operation of stock market for the shares of the large business companies.

(ii) Foreign Enterprises

The figures for 1959 - 1969, (Table 2.4) taken from the Board of Investment, clearly show that some major industries have been dominated by foreign capital investment funds. The main industries which have absorbed high percentages of registered foreign capital are textiles, furniture and fixtures, chemical and chemical products, petroleum products, manufacturing and repair of non-electrical machinery, electrical equipment and supplies; i.e. 42.7%, 54.8%, 44.4%, 50.2%, 79.0%, 48.5% respectively.

Foreign investment amounts to 34.6% of the total, estimated to be almost one-third of the whole investment in Thailand. The amount of foreign investment was allocated in various kind of the important industries as they had already mention previously. Apart from the

foreign capital, the amount of the registered capital came from domestic financial sources.

Out of the total foreign registered capital, (Table 2.5) Japan took a larger share than the others, amounting to 13.18%, while the Republic of China took 7.54%; and the United States took 6.56% of the registered capital of the joint ventures. With respect to the registered capital solely owned by one nationality, Japan also took a high percentage i.e. 8.27% of the total, while the United States took 2.92% of the total.

Table 2.4 The Shares of Registered Capital of Promoted Manufacturing Industries from 1959 to December 31, 1969

Industries	Domestic		Foreign		Total
	Amount	% of total	Amount	% of total	
Food except beverage	704,375	75.2	232,086	24.8	936,461
Textiles	604,902	57.3	451,127	42.7	1,056,029
Wood and Cork	113,223	92.2	9,577	7.3	122,800
Furniture and Fixtures	1,400	45.2	1,700	54.8	3,100
Paper and Paper products	186,690	76.2	58,310	23.8	245,000
Rubber and rubber products	106,441	66.2	54,356	33.8	160,697
Chemical and chemical products	231,140	55.6	184,420	44.4	415,560
Petroleum products	187,650	49.8	189,390	50.2	377,040
Non-metallic mineral products	378,722	76.6	115,678	23.4	494,400
Basic metal	172,182	69.5	75,468	30.5	247,650
Metal products except machinery and transport equipment	316,219	65.1	169,707	34.9	485,926
Manufacturing and repairing non-electrical machinery	2,626	21.0	9,894	79.0	12,500
Electrical and supplies	133,770	51.5	125,855	48.5	259,625
Transport equipment	154,589	57.2	115,785	42.8	270,374
Miscellaneous not else when classified	382,607	71.0	150,375	29.0	532,982
Total	3,676,536	65.4	1,943,608	34.6	5,620,144

Source BOI

Table 2.5

Details of The Registered Capital of Industrial Activities Already
Promoted by Nationality of Ownership and Participation in Ventures
From October 26, 1960 - June 31, 1972

No. (1)	Nationality of Ownership (2)	Registered Capital Solely Owned by One Nationality (3)		Registered Capital Of Joint Ventures (4)		Total Registered Capital (5)	
		Amount in Baht	%	Amount in Baht	%	Amount in Baht	%
1.	Thailand	2,035,668,243	86.68	2,923,386,527	18.26	4,959,054,770	67.32
2.	Japan	194,194,000	8.27	661,384,200	13.18	855,578,200	11.61
3.	U.S.A.	68,640,000	2.92	329,399,991	6.56	398,039,991	5.40
4.	Republic of China	3,000,000	0.13	378,262,709	7.54	381,262,709	5.18
5.	United Kingdom	11,000,000	0.47	124,037,650	2.47	135,037,650	1.83
6.	Malaysia	-	-	93,054,533	1.85	93,054,533	1.26
7.	Netherland	-	-	50,197,750	1.00	50,197,750	0.68
8.	West Germany	16,750,000	0.71	31,393,000	0.63	48,143,000	0.65
9.	Hong Kong	-	-	33,431,500	0.67	33,431,500	0.45
10.	India	8,000,000	0.34	19,183,850	0.38	27,183,850	0.37
11.	Singapore	11,138,000	0.48	14,728,000	0.29	25,866,000	0.35
12.	Switzerland	-	-	23,321,400	0.46	23,321,400	0.32
13.	Panama	-	-	19,452,000	0.39	19,452,000	0.26
14.	Denmark	-	-	15,809,200	0.31	15,809,200	0.22
15.	Philippines	-	-	15,275,000	0.31	15,275,000	0.21
16.	Australia	-	-	14,749,750	0.29	14,749,750	0.20
17.	Portugal	-	-	11,402,600	0.23	11,402,600	0.15
18.	Israel	-	-	7,000,000	0.14	7,000,000	0.10
19.	Italy	-	-	6,600,540	0.13	6,600,540	0.09
20.	Indonesia	-	-	5,500,000	0.11	5,500,000	0.08
21.	Norway	-	-	3,600,000	0.07	3,600,000	0.05
22.	Argentina	-	-	3,000,000	0.06	3,000,000	0.04
23.	Burma	-	-	1,750,000	0.04	1,750,000	0.02
24.	Others	-	-	232,238,800	4.63	232,238,000	3.15
Total		2,348,390,243	100	5,018,159,000	100	7,366,549,243	100

Footnotes: Column (3) Registered capital of business enterprises
totally owned by any nationality.

Column (4) Registered capital of either Thai or Foreign Investment of
the joint venture showing participation of each nationality
of various joint ventures.

Source: BOI (mimeograph)

2. Electric Power Supply

Before 1932, the electric power supply was severely limited. The shortage of electric supply continued until after the Second World War, during which there was an increasing power shortage despite limitations on use. From 1962 to 1964, the volume of electricity used in Bangkok amounted to 11%, 18%, and 24% per year of the total electric power supplied by the Public Electric Authority. This was mainly due to the growth of the metropolitan areas and also the increase in the standard living of people in these areas. From 1960 until 1969, the industrial sector still had electric power supply problem.

Since 1970, modern industries have been more satisfied than they were the 1960's; this may be attributed to lower rates and the greater supply of electric power. The following figures show the availability of electric power supply and its improvement up to 1965. The increasing supply capacity resulted from extension of the Public Electric Authority's capacity to distribute over a wider area and from an increase in electric production units in the provinces.

By a projection of the Third Economic Development Plan, it can be estimated that in 1971 the volume of electric power supply amounted to 4833 KWH, and in 1972, 1973, 1974, 1975, 1976, 1977 will be equal to 4833 KWH, 5698 KWH, 6608 KWH, 7830 KWH, 9048 KWH, 10,214 KWH, and 11,318 KWH respectively

TABLE 2.6 CAPA CITY OF ELECTRICITY

Year	Electricity Generated (million KWH)
1951	104.8
1952	128.0
1953	158.4
1954	223.6
1955	288.5
1956	328.1
1957	393.8
1958	408.1
1959	420.6
1960	515.9
1961	611.9
1962	709.2
1963	804.1
1964	1,027.7
1965	1,378.5

Source: Public Electric Authority, Bangkok, Thailand

3. Transportation

The present transportation system in Thailand can be divided in three modes: inland transportation, waterways transportation and airline transportation.

3.1 Inland Transportation

3.1.1. Road system

The present road system has been developed effectively owing to the first and second economic development plans. During 1961 - 1971, the public highway network increased from 8,499 kms. to 17,105 kms. It is respected in the Third Economic Development Plan that from 1972 to 1976 the budget for public road transportation will amount to 16,266.99 million baht. Road transportation plays the most important role in inland transportation. The sales and shipment of agricultural and industrial commodities require road transportation as the most effective means of communication between regional and urban sectors. Recently, attention was given to the extension of public highways and coordination of transportation network among regional sectors themselves. The standardization and improvement of the road system contribute directly to regional productivity and the modernization of the rural sectors.

3.1.2. Railways

Railway transportation began to operate in 1897, and four main lines have since been established in the railroad network. The railroad network radiates from Bangkok toward the north, the south, the east and the northeast of the country. The budget of the railway during 1972 - 1976 amounts to 1,932.99 million baht. The railroads are mostly used for passenger conveyance rather than for transportation of commodities.

3.2. Waterways

The length of the total waterways in Thailand amounts to 5,798 kms, but only 1,600 kms can be used for transportation purposes.

The Chao Phya river is 500 kms in length from Bangkok to Phitsanulok province. It is estimated that about 25 million tons of commodities from the north, northeast and central region are shipped to Bangkok annually; most of these commodities are agricultural and mineral raw materials. The main advantage gained in using waterways as transportation stems from the lower costs of transportation for the bulky agricultural and mineral raw materials.

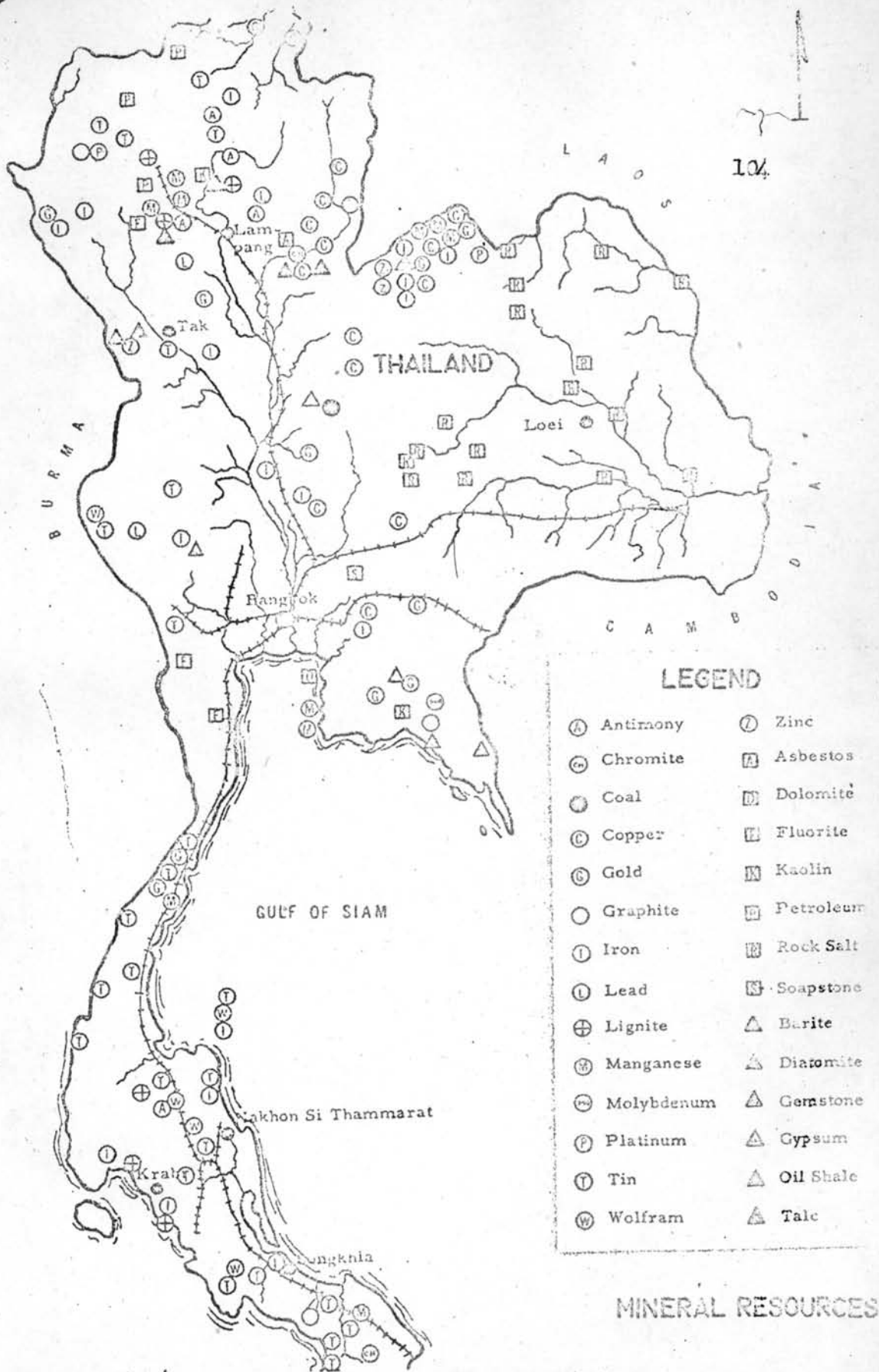
3.3 Air-line transportation

In addition to the fact that Bangkok is an international air port, internal air-line transportation is also used for passenger conveyance and as a mean of urgent business communication. During 1972 - 1976, the budget for improvement of internal air-line transportation amounted to ₪ 815.69, equal to that for waterway transportation.

4. Industrial Input

4.1 Mineral raw material

Various kinds of mineral resources have been found in regional sectors in Thailand. The most significant mineral deposits are considered to be tin, fluorite, iron, manganese, antimony, copper, rock-salt gypsum, lead and zinc, and lignite. Tin is mostly found in locations in the south, but a small quantity has found in the north. The northeast region has been endowed with the richest rock salt deposits; copper is mostly found in the north as well as manganese, antimony, and iron. The other kinds of mineral resource are diversified over the regions of Thailand.



The quantity of tin mined in 1964 equal to 20,000 metric ton; during 1963 - 1970, fluorite increase from 10,000 metric tons to 318,000 tons; iron increase from 750,000 metric ton in 1965 to 22,523 metric ton in 1970. The quantity of gypsum deposit equal to 40,000 tons per annum.

Most of the mineral raw materials produced depend on traditional mean of production; only a couple of modern large-scale establishments are in operation. The level of productivity is also limited by technical know-how. To meet industrial requirements in long run, it will be necessary to discover new deposits of mineral raw materials so as to enlarge their supply in the future.

4.2 Agricultural raw material

It is well known that agriculture is the base of Thailand's economic structure. A portion of the agricultural product has been exported as well as being used as inputs in agricultural industries. The main agricultural products which have been used in industrial processing are rubber, oilseeds, fibres, jute, kenaf, cotton, and kapok, corn, tapioca, and sugar-cane. Recently, fish processing industries have been increasingly well established as well as cattle and poultry processing industries.

The quantities of the agricultural inputs mentioned above vary from year to year due to the seasons and climate of a country in the tropical zone. Also, the traditional methods used in the agricultural sector determine the level of agricultural productivity, and consequently the volume of industrial processing inputs. The utilization of

agricultural raw materials as inputs in industrial processing has been limited in quantity because of the high proportion of agricultural products which are expected.

4.3 Imported material inputs

In addition to using minerals and agricultural raw material, Thailand also imports a large quantity of industrial material inputs year to year. The figures in table 2.7 show that the volume of the raw material imports as percentages of total imports from 1962 - 1965 are 31.9%, 31.5%, 33.4%, and 31.0%, respectively. The almost equal figures include unmanufactured tobacco, crude inedible materials (except fuels), mineral fuels, lubricants and related materials, chemical, paper and paperboard, textiles, non-metallic mineral products and metals.

Mineral fuels, lubricants and related materials accounted for a greater share than the other items, i.e. 33.4%, 30.2%, 30.7%, and 27.1% respectively. The second largest percentage came from metals, which amounted to 25.3% in 1962, 27.8% in 1963, 25.7% in 1964 and 26.9% in 1965. Chemical inputs increased from 16.6% in 1962 to 20.0% in 1965 and were the third largest percentage. It is also easy to see that the value of imported raw materials increased year by year, growing from 3,666,872 baht in 1962 to 5,010,206 baht in 1965.

5. Labour

Labour has been an important factor in both past and present economic activity. It contributes to both agricultural and industrial

Table 2.7 Volume of Major Imported Raw Material and other Material Imports in 1962 - 1965

Items	1962		1963		1964		1965	
	'000 Baht	%	'000 Baht	%	'000 Baht	%	'000 Baht	%
1. Unmanufactured tobacco	125,922	3.4	120,984	3.0	120,984	3.4	173,017	3.4
2. Crude inedible materials except fuels	204,944	5.6	223,867	5.5	282,480	5.9	466,000	9.3
3. Mineral fuels, lubricants and related materials	1,223,528	33.4	1,220,952	30.2	1,458,426	30.7	1,357,000	27.1
4. Chemicals	609,970	16.6	702,045	17.4	892,975	18.8	1,001,253	20.0
5. Paper and paperboard	246,758	6.7	274,048	6.8	270,505	5.7	289,135	5.8
6. Textiles (yarns)	180,610	4.9	216,989	5.4	282,173	5.9	170,383	3.4
7. Non-metallic mineral products	148,560	4.1	157,238	3.9	185,250	3.9	203,550	4.1
8. Metals	927,480	25.3	1,121,956	27.8	1,220,681	25.7	1,349,868	26.9
Total	3,666,872	100	4,038,079	100	4,959,732	100	5,010,206	100
Total (1 - 8) as per cent of total imports	31.9		31.5		33.4		31.0	

Source: Isarangkun Chirayu Ibid p. 350

Table 2.8 Industrial Labour Force Participation in 1960 and 1973

No.	Industries	1960	1973
1.	All industries	13,792,104	16,465,580
2.	Agriculture, Forestry, Hunting and Fishing	11,334,383	11,072,960
3.	Mining and Onarrying	29,568	139,310
4.	Manufacturing	471,027	1,506,400
5.	Construction, Repair, and Demolition	68,581	289,730
6.	Electricity, Gas, Water and Sanity feruices	15,463	42,320
7.	Commerce	779,904	1,590,390
8.	Transportation, Storage, and Commerication	165,778	429,350
9.	Services	655,975	1,389,250
10.	Activities not Adequately Describe	251,925	5,900

Source National Statistical Office, Report of the Labour Force Survey 1973
(Bangkok: Office of the Prim Minister, 1974)

Table 2.9 Rate of Labour Force Participation and Population Growth Rate

Year	1. Industrial Labour Force Participation	Rate of increase in Industrial Labour Force Participation	2. Population	Rate of Increase in Population	Percentage of Industrial Labour Force Part./Pop.
1954	10,200,680		22,214,000		45.92%
1960	12,081,257	18.43%	27,133,000	22.14%	44.52%
1966	14,554,135	16.99%	33,047,000	21.79%	44.04%
1971	16,764,186	15.18%	38,695,000	17.09%	43.32%

Source: (1) Department of Labour, Year Book of Statistics 1968, (Bangkok: Ministry of the Interior, 1969) p.20

(2) Pradit Charsombuti and Meluin M Wagner, Estimates of The Thai Population 1947-1976 and some Agriculteval Implication
(Bangkok: Kasetsart University, 1969)

development as a productive factor in the economic system.

In 1954, Thailand's industrial labour force participation amount to 10,200,680, and it increased to 12,081,257 in 1960. During 1966 - 1971 industrial labour force participation grew from 14,554,135 to 16,764,186. The rate of increase of a percentage from 1954 - 1960 equalled 18.43%. It was 16.79% from 1960 to 1966; and it slightly decreased from 1966 to 1971, to 15.18%. (Table 2.9).

Eventhough the rate of increase in the industrial labour force participation was slower than the rate of increase in population, which was about 22.14%, 21.79%, 17.09% in 1954 - 1960, 1960 - 1966, and 1966 - 1971 respectively, the percentages of industrial labour force participation are still very high; i.e. 45.92% in 1954, 44.52% in 1960, 44.04% in 1966 and 43.32% in 1971 (Table 2.9).

Agriculture, forestry, hunting and fishing occupied 11,334,383 persons in 1960 and 11,072,960 in 1973; the decrease in employment is possibly due to limited raw material resources in agriculture, forestry, and fishing. The other kinds of industry experienced a satisfactory increase in employment, as shown in Table 2.8.

6. Land

6.1 Urban land use

In 1958, the ratios of urban land use were recorded, as shown in table 2.10. About 39.28% of the total urban land was occupied by the agricultural sector, about 24.49% was occupied for residential use and about 16.76% was left as an undeveloped area. Only 2.45% was

utilized for industrial purposes. The other great share of land utilization in Bangkok-Thonburi in the past 15 years has been for institutional purposes.

The situation described above no longer exists at present, due to the increasing population in the Bangkok-Thonburi Metropolitan area. Within the central city of Bangkok-Thonburi, the population increased about 1.5 times, from 1,800,678 persons in 1960 to 2,614,350 person in 1967. It was expected that the population would increase to 3.6 million persons, averaging a 6.5% annual rate of increase, by 1974. This would cause Bangkok-Thonburi to be a significantly over populated city, and would by no means result in improving the allocation of the limited land area in the city. Vacant areas and agricultural land have experienced decreases in their shares of land utilization since 1958.

The 16.76% of the land area that was left vacant in 1958 has recently been reallocated for residential and industrial purposes. The demand for institutional, commercial, warehousing, residential, and public utilities uses increasingly requires more land for expansion. The shortage in housing owing to the population pressure has been especially remarkable. It is estimated that during 1963 - 1969, the total shortage was equal to 61,019 units and during 1963 - 1976 will amount to 141,587 units (Table 2.11).

¹Sidney Goldstein, Urbanization in Thailand, 1947 - 1967, Research Report No. 2, Institute of Population Studies (Bangkok: Chulalongkorn University, 1972), p. 3.

Existing Land Use
Metropolitan Area, Bangkok and Thonburi 1958

CLASSIFICATION	M.A.		BANGKOK		THONBURI	
	RAI	%	RAI	%	RAI	%
TOTAL	108,239	100.00	80,833	100.00	27,406	100.00
UNDEVELOPED	18,140	16.76	16,155	19.98	1,985	7.25
- Open	9,249	8.54	9,107	11.26	142	.52
- Wooded	291	.27	291	.36		
- Water	8,600	7.95	6,575	8.36	1,843	6.73
AGRICULTURAL	42,513	39.28	24,338	30.11	18,175	66.31
- Rice Paddies, Farms, Vegetable Gardens	13,330	12.32	13,312	16.47	18	.07
- Orchards, Plantations	29,183	26.96	11,026	13.64	18,157	66.24
RESIDENTIAL	26,508	24.49	22,221	27.48	4,287	15.65
- Farmer's Type	1,625	1.50	1,554	1.92	71	.26
- Compound	9,089	8.40	8,564	10.59	525	1.91
- Small Lot	6,671	6.16	4,345	5.38	2,326	8.50
- Attached, Apt.	270	.25	187	.23	83	.31
- Condensed	8,853	8.18	7,571	9.36	1,282	4.67
COMMERCIAL	2,743	2.53	2,472	3.06	271	.98
- Comm. & Residential	2,311	2.13	2,067	2.55	244	.89
- Retail Stores	10	.01	10	.01		
- Gas & Auto Repair	161	.15	150	.19	11	.04
- Office, Hotels & Motels, Movies, Restaurants	177	.16	175	.22	2	.01
- Markets	84	.08	70	.09	14	.04
WAREHOUSING & STORAGE	1,090	1.01	782	.97	308	1.12
INDUSTRIAL	2,656	2.45	2,193	2.72	463	1.70
- Industrial & Residential	105	.09	150	.13		
- Other Industrial	2,551	2.36	2,088	2.59	463	1.70
UTILITIES	1,714	1.58	1,583	1.96	131	.48
- Water, Electrical & Communications	248	.23	248	.31		
- Transportation	1,466	1.35	1,335	1.65	131	.48
INSTITUTIONAL	11,374	10.51	9,596	11.87	1,778	6.48
- Schools	1,981	1.83	1,809	2.24	172	.62
- Govt. Bldgs. & Areas	6,529	6.03	6,049	7.08	480	1.75
- Embassies & Internat. Organizations	313	.29	313	.39		
- Private Hospitals & Libraries	85	.08	85	.10		
- Temples, Churches & Cemeteries	2,466	2.28	1,340	1.66	1,126	4.11
PUBLIC & SEMI-PUBLIC OPEN SPACES	1,501	1.39	1,493	1.85	8	.03

Source: Litchfield, Whiting, Bowne and Associates, Greater Bangkok 2533, (Bangkok: Department of Town and Country Planning, Ministry of Interior 1964), p. 49.

Table 2.11 Estimated Housing Shortage in Bangkok and Thonburi 1963 - 1976

Year	Population (persons)	Available housing units	Increase of housing per year	Construction of housing desired according to the basis of 10 units to 1000 population	Shortage of housing below the basis of 10 to 1000	Remarks
1962	1,983,398	250,934				Back-log 9.4% of total
1963	2,106,881	262,879	11,945	21,069	9,124	household, 24,467 units
1964	2,173,724	274,415	11,536	21,737	10,201	
1965	2,407,585	290,391	15,976	24,076	8,100	
1966	2,500,367	306,187	15,796	25,004	9,208	
1967	2,614,356	322,375	16,188	26,144	9,956	
1968	2,716,710	344,355	21,980	27,167	5,187	
1969	2,850,756	363,608	19,253	28,506	9,253	Total shortage, 1963-69,
1970	2,998,425	383,246	19,638	29,984	10,346	61,019 units
1971	3,153,444	404,063	20,817	31,534	10,717	
1972	3,316,477	426,129	22,066	33,165	11,099	
1973	3,487,939	449,519	23,390	34,879	11,489	
1974	3,668,266	474,311	24,792	36,683	11,891	
1975	3,857,916	500,592	26,281	38,579	12,298	
1976	4,057,370	528,448	27,856	40,574	12,718	Total shortage, 1963-76, 141,587 units

Source: Phairoh Praiyanant, Housing Shortage and the Impact of USAID Housing Investment Guarantee Program in Thailand, Economic Journal vol 1, 1972, p. 65.

6.2 Land for industrial use

The pattern of geographical location of **industry** in Thailand in 1972 indicated that sixteen categories of large manufacturing establishments tend to locate within a five-province region. About 210 firms are located in the municipal area of Bangkok-Thonburi, in four provinces of the central region, Samut Prakarn, Pathum Thani, Nonthaburi, and Samut Sakorn about 191, 30, 27, 26 are located respectively (Table 2.32 and Appendix III).

From the present industrial locations described above we can derive two general basic findings about the locational pattern. First, the highest industrial land values are in Bangkok-Thonburi; and second, the greater the population size the greater are the requirements for residential land, and consequently the lesser the production of land available for industrial areas. Given the existing amount of land in Bangkok-Thonburi and its surrounding provinces, a high proportion of investment must go for land for industrial locations in the central regions. However, owing to the fact that industrial establishments enjoy the conveniences of using all kinds of public utilities as well as gaining an advantage from proximity to the markets in the central region, large manufacturing establishments are continuously locating their factories in the central region.

Geographical Dispersion and Locations of Industrial Pattern in Thailand 1971 (Large Scale)

Serial Number	Categories	CENTRAL													
		Bangkok	Thon Buri	Samut Prakan	Nonthaburi	Pathum Thani	Samut Sakhon	Saraburi	Kanchanaburi	Ayutthaya	Chon Buri	Nakhon Pathom	Ratchaburi	Chanthaburi	Phetchaburi
1	Agricultural and Fishing Products Industry	3	-	3	-	-	8	1	-	-	1	-	1	-	2
2	Minerals and Mineral Products, Metal and Metal Products Industry	21	1	36	2	2	1	2	2	1	-	-	1	-	1
3	Food Production and Preservation Industry	13	5	18	3	1	2	-	2	-	9	1	2	-	1
4	Weaving Industry	27	7	39	12	10	8	4	-	2	-	9	-	-	-
5	Products from Wood Industry	8	3	10	-	3	-	-	2	1	2	3	2	-	-
6	Chemical and Chemical Products Industry	2	-	10	-	-	-	-	-	-	1	-	1	-	-
7	Petroleum and Products from Petroleum Industry	1	-	-	-	-	-	-	-	-	1	-	-	-	-
8	Rubber Products, Plastics and Plastic Products Industry	8	3	11	2	5	2	-	-	-	-	1	-	1	-
9	Electrical Appliances and Accessories Industry	17	1	21	6	-	-	-	-	-	-	-	-	-	-
10	Motors, Machine Tools and Component Parts for Factory Industry	5	5	11	-	1	1	-	-	7	-	-	-	-	1
11	Industry concerning Rock, Soils, Ceramics, Lime and Cement	1	-	4	-	3	4	8	-	2	-	-	1	-	1
12	Glass, Lens and Glassware Industry	1	-	3	1	-	-	-	-	-	-	-	-	-	-
13	Painting Industry	3	-	3	1	-	-	-	-	-	-	1	-	-	-
14	Vehicles and Component Parts Industry	25	4	19	-	4	-	-	-	-	-	-	-	-	-
15	Hotel Industry	24	-	-	-	-	-	-	-	-	4	-	-	2	-
16	Transport Industry and Others	16	3	3	-	1	-	-	-	-	-	-	-	-	-

Source: BOI (Work Seet)

IV. FACTORS INFLUENCING THE INDUSTRIAL LOCATION PATTERN IN THAILAND

In what follows, we will examine the Weberian Framework in terms of transport cost advantages, labor cost advantage, together with other processing cost advantage and agglomeration economies. Although several variants of a comparative cost analysis may be pursued, we shall use a variant which follows the traditional Weberian model based on the least-cost approach.

Following Weber, as has already been analyzed in the first Chapter, the analyst assumes a fixed pattern of marketing for the product of a specific industrial location. Also, he assumes as given, the geographic positions of the sources of each of the raw materials. With the weight and quantities of raw materials and other input and output designated and with the geographical position of each set, the minimum transport cost of location may be obtained by each specific industrial location.

To illustrate this step, we once again turn to the empirical data described in the previous section concerning the transport factor. The location of the majority of industries other than agricultural products processing in Bangkok and Thonburi were mostly dependent on imported products as material sources, and Bangkok and Thonburi have been the principal markets. The situation generally characterizes Bangkok as the minimum-transport-cost location.

Once the minimum-transport-cost locations are determined, the analyst, using a modern Weberian approach, searches for possible

deviations due to variations in the costs of labor, power, etc.

The significant increase of females in the labour force and their participation rates in urban areas is a consequence of the very high growth of urban female population of 8.4 percent during 1954-1969, part of which is accounted for by the large migration of females from rural areas. A study on migration, based on the 1960 Population Census gave supporting evidence that a large number of females migrated to the Bangkok and Thonburi areas.² This tendency is also applicable to other urban areas in Thailand. Net migration to Bangkok and Thonburi for females was 38 per 1,000 while the figure of males was 31 per 1,000.

At present, the high rate of increase of labour supply into urban areas, particularly Bangkok and Thonburi, ensures that the labour cost differential between the Bangkok - Thonburi, and rural areas would not be very significant. Therefore, the possible deviation due to cheap labour can be omitted.

²Sidney Goldstein, Urbanization in Thailand 1947-1967, Research Report No. 2, The Population and Training Center C.U. 1970.

As for electric power, most of the modern industries located in the Bangkok-Thonburi area found that the public supply of electricity was adequate; rates had fallen and the supply was more reliable than the other regions, except for the cities in the central regions which are also adequate.

So far, we may draw the conclusion that small, medium and large scale manufacturing firms have found it difficult and expensive to locate their plants in the regions of Thailand other than Bangkok and Thonburi. Moreover, it is apparently indicated that Bangkok and Thonburi offer such attractions of large market, availability of skilled labour and the best public utilities, transport and other infrastructural facilities. The two cities are the logical choices for location of industries other than those which depend on local sources of raw materials.

The final force that made the major industries locate in the central region of Thailand is due to the agglomerative economies provided by the value added through manufacturing. Based on Weber's theoretical statement, that coefficients of manufacture would lead to strong tendencies to agglomerate, industries with low coefficients of manufacture would show weak tendencies to agglomerate, and these tendencies were inherent in the nature of each industry. According to a recent report,² central region of Thailand benefitted from the agglomerating economy many times greater than the rest of the region.

²NAD, NESDB, The Figures of Gross Regional Product Originating by Industry in Thailand, Revised Series 1960-1973, Regional Accounts and Data Analysis Unit, June 1974.

In the next chapter, we shall turn our attention to a more detailed analysis of the cement industry in Thailand. The analysis will, generally, follow the Weberian framework due to the fact that it is probably the most appropriate, given the market structure of the cement industry and the data available.