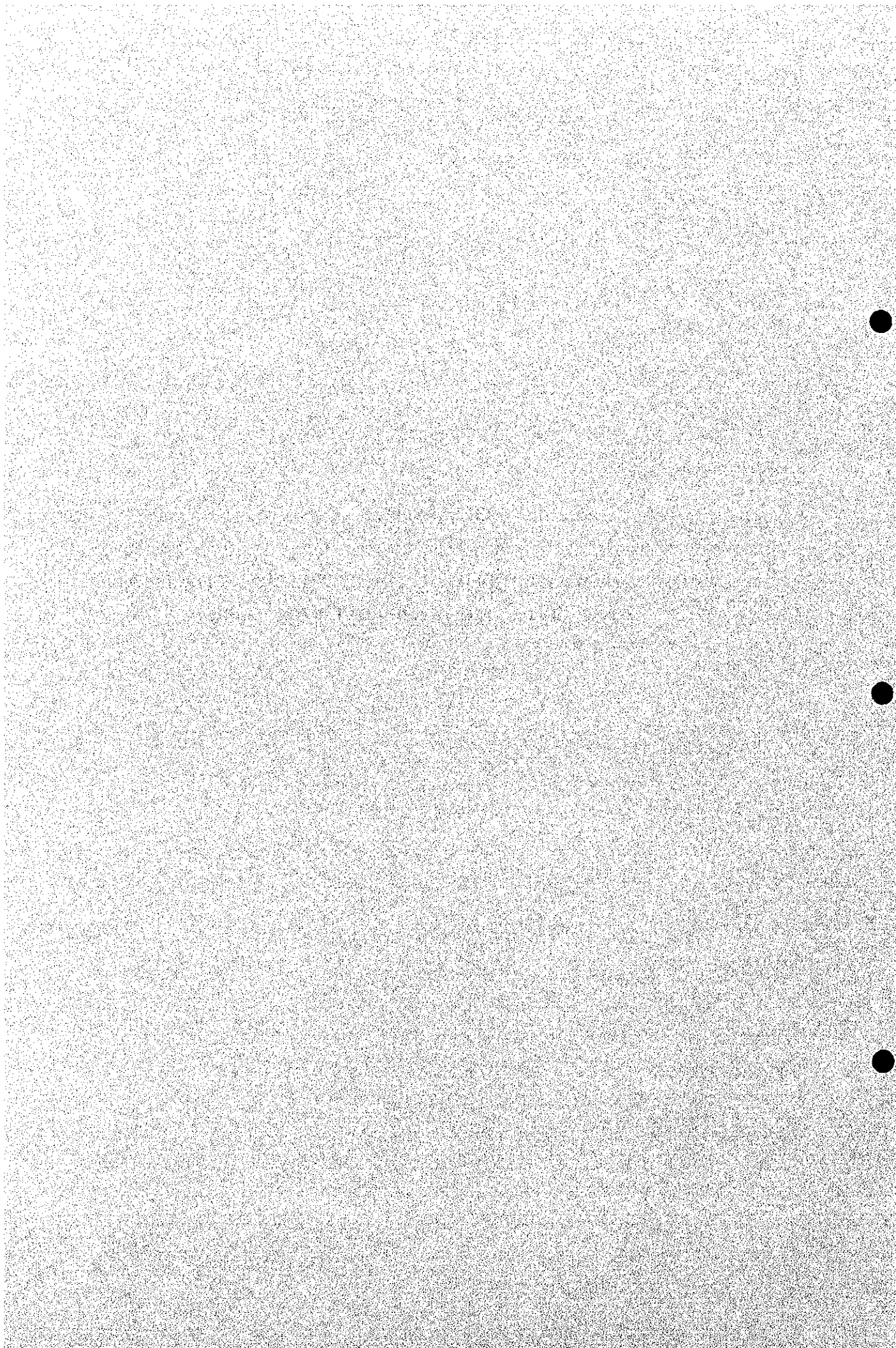


CHAPTER 2

OVERVIEW OF THE KINGDOM OF THAILAND AND THE METROPOLITAN AREA



CHAPTER 2 OVERVIEW OF THE KINGDOM OF THAILAND AND THE METROPOLITAN AREA

2.1 General

(1) Location and territorial area of the country

The Kingdom of Thailand (hereinafter simply referred to "Thailand") is located nearly at the central part of the Indo-Chinese Peninsula ranging from Latitude 5° 36' North to Latitude 20° 24' North and Longitude 97° 14' East to Longitude to 105° 41' East. The land area of 513,115 km² is the second largest next to Indonesia among the member countries of the Association of Southeast Asian Nations (ASEAN).

Geographically, the country is bounded on the north and east by Laos, on the east by Cambodia, on the south by Malaysia, and on the west by Myanmar.

(2) Climate

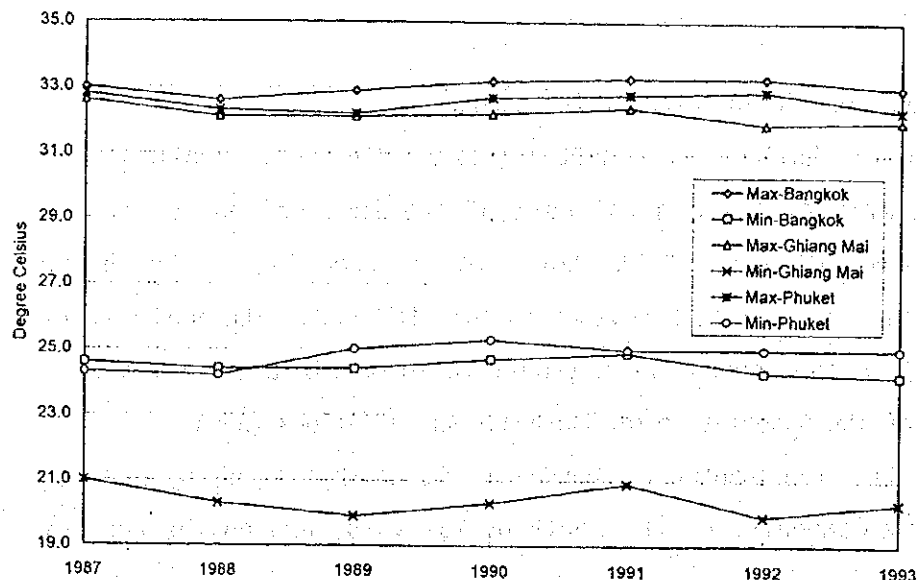
As Thailand is located in the tropical zone, the climate is affected intensively by the effect of monsoon. The season is divided into the rainy and dry seasons, and cool and hot seasons are observed further in the dry season.

Out of the dry season roughly from November through to May, the period from November through February when northeasterly monsoon blows is called a cool season. The air temperature in this season becomes low throughout the country. Even in Bangkok, the temperature sometimes drops to 15°C or so during nighttime although it exceeds 30 °C during daytime.

The period from March through May when the temperature becomes highest throughout a year is called a hot season. Since the sun rises just above the country as the northeasterly monsoon is weakened in this season, the temperature reaches nearly 40°C in April.

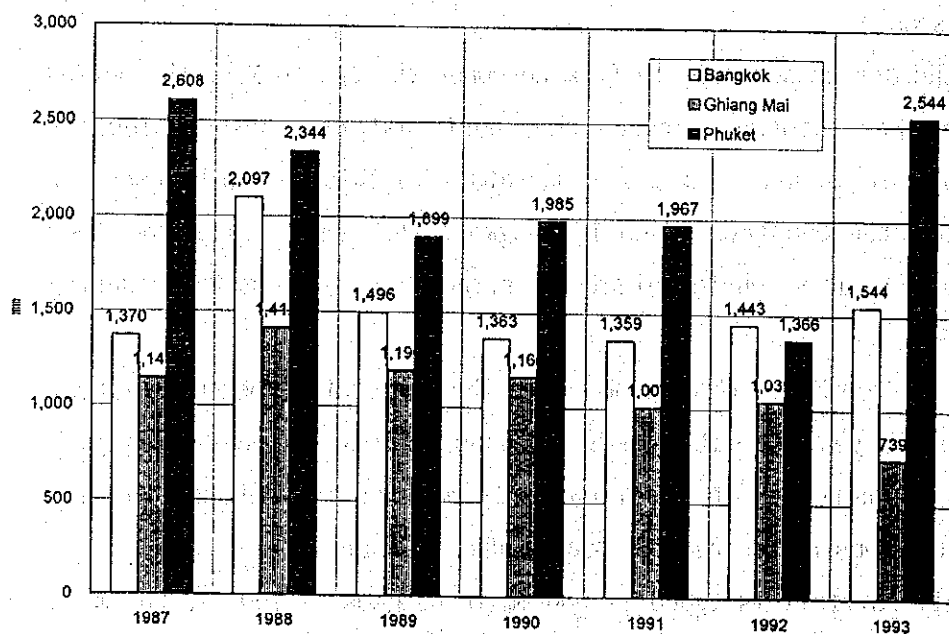
The yearly rainfall is 1,300~1,500 mm in Bangkok, 1,100~1,200 mm in Chiang Mai and 1,900~2,600 mm in Phuket.

Meanwhile, the fluctuation of rainfall has become increasingly large since these several years.



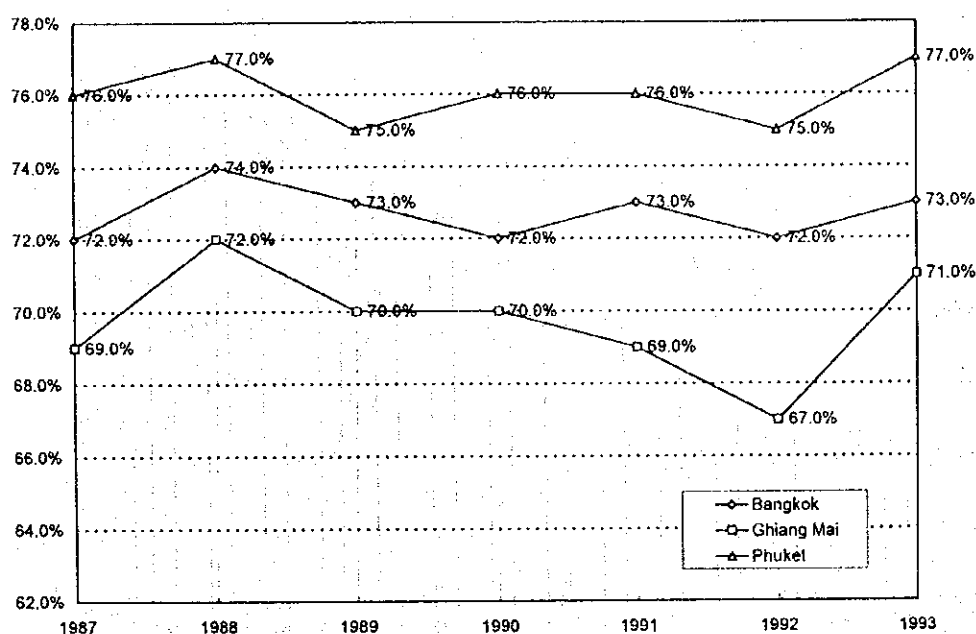
Source: Meteorological Observatory of Thailand

Fig. 2.1-1 Temperature



Source: Meteorological Observatory of Thailand

Fig. 2.1-2 Rain Fall



Source: Meteorological Observatory of Thailand

Fig. 2.1-3 Relative Humidity

(3) Population

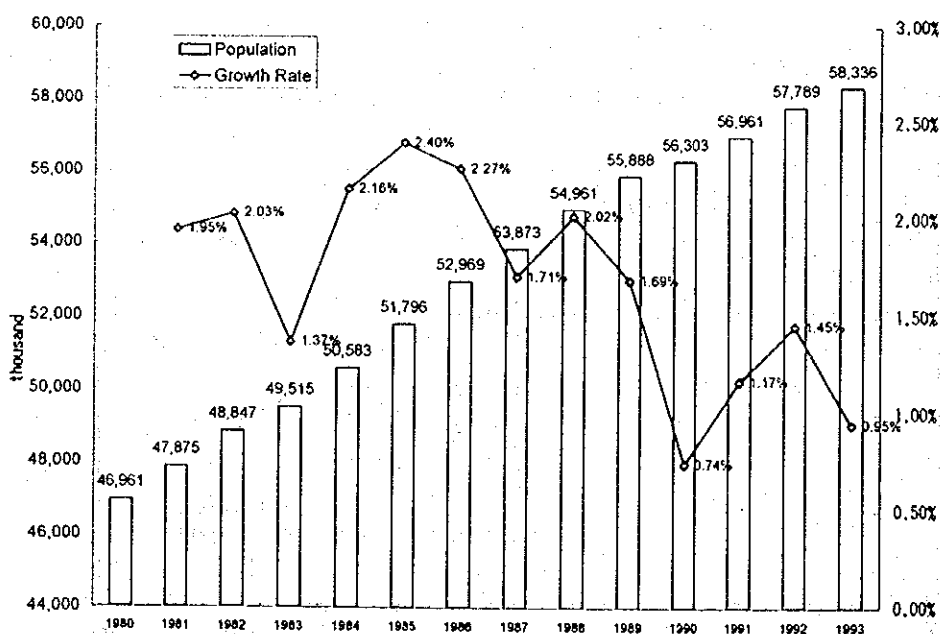
At the end of 1993, the population is 58.3 million with a population density of 114 persons per square kilometer. The average population increase rate of 2.7% marked in 1970s has been undergoing a downward curve to 1.8% in 1980s and 1.3% in 1990s.

When compared with the other ASEAN member countries where the population increase rate is undergoing moderate decrease, that in Thailand has been decreasing at an outstandingly rapid tempo.

Table 2.1-1 Population Increase Rate of ASEAN Member Countries

Year	Thailand	Singapore	Malaysia	Philippines	Indonesia
1970 - 1980	2.7 %	2.0 %	2.4 %	2.5 %	2.3 %
1980 - 1992	1.8 %	1.8 %	2.5 %	2.4 %	1.8 %
1992 - 2000	1.3 %	1.4 %	2.0 %	2.3 %	1.4 %

Source : World Bank, World Development Report 1994



Source: Department of Local Administration, Ministry of Interior

Fig. 2.1-4 Trend of Population Growth and its Rate

(4) Government system

(a) System of government and the constitution

Constitutional monarchy has been established in Thailand in 1932.

The present constitution was promulgated in December 1991 and its major points are as follows :

- 1) Thailand is a Kingdom having a King as sovereign
- 2) Sovereignty rests with the people
- 3) Freedom of religion, speech, publication, association, formation of political parties and correspondence
- 4) Support of the democratic form of government and obligation of military service based on the nation, religion, King and Constitution
- 5) Parliament with two-chamber system
 - Member of Upper House : appointed
 - The Lower House : publicly-elected
- 6) Promotion of party politics
 - (Members of Lower House must belong to parties)
- 7) Cabinet consisting of a Prime Minister and Ministers of state

(b) Organization of the government

The organization of the government consists of the Prime Minister's Office, thirteen Ministries and the University affairs Office.

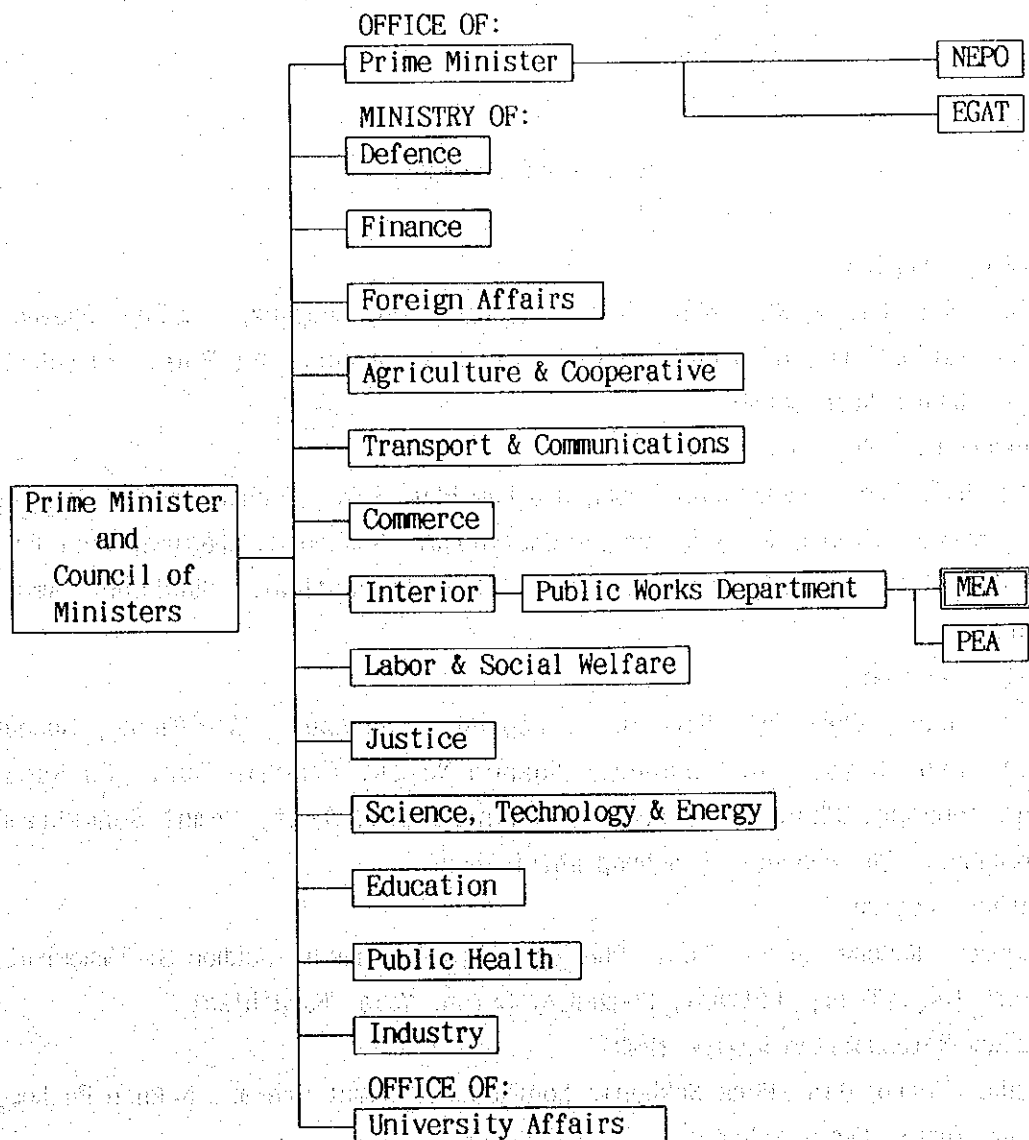
The organization of the local government mainly consists of "Province (Changwat)", "District (Amphoe)", "Town (Tambon)" and "Village (Mo Ban)".

These are under the supervision of the Central Government.

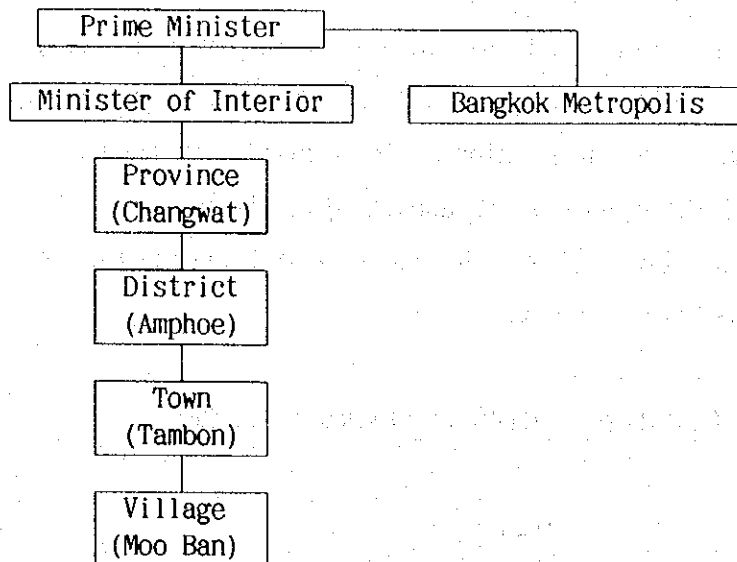
Governors of the provinces are appointed by the Minister of Interior.

however, the Governor of the Bangkok metropolitan area has been publicly-elected since 1985.

ORGANIZATION CHART OF CENTRAL GOVERNMENT



ORGANIZATION CHART OF LOCAL GOVERNMENT



Region and Changwat

I. Northern Region

Chiang Mai, Chiang Rai, Nan, Phare, Mae Hong Son, Lampang, Lamphun, Phayao Tak, Sukhothai, Uttaradit, Phitsanulok, Kamphaeng Phet, Phichit, Phetchabun, Nakhon Sawan.

II. Northeastern Region

Nong Khai, Loei, Udon Thani, Nong Bua Lam Phu, Sakon Nakhon, Nakhon Phanom, Khon Kaen, Kalasin, Maha Sarakham, Chaiyaphum, Nakhon Ratchasima, Buri Ram, Surin, Si Sa Ket, Roi Et, Yasothorn, Ubon Ratchathani, Mukdahan, Amnat Charoen.

III. Central Region

Utahi Thani, Chai Nat, Sing Buri, Lop Buri, Saraburi, Ang Thong, Suphan Buri, Ayutthaya, Kanchanaburi, Nakhon Nayok, Prachin Buri, Sa Kaea, Chachoengsao, Chon Buri, Rayong, Chanthaburi, Trat, Samut Songkhram, Ratchaburi, Phetchaburi, Prachuap Khiri Khan.

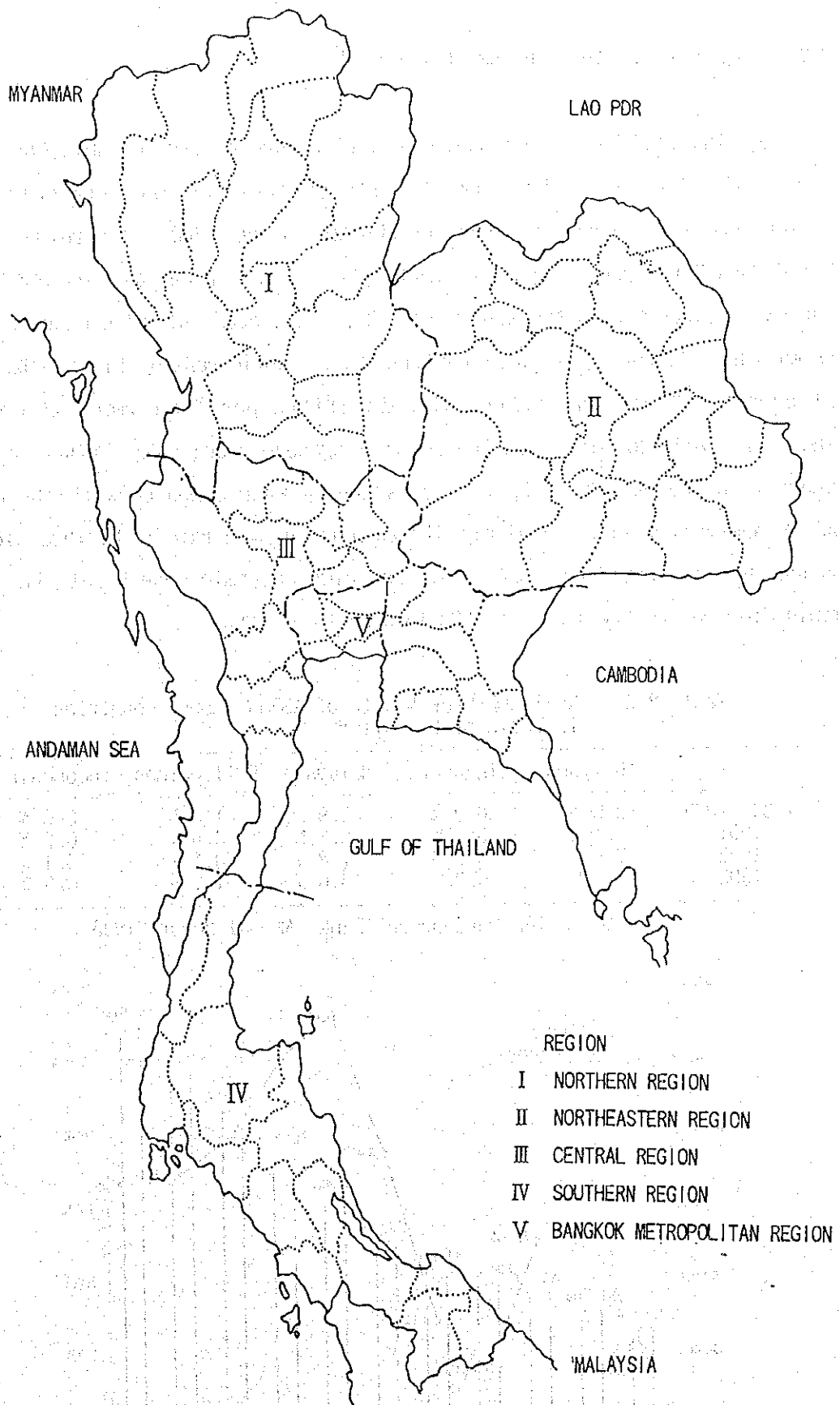
IV. Southern Region

Chumphon, Ranong, Surat Thani, Phangnga, Krabi, Phuket, Nakhon Si Thammarat, Phatthalung, Trang, Pattani, Songkhla, Satun, Yala, Narathiwat.

V. Bangkok Metropolitan Region (BMR)

Bangkok Metropolis (Phra Nakhon), Nonthaburi, Samut Prakan, Nakhon Pathom, Pathum Thani, Samut Sakhon.

Regional Map of Thailand



2.2 Economics

2.2.1 Economics of the Kingdom of Thailand

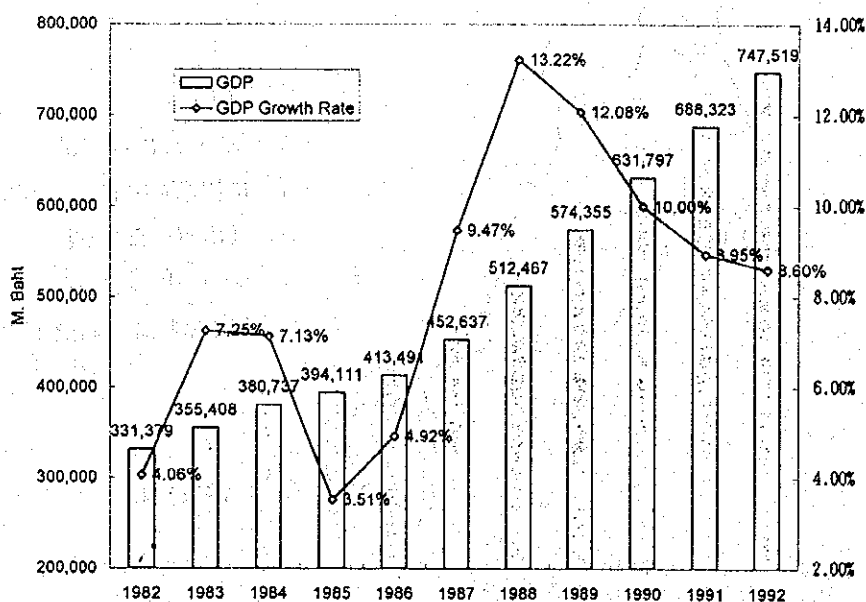
Although Thailand has been relying on agriculture as its economic basis for years, the Government has directed its efforts for diversification of agriculture and progress of industrialization since 1960s. According to the World Bank Development Report, the GDP per capita, which was only US\$770 or the 63rd position from the top in FY 1981, had successfully been improved to as much as US\$1,900 or the 51st position in the world ranking in FY 1992.

At present, Thailand is attaining the fifth position among the Newly Industrialized Economies (NIES) next to Singapore, Hong Kong, Taiwan and the Republic of Korea. This fact is outstanding when compared with the other ASEAN member countries. Although the economic growth rate in FY 1993 did not reach that of Singapore, its stable and high economic growth rate had been maintained constantly since FY 1983 through to FY 1993.

Table 2.2-1 Real GDP Growth Rate of ASEAN Member Countries in Terms of US Dollar

Year	Thailand	Singapore	Malaysia	Philippines	Indonesia
1983-1990	8.5 %	6.9 %	5.9 %	1.3 %	5.6 %
1991	8.1 %	6.7 %	8.7 %	0.5 %	6.9 %
1992	7.6 %	6.0 %	7.8 %	0.1 %	6.4 %
1993	7.8 %	9.9 %	8.0 %	1.7 %	6.5 %

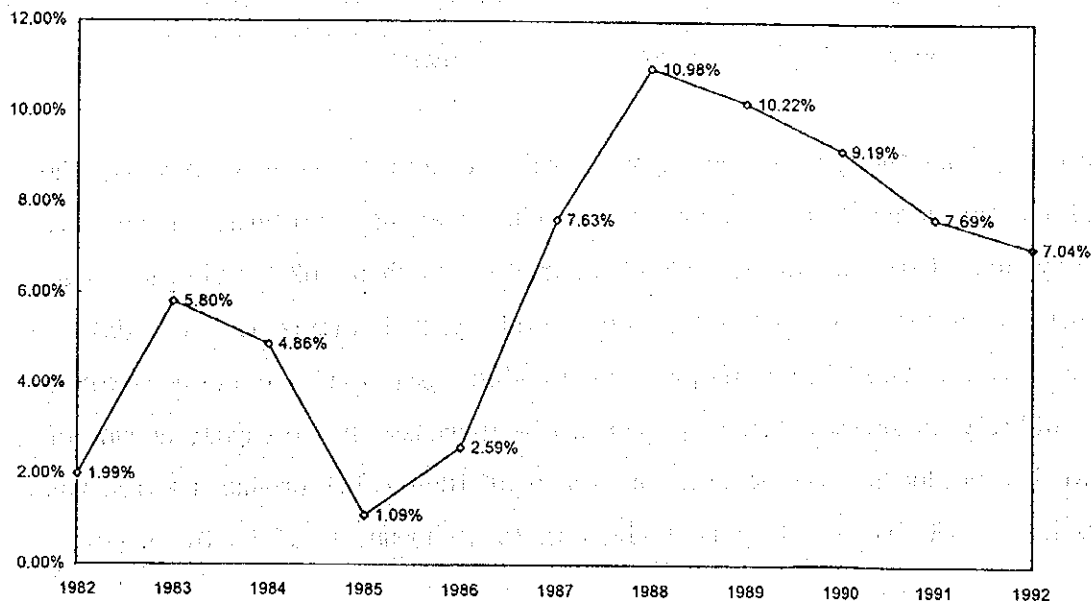
Source : Asian Development Bank, Annual Report 1993



Source: MEA's Load Forecast Results FY 1993

Fig. 2.2-1 Real GDP Growth and Growth rate at 1972 Constant Prices

As the real GDP growth rate in terms of Baht is indicated below, the growth rate, which exceeding 10% from 1980s through to 1990s, has been declined to an order of 8%.



Source: MEA's Load Forecast Results FY 1993

Fig. 2.2-2 Growth Rate of Real GDP per Capita at 1972 Constant Prices

Along with the progress of industrialization, the Thai economy has been shifting gradually to the industrial sector from the agricultural sector. Traditionally, Thailand had been relying on export of primary products on the basis of agriculture. However, the amount of industrial manufacturing production has been sharing the top position among other sectors since 1981 following the change in its domestic industrial structure resulting from direct investment from overseas countries. Since then, the gap between both of the sectors has been increasing little by little. As the share of the manufacturing industry to the total amount of nominal GDP is 28.3% and that of the agricultural, forestry and fishery industries is 11.9% respectively as in 1992, the top position had perfectly been reversed when compared with the shares in FY 1970.

Table 2.2-2 Trend of the Shares of Agricultural and Manufacturing Industries to Nominal GDP

FY	1970	1980	1990	1991	1992
Agriculture	25.9 %	23.2 %	12.7 %	12.6 %	11.9 %
Industry	16.0 %	21.2 %	27.2 %	28.3 %	28.3 %

Source : National Income Accounts, NESDB

Speaking of the changes in the export structure during the above period, the total export amount of such primary products as agricultural, forestry, fishery and mining products, which shared as much as 62.7% of the total amount of export in FY 1980, increased by 2.1 times in FY 1993. Nevertheless, the share of primary product exports had been lowered substantially to 18.4% reflecting remarkable increase in the export amount of industrial products. Meanwhile, the share of industrial products which was 32.3% in FY 1980 increased by 17.3 times in total amount to 79.9% in FY 1993.

Table 2.2-3 Trend of Shares in Export Amount

FY	Primary Products Export Amount		Industrial Products Export Amount		Amount of Export Amount (M. Baht)
	(M. Baht)	(Share)	(M. Baht)	(Share)	
1980	83,543	62.7 %	43,065	32.3 %	133,197
1985	94,479	48.9 %	95,615	49.4 %	193,366
1990	140,701	23.9 %	440,395	74.7 %	589,813
1991	161,388	22.2 %	553,187	76.2 %	725,630
1992	179,405	21.8 %	634,385	77.0 %	824,644
1993	172,116	18.4 %	747,053	79.9 %	935,085

Source : Bank of Thailand

Although the share of primary products to the export amount was lowered, the export of agricultural, forestry and fishery products which had previously been relying solely on rice and rubber has been replaced by various kinds of products such as new processed food products of tapioca, sugar, fruits and fishery products. Thus, it can be said that the primary products have undergone diversification.

Reflecting the increase in the share of manufacturing sector to GDP, moreover, this sector has come to occupy a leading position in Thailand. As the export share has also been undergoing outstanding increase continuously year after year, the manufacturing sector surpassed the primary products in export amount in FY 1985, and its share has been expanding so rapidly as to occupy 80% of the total amount of export in FY 1993. As a result of suffering from chronic deficit in trade balance, the trade balance deficit reached 247,618 million Baht in FY 1991.

Table 2.2-4 Trend in the Amount of Trade in Thailand

FY	Export Amount (M. Baht)	Import Amount (M. Baht)	Trade Balance (M. Baht)
1960	8,614	9,622	↓ 1,008
1970	14,772	27,009	↓ 12,237
1980	133,197	193,618	↓ 60,421
1985	191,703	253,375	↓ 61,672
1990	583,206	838,343	↓ 225,136
1991	720,545	968,163	↓ 247,618
1992	815,202	1,020,583	↓ 205,381
1993	921,403	1,143,684	↓ 222,281

Source : Bank of Thailand, June 1994

However, this trade deficit has basically been expanding due chiefly to the increase in the import of raw materials and intermediate products as well as capital goods for covering investment in export-oriented industries. Therefore, the amount of export is expected to increase. Although the trend of trade balance deficit will continue to prevail for the time being, the balance is deemed to be improved gradually in the future.

Table 2.2-5 Trend in the Share of Imported Goods

FY	Fuels	Capital Goods	Raw Materials & Intermediate Products	Consumption Goods	Motor Vehicles & Parts	Others	Total
1980	30.5 %	26.5 %	25.1 %	7.7 %	3.8 %	6.4 %	100 %
1985	22.7 %	30.1 %	30.5 %	8.8 %	3.8 %	4.0 %	100 %
1990	9.3 %	38.8 %	33.8 %	8.5 %	6.6 %	3.0 %	100 %
1991	9.1 %	40.2 %	34.4 %	8.6 %	4.9 %	2.8 %	100 %
1992	8.1 %	41.3 %	32.1 %	10.0 %	5.6 %	2.9 %	100 %
1993	7.7 %	42.5 %	29.9 %	9.8 %	7.1 %	3.0 %	100 %

Source : Bank of Thailand

In FY 1993, 183,184 million Baht of current balance deficit was allocated reflecting little growth of revenue from sightseeing industry, remittance from abroad as well as deficit of trade balance.

In view of overall international balance, private investment from overseas countries has been extended positively in Thailand. As a result, this investment is turning the overall international balance of Thailand to a surplus.

Table 2.2-6 Trend of International Balance

FY	1985 (M. Baht)	1990 (M. Baht)	1991 (M. Baht)	1992 (M. Baht)	1993 (M. Baht)
Trade Balance	▲ 61,672	▲ 225,136	▲ 247,618	▲ 205,381	▲ 222,281
Invisible Trade Balance	15,253	63,528	46,375	34,525	31,187
Balance of Transfer Account	4,494	5,424	7,624	9,578	7,910
Current Balance	▲ 41,925	▲ 186,185	▲ 193,619	▲ 161,278	▲ 183,184
Capital Balance	51,433	247,753	288,160	251,573	304,858
Net Errors and Omissions	2,956	35,663	11,235	▲ 13,182	▲ 22,883
Overall Balance	12,464	97,232	105,776	77,113	98,791

Source : Bank of Thailand, June 1994

In FY 1993, the balance of capital account marked a record high (surplus) of 304,858 million Baht. This was not due to direct investment but due chiefly to rapidly concentrated inflow of securities investment capital from overseas countries, which accounted for as much as 41.8% of capital account in FY 1993. This trend is expected to contribute greatly for internationalization, expansion and development of the capital market of Thailand. While the market of Thailand has been in increasingly closer relation with overseas financial market on one hand, the Thai market has come to be affected more greatly by the global trend of financing on the other hand.

The balance of foreign debts of Thailand, which amounted to US\$42,704 million by the end of FY 1993, tends to be on the increase year after year.

However, the debt service ratio constituting one of the criteria for judging the debt repaying capacity had been improved to 10.2% in FY 1993 after marking a peak of 21.9% in FY 1985.

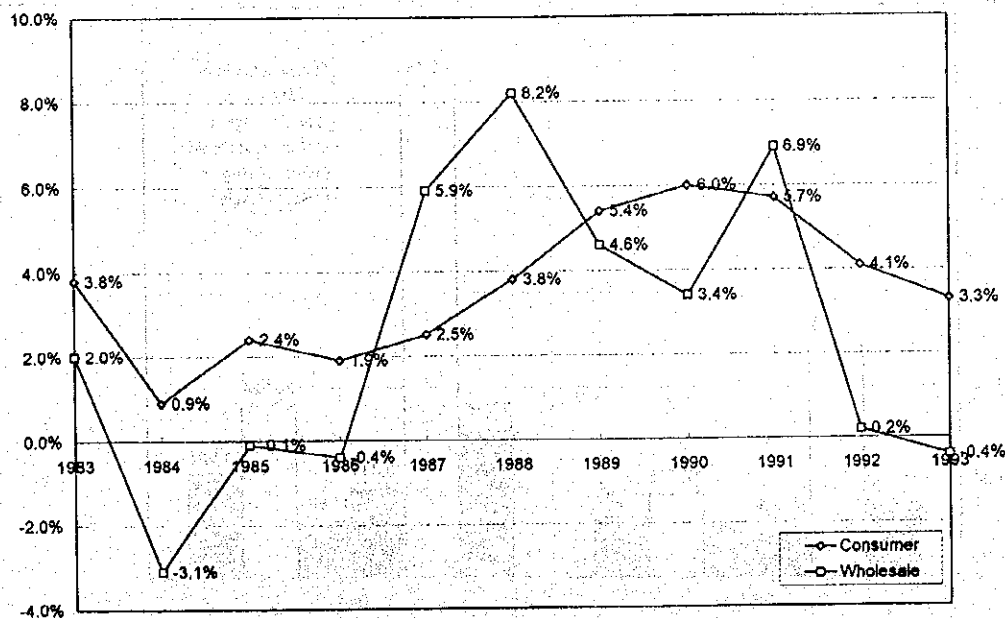
Reflecting favorable increase in the amount of export, the debt service ratio has been remaining at as low level as roughly 10% in contrast to substantial increase in the total amount of debt. Moreover, the amount of foreign exchange reserves had also undergone substantial increase and reached as much as US\$20,441 million at the end of FY 1993.

Table 2.2-7 Trend in the Balance of Foreign Debts

FY	1985	1990	1991	1992	1993
Total External Debt (M. US\$)	14,699	25,061	33,070	37,354	42,704
Payment of External Debt (M. US\$)	2,189	2,749	3,648	4,401	4,906
Debt Service Ratio	21.9 %	9.1 %	10.0 %	10.5 %	10.2 %
Foreign Currency Reserves (M. US\$)	2,709	12,403	16,788	17,707	20,441

Source : Bank of Thailand

Following stabilization of the prices of crude oil and agricultural products after the "Second Oil Crisis", the price had undergone comparatively stable trend. While the consumer price had also risen in proportion to escalation of whole sale price since FY 1987 on one hand, the price has undergone a downward curve since FY 1991 on the other hand. However, the price is predicted to rise in FY 1994.



Source: Ministry of Commerce

Fig 2.2-3 Consumer Price Index and Wholesale Price Index

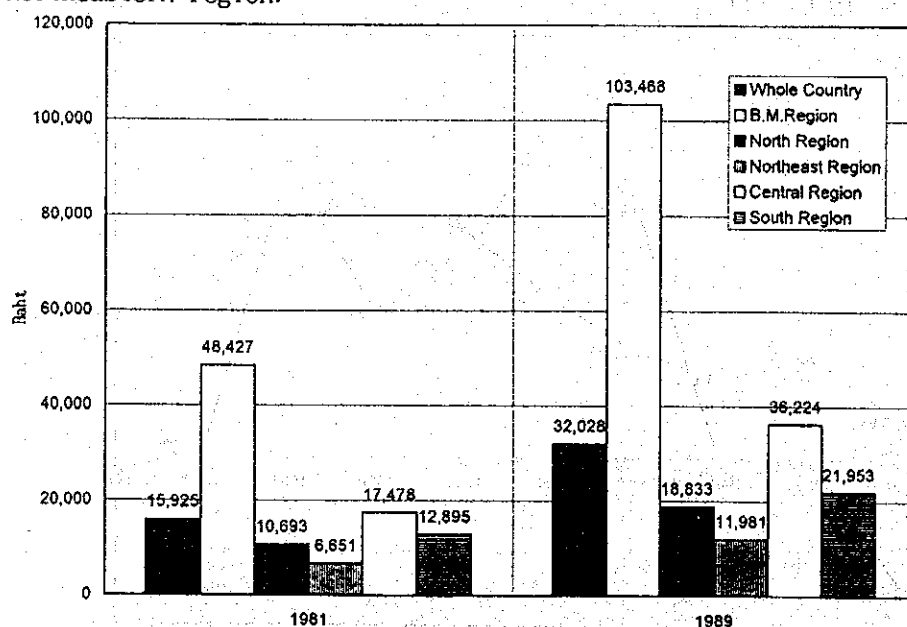
As the Thai economy has been expanded to the fifth position among the NIES along with rapid progress of industrialization, the gaps between industrial categories and regions have been widened due to imbalance in the productivity between manufacturing and agricultural industries.

In FY 1992, the share of the agricultural, forestry and fishery industries to GDP was only 11.9%, but the share of the farming population to the total working population was as high as 60.9%. On the contrary, the manufacturing industry shared 28.3% of GDP with only 11.1% of the working population. This fact apparently shows a substantial gap by industries.

Table 2.2-8 Comparison of the Respective Industrial Sectors to GDP and Working Population (1992)

Item	GDP	Manpower
Agriculture	11.9 %	60.9 %
Manufacturing	28.3 %	11.1 %
Construction	6.6 %	4.1 %
Transport	7.2 %	2.4 %
Others	46.0 %	21.5 %
Total	100.0 %	100.0 %

As the manufacturing and tertiary industries are over concentrated in the Bangkok Metropolitan Region, the nominal GDP per capita in the metropolitan region was 48,427 Baht, or as much as 7.3 times of 6,651 Baht in the northeast region in fiscal 1981. In FY 1989, however, the GDP per capita in the metropolitan region expanded to 103,468 Baht or 8.6 times of 11,981 Baht in the northeastern region.



Source: NESDB, Gross Regional and Provincial Products 1991

Fig. 2.2-4 Comparison of Nominal GDP per Capita by Region

As a result of comparing the income differential in FY 1975 and 1988 in Thailand, the differential remained at a nearly same level showing little improvement in income distribution. However, the fact that share of 20% of low income bracket increased from 5.6% to 6.1% indicates relative increase in the income of poverty world. So that, the income level of the low income bracket can be said to have been slightly improved.

Table 2.2-9 Trend of Income Distribution by Brackets

Item	FY 1975	FY 1988
Lowest 20 Percent	5.6 %	6.1 %
Second Quintile	9.6 %	9.4 %
Third Quintile	13.9 %	13.5 %
Fourth Quintile	21.1 %	20.3 %
Highest 20 Percent	49.8 %	50.7 %
Total	100.0 %	100.0 %

Source : World Development Report 1994, World Bank

When the school attendance of Thailand is compared with that of the other ASEAN member countries, it can be seen that the secondary school attendance is much lower than that in the above countries. Where 67% of the people are to remain at the primary school level as in FY 1988, smooth economic development will be hindered in the future from a long term point of view.

Table 2.2-10 Percentage of Age Group Enrolled in Education (FY 1988)

Item	Thailand	Singapore	Malaysia	Philippines	Indonesia
Primary	100 %	100 %	93 %	100 %	100 %
Secondary	33 %	70 %	58 %	74 %	45 %
Tertiary	16 %	8 %	7 %	28 %	10 %

Source : World Development Report 1994, World Bank

In this sense, it would be essential to promote education of engineers not only through school education but also through education and training by enterprises.

While confronting with various problems, the Government of Thailand is now implementing the Seventh National Economic and Social Development Plan (FY 1992-1996).

The factors that Thailand had attracted investors from overseas countries were mainly:

- (1) Low cost but high quality labor force.
- (2) Political and social stability.
- (3) Future potential of domestic market.
- (4) Preferential treatment of foreign capital.

Along with the change in domestic and overseas economic environment since early 1990s, however, its comparative predominance has gradually been lost. This has resulted from rise of domestic labor cost, shortage of middle class management, engineers and skilled worker, delay in modernization of infrastructure, overconcentration in the Bangkok Metropolitan Region in addition to competition with other countries, particularly the Asian neighbor countries including China and Vietnam.

(1) Wage hike

In the Bangkok Metropolitan Region, the minimum wage which was 100 Baht in 1991 rose to 135 Baht in October 1994 with an annual average increase rate being as high as 10% during the period. Since the economy of the country is predicted to grow continuously at an annual average rate of 8%, the wage is also deemed to rise at a rate equivalent to or higher than the economic growth rate. Therefore, the investment in search for only low labor cost will become smaller increasingly in the future.

(2) Shortage of engineers and skilled workers

As the economic growth has been sustained, the shortage of engineers, skilled workers, middle class management and other manpower has become potential.

Although the Thailand Government has been directing its efforts for establishment and extension of science and engineering courses to cope with shortage of science and engineering specialists, the gap between demand and supply is deemed to prevail for the time being.

(3) Traffic conditions

As a result of overconcentration of population and industries particularly in Bangkok along with the rapid progress in industrialization, the traffic congestion has become a serious problem in Bangkok, thereby causing increased non-productive loss time for traffic and cargo transportation. To cover these problems, the multi-level road crossing, extension of highways, construction of elevated railway and other projects have been promoted.

In December 1994, His Majesty the King also touched on the traffic problem in his speech addressed to the people.

In his speech, the King stated: "Our traffic problem is too serious to solve all at once, and it's important to carefully study and steadily implement remedial countermeasures." Since it would be difficult to increase roads or limit the number of cars, moreover, he proposed the possibility of locating the working and residential areas adjacent to each other by restructuring the residential and business areas.

Should clearcut city development (redevelopment) plan be formulated urgently before anything else, a substantially large economic loss would result in and certainly cause an adverse effect upon stable economic growth of Bangkok in the future.

Seventh National Economic and Social Development Plan (FY 1992-1996)

Subsequent to approval by the cabinet in August 1990, the Seventh National Economic and Social Development Plan (FY 1992-1996) has been placed into implementation since October 1991. The outline of this plan is as presented below:

(1) Objectives

- (a) To keep an appropriate level of economic growth while maintaining economic and financial stability.
- (b) To distribute the revenues and results of economic development to rural regions (local areas).
- (c) To promote development of human resources, living standard and natural resources.

(2) Targets

To attain the above objectives, the following qualitative and quantitative targets have been set:

(a) Economic growth

- 1) To increase the GDP per capita to 75,000 Baht in the final fiscal year of this development plan from 41,000 Baht in FY 1991. In other words, it is essential to attain an annual average economic growth rate of 8.2%.
- 2) Annual average growth rate of 3.4% or over of agricultural production.
- 3) Annual average growth rate of 14.7% in export revenues and 11.4% in the amount of export.

(b) Target of economic stability

- 1) The inflation rate should not exceed 5.6% on an annual average.
- 2) The deficit of trade balance should not exceed 9.4% on an annual average in terms of GDP.
- 3) The balance of current account should be restored by the final fiscal year of the plan. The deficit of current account should not exceed 5.2% on an annual average in terms of GDP.

(c) Target of income/revenue distribution

- 1) The groups constituting a target of income distribution should be the people belonging to the following categories: namely, poor farmers, tenant farmers, persons operating petty businesses in city areas, and low wage workers employed by private enterprises.
- 2) The share of those under the poverty line to the population should be reduced to 20% or less. Thereby, the number of poor people should be reduced by the final fiscal year of the plan.
- 3) While redressing the income gaps by regions and professional categories, efforts should be directed for improving the living standard of the target groups, particularly poor tenant farmers and those who are employed by the agricultural development industry.
- 4) The right of income from assets should be distributed while placing emphasis on the income of farmers from farms and supply of houses to

low income workers.

(d) Targets pertaining to human resources, living standard, environment and natural resources

- 1) The annual average increase rate of population should be lowered to 1.2% by the final fiscal year of the plan.
- 2) The quality of the people of Thailand should be improved by exerting incessant efforts for promoting lifelong education throughout the entire education system (official and unofficial/public and private) to make it possible to cope with any change in the environment with adequate flexibility. At the same time, the general public should be encouraged to take part positively in a further wide range of development projects, and the profits obtained from participating in the development project for investors should be protected and guaranteed.
- 3) It should be made possible for all of the Thai people to enjoy their health in the coming one decade.
- 4) For the purpose of preserving and maintaining the traditional value and inherent features important for Thai people while promoting social development, it is important to promote education of the people to let them have senses of moral and ethics matching the physical health and technology.
- 5) The efficiency of protecting the life, properties and interests of consumers should be so improved that every people in rural and urban areas can enjoy high quality life style and peaceful social benefits.
- 6) By exerting efforts for reducing the levels of water and air pollution, noise, solid wastes and harmful wastes as well as for checking/monitoring deterioration of overall environmental conditions, the living standard should be raised. Recreation zones should be provided. In addition, the concentrations of sulfur dioxide, carbon monoxide, nitrogen dioxide including harmful substances exhausted from car into atmosphere should be reduced to such levels as not causing any adverse effect upon human health either in urban or rural area.

Table 2.2-11 Outline of the First - Seventh National Economic Development Plans

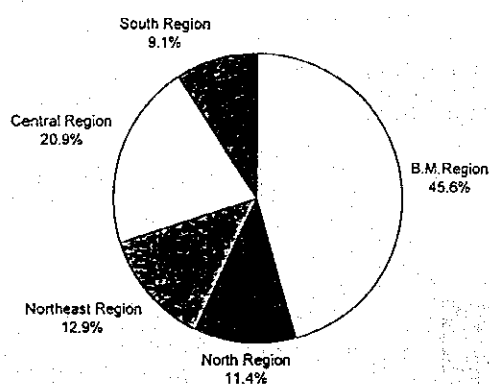
Growth Item	1st Plan (1961-1966)		2nd Plan (1967-1971)		3rd Plan (1972-1976)	
	Target	Reached	Target	Reached	Target	Reached
Economic Growth Rate (%)	6	8.1	8.5	7.8	7.0	7.1
Agriculture	4.5	5.0	4.3	4.1	5.1	3.9
Manufacture	—	10.5	10.9	9.2	8.0	8.6
Income per Capita (Baht)	—	2,787	—	3,835	—	7,330
Population Increase (%)	3.0	3.3	3.3	3.2	2.5	2.6
Balance of Trade (M Baht)	—	-2,167	—	-10,484	—	-13,047
Commodity Price Rise (%)	—	—	—	—	10.0	12.0

4th Plan (1977-1981)		5th Plan (1982-1986)		6th Plan (1987-1991)		7th Plan (1992-1996)	
Target	Reached	Target	Reached	Target	Reached	Target	Reached
7.0	7.1	6.6	4.4	5.0	10.5	8.2	
5.0	3.5	4.5	2.1	2.9	3.4	3.4	
9.6	8.7	7.6	5.1	6.6	13.7	9.5	
—	17,200	35,700	21,935	27,783	41,000	71,000	
2.1	2.2	1.5	1.7	1.3	1.4	1.2	
-17,940	-45,000	-78,400	-54,000	-35,900	-168,000	-313,000	
—	—	10.6	2.7	2.3	4.7	5.6	

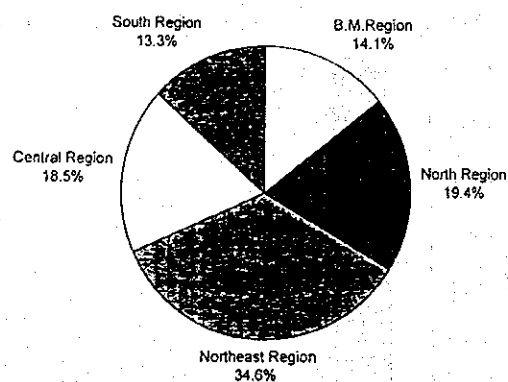
Source : NESDB

2.2.2 Economics of the Metropolitan Area

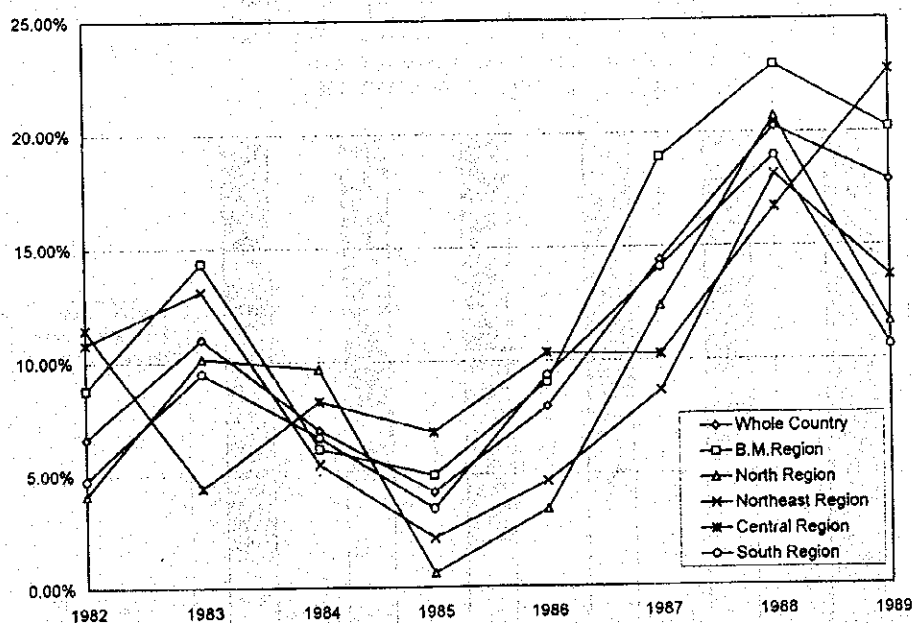
The Bangkok Metropolitan Region (BMR) includes the Bangkok Metropolitan Administration and the five provinces adjacent to Bangkok, namely, the Samut Prakan, Nonthaburi, Pathum Thani, Nakohn Pathom and Samut Sakhon Provinces. In FY 1989, the nominal GDP in this BMR amounted to 810,054 million Baht and shared 45.6% of the total nominal GDP of the country. In addition, 7.8 million or 14.1% of the nationwide total population was concentrated in this region. From FY 1981 through to FY 1989, the nominal GDP in the BMR had grown at an annual average rate of as high as 13.0%. When compared with the annual average growth rate of 8~9% in the other regions excluding 11.2% in the central region, it can readily be seen that this region is the center of economy of Thailand.



Source: Gross Regional and Provincial Products 1991, NESDB
Fig. 2.2-5 Regional Share in Nominal 1989 GDP



Source: Gross Regional and Provincial Products 1991, NESDB
Fig. 2.2-6 Regional Share of Population in 1989



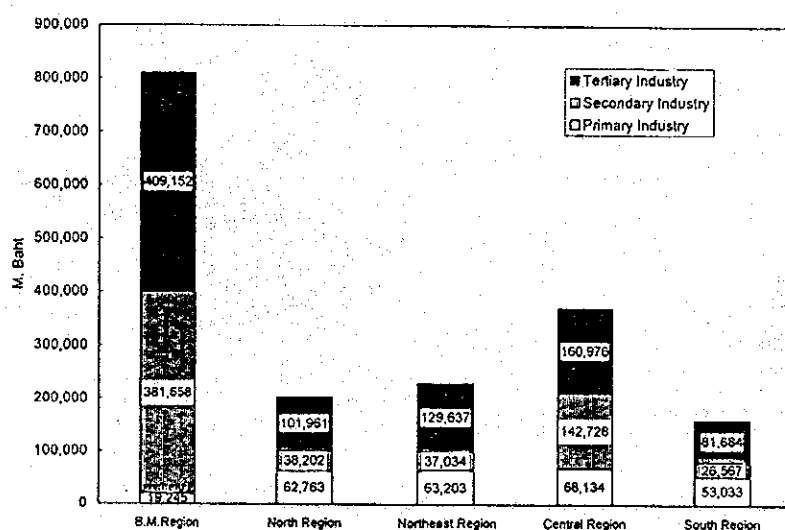
Source: Gross Regional and Provincial Products 1991, NESDB
Fig. 2.2-7 Growth Rate of Nominal GDP by Region

Speaking of the features of this region, the share of the primary industry in this region to GDP is only 2.4% and much lower than the share of roughly 30% in the other regions excluding the central region. Whereas, the share of the secondary industry is 47.1% and much higher than the share of roughly 20% in the other regions.

These facts indicate that the BMR mainly relies mainly on the manufacturing and not on agriculture. The share of the manufacturing industry to GDP is high in the central region next to the BMR because of the following reasons.

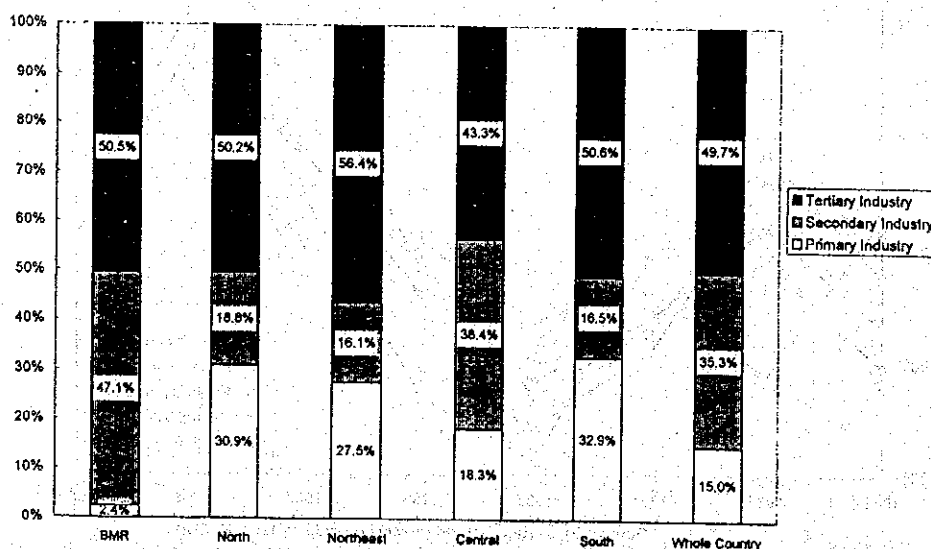
Namely, the BMR has been overconcentrated following concentration of industrial parks in this region. This indicates that location of industrial plants, etc. in the surrounding central region has been promoted.

These are also deemed to reflect the incentives of the Government of Thailand taken for encouraging investment in local regions in recent years.



Source: Gross Regional and Provincial Products 1991, NESDB

Fig. 2.2-8 Nominal GDP by Region in FY 1989



Source: Gross Regional and Provincial Products 1991, NESDB

Fig. 2.2-9 Nominal GDP's Share by Industries and Region in FY 1989

The manufacturing industry in the BMR occupies so much as 70.7% of the nationwide manufacturing industry, and when 20.2% in the central region is added, these two regions 90.9%. Moreover, the BMR occupies 59.3% of overwhelming share of the national total in the transportation and communication sector, 64.9% in the finance and real estate industries, 49.0% in the electricity, gas and water supply.

Table 2.2-12. Nominal GDP by Industries and Regions in FY 1989

Item	B.M.Region (M.Baht)	North Region (M.Baht)	Northeast Region (M.Baht)	Central Region (M.Baht)	South Region (M.Baht)	Whole Country (M.Baht)
GDP Total	810,055 45.6%	202,926 11.4%	229,875 12.9%	371,838 20.9%	161,284 9.1%	1,775,978 100.0%
Primary Industry	19,245 7.2%	62,763 23.6%	63,203 23.7%	68,134 25.6%	53,033 19.9%	266,378 100.0%
Secondary Industry	381,658 60.9%	38,202 6.1%	37,035 5.9%	142,728 22.8%	26,567 4.2%	626,190 100.0%
Mining	3,873 6.4%	11,235 18.5%	5,077 8.4%	32,056 52.9%	8,407 13.9%	60,648 100.0%
Manufacturing	320,643 70.7%	15,239 3.4%	17,168 3.8%	91,440 20.2%	8,769 1.9%	453,259 100.0%
Construction	57,142 50.9%	11,728 10.4%	14,790 13.2%	19,232 17.1%	9,391 8.4%	112,283 100.0%
Tertiary Industry	409,152 46.3%	101,961 11.5%	129,837 14.7%	160,976 18.2%	81,684 9.2%	883,410 100.0%
Electricity & Gas	20,348 49.0%	3,533 8.5%	3,575 8.6%	10,881 26.2%	3,162 7.6%	41,499 100.0%
Transport	72,949 59.3%	10,061 8.2%	10,436 8.5%	19,721 16.0%	9,881 8.0%	123,048 100.0%
Wholesaling	100,434 36.8%	35,444 13.0%	50,932 18.7%	55,863 20.5%	30,075 11.0%	272,748 100.0%
Financing	57,051 64.9%	7,172 8.2%	6,464 7.4%	11,657 13.3%	5,501 6.3%	87,845 100.0%
Service	122,832 52.2%	25,629 10.9%	28,298 12.0%	38,932 16.5%	19,823 8.4%	235,514 100.0%
Others	35,538 29.0%	20,122 16.4%	29,932 24.4%	23,922 19.5%	13,242 10.8%	122,756 100.0%

Source: Gross Regional and Provincial Products 1991, NESDB

2.2.3 Economic Growth of the Kingdom of Thailand

At present, Thailand is implementing the fourth year of the Seventh Economic and Social Development Plan from FY 1992 through 1996. As the Eighth Plan from FY 1997 through 2001 is under formulation, and future long trend outlook has not been publicized.

However, the National Economic and Social Development Board (NESDB) announced a report on the future outlook of Thai economy by 2000 in September 1994.

In this report, the NESDB predicted the annual average real economic growth rate by 2000, namely, 8.0% during the earlier half of 1990s and 7.7% during the latter half of 1990s. In addition to this, the MEA also forecast similar growth rate values in the MEA's Load Forecast Results FY 1993. Particularly in the case of the MEA's supply area, the economic growth rate is predicted to undergo a moderate downward trend from 8% to 6% by 2006.

Table 2.2-13 Targets of Economic Growth and Achievements

FY	1990-95	1995-00	2000-06
[Estimation of whole Country]			
NESDB	8.0 %	7.7 %	
MEA's Load Forecast Results FY 1993	8.4 %	7.8 %	6.6 %
Actual (1990-92)	8.8 %		
[Estimation of MEA'S Area]			
MEA's Load Forecast Results FY 1993	8.8 %	8.0 %	6.6 %
Actual (1990-92)	9.4 %		
[Estimation of PEA'S Area]			
MEA's Load Forecast Results FY 1993	8.1 %	7.7 %	6.6 %
Actual (1990-92)	8.3 %		

Looking back the course of economic progress in Thailand over the past three decades since 1960, overall results are evaluated to be satisfactory in the NESDB Report. However, the following problematical points are pointed out in the report: Such infrastructure as electricity, intercity transportation network including traffic in Bangkok have not yet been established sufficiently. In addition, it is pointed out that the competitive power of Thai products on the global market is being lost due to recent tight

situations of labor demand and supply, rise of wages and land price.

While introducing a comment that Thailand should take part in one of the Asian NIES in the twenty-first century, it is pointed out as the tasks in 1990s how to sustain the prevailing economic growth and maintain the competitive power in the international economic environment. In the report, it is stressed that the following various problems should be cleared within the coming one decade:

- (1) High growth capability of East Asian economy and expansion of export market of Thailand.
- (2) Regional cooperation with six countries in Mekong River basin, Malaysia and Indonesia.
- (3) Improvement of technology in six industries: agriculture, fiber and clothing, car, electronics, petrochemical and steel making, and decentralization of industries to local regions.
- (4) Reduction of capital cost through liberalization of finance and demonstration of functions as regional financing center.
- (5) Such miscellaneous problems as improvement of productivity through application of agricultural and other technology.

In addition, the following restrictive conditions should be cleared:

- (1) Expansion of secondary education and improvement of higher education matching the needs of economy, as well as reestablishment of education and training programs.
- (2) Construction and improvement of infrastructure on the basis of the prospects for the 21st century.
- (3) Sophistication of industrial structures through introduction of new technology.
- (4) Improvement in income distribution and decentralization of economic activities to local regions.

Table 2.2-14 Targets of Economic Growth

FY	1990	1995	2000	1990-1995	1995-2000
Real Economic Growth Rate	11.6%	8.0%	7.6%	8.0%	7.7%
Agriculture	-3.7%	3.2%	2.5%	3.5%	2.8%
Manufacturing	16.0%	10.7%	8.7%	11.3%	8.9%
Services	12.9%	8.3%	7.2%	7.5%	7.3%
GDP (\$ billion)	86.0	156.0	283.0	125.0	225.0
GDP per Capita (\$)	1,532.0	2,595.0	4,416.0	2,131.0	3,588.0
Exports (\$ billion)	22.9	47.9	91.5	37.2	72.1
Share in GDP	14.4%	14.2%	13.6%	16.0%	13.8%
Imports (\$ billion)	32.9	58.5	100	46.6	82.3
Share in GDP	28.9%	13.4%	10.7%	12.3%	11.3%
Balance of Trade (\$ bn.)	-10	-10.5	-8.4	-9.3	-10.2
Share in GDP	-11.6%	-6.8%	-3.0%	-7.6%	-4.7%
Current Balance (\$ bn.)	-7.3	-7.5	-2.4	-7.1	-5.4
Share in GDP	-8.5%	-4.8%	-0.8%	-5.8%	-2.6%

Source: NESDB

2.3 Population Increasing Ratio of the Metropolitan Area

The population of Bangkok, a capital and business center of the country is 5.57 million and shares 9.6% of the total population as at the end of 1993.

The population of Nakhon Ratchasima, the second largest city at the northeastern part of Thailand is 188 thousand and that of Chiang Mai, the third largest city at the northern part of Thailand is 170 thousand. As there is not any other particularly large scale city in Thailand, the population is concentrated solely in Bangkok Metropolitan area.

However, the share of the population in the capital city, Bangkok has been on the decrease from a peak of 10.4% recorded in 1989 to less than 10% in recent years.

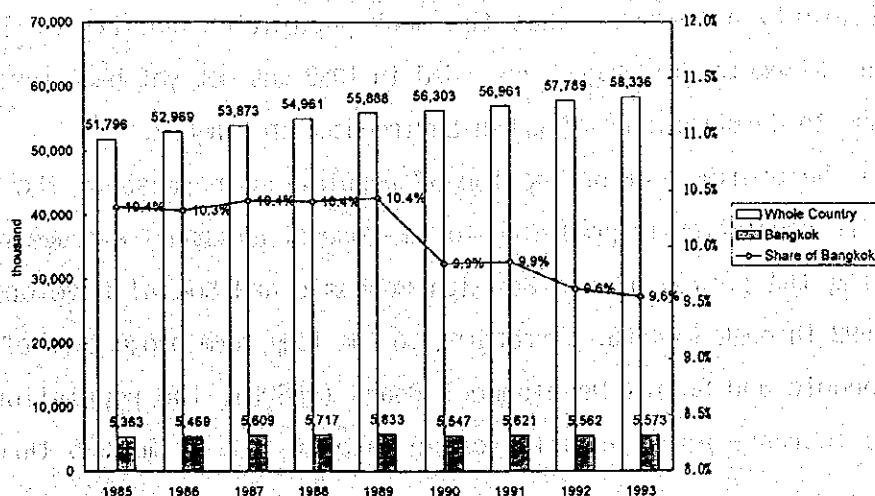
When the trend of population is viewed in terms of the MEA, the increase rate in the PEA area is also higher than that of the MEA area, and the share of the population in the MEA area has been decreasing year after year and lowered to 12.3% at the end of 1993.

Table 2.3-1 Comparison of Regional Population

Area	1985		1993		
	(thousands)	(% share)	(thousands)	(% share)	(% aai)
PEA	45,266	87.4 %	51,150	87.7 %	1.5 %
MEA	6,530	12.6 %	7,186	12.3 %	1.2 %
Bangkok	5,363	10.4 %	5,573	9.6 %	0.5 %
Nonthaburi	504	1.0 %	717	1.2 %	4.5 %
Samut Prakan	663	1.3 %	895	1.5 %	3.8 %
Whole Country	51,796	100.0 %	58,336	100.0 %	1.5 %

Source : Ministry of Interior

Remarks : aai = average annual increase

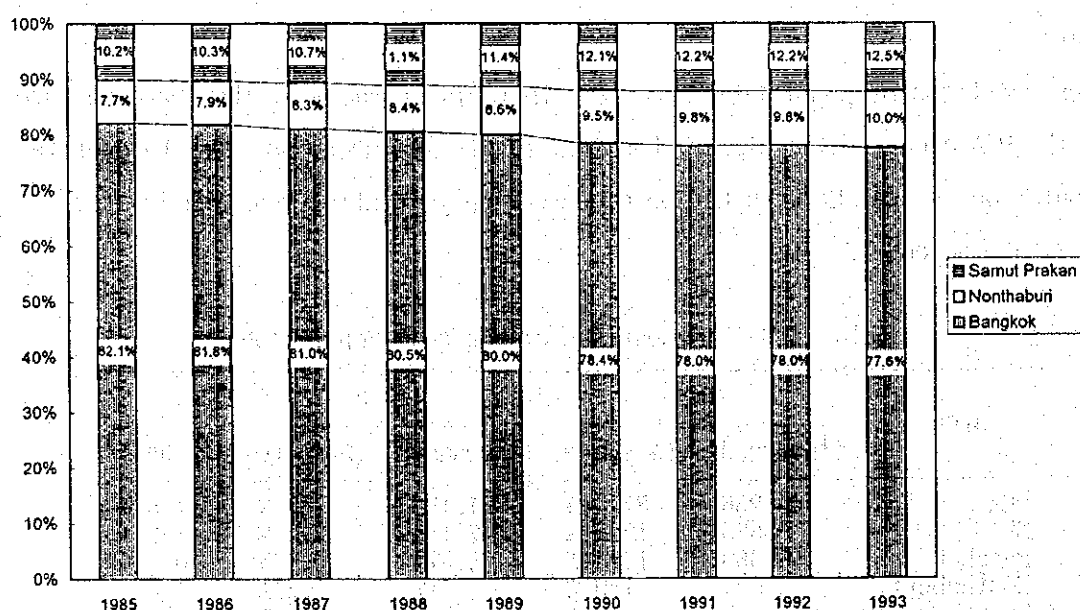


Source: Department of Local Administration, Ministry of Interior

Fig. 2.3-1 Population of Bangkok and its Share

As the annual average increase rate of population in Bangkok was only 0.5% and much lower than 1.5% in the PEA area and 1.2% in the MEA area in 1985 through 1993, the downward trend in the share of population in the MEA area is apparent.

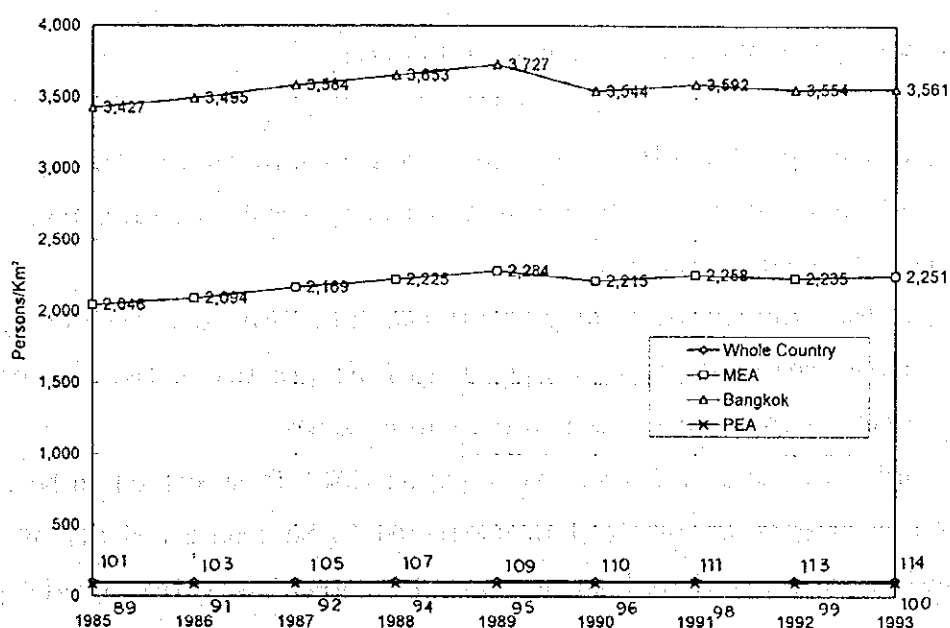
According to the trend of population by the provinces in the MEA area, the fact that the population increased largely by 4.5% and 3.8% respectively in Nonthaburi and Samut Prakan during the same period indicates that the population in Bangkok had flown out to the surrounding areas. This fact proves that the share of population within the MEA area of Bangkok also decreased from 82.1% in 1985 to 77.6% in 1993.



Source: Department of Local Administration, Ministry of Interior
Fig. 2.3-2 Share of Population in MEA's Area

It is particularly noteworthy that the peak population density of 3,727 persons/square kilometer in Bangkok recorded in 1989 has not yet been restored presumably due to deterioration of urban environment in Bangkok.

According to the medium term projection of population increase by the Thai Government, the population is predicted to increase at an annual average rate of 1.2% during the period of the Seventh Economic and Social Development Plan from 1992 through to 1996. According to the long term projection of the National Economic and Social Development Board (NESDB), the population is predicted to increase at an annual average rate of 1.3% from 1995 through 2000.



Source: Department of Local Administration, Ministry of Interior

Fig. 2.3-3 Regional Population Density

These values can be said just the same as those in the World Population Projections 1992-2000 of the World Bank, such values are deemed justifiable judging from the past records in 1990 through 1993 and when considering that the birth population turned to minus growth from a peak of age levels born in the latter half of 1970s to 1980.

The MEA predicts a considerably positive growth rate ranging from 1.9% to 1.4% during this period. The above values are considered to reflect the projection that the population would be concentrated continuously in the MEA area also in the future. For this purpose, therefore, it will be necessary to promote substantial redevelopment of surrounding urban areas including Bangkok.

Table 2.3-2 Prediction of Population Increase

Item	1990- 1995	1995- 2000	2000- 2005	2005- 2010
Whole Country				
Seventh National Economic and Social Development Plan (1992~96)	1.2 %			
NESDB	1.4 %	1.3 %		
World Bank	1.4 %	1.3 %	1.3 %	1.2 %
Records * (1990~93)	1.2 %			
MEA's Area				
MEA (Load Forecast Subcommittee)	1.9 %	1.7 %	1.5 %	1.4 %
Records * (1990~93)	0.5 %			

* Ministry of Interior

2.4 Development Situation of the Metropolitan Area

For the purpose of attaining stable economic growth in the future, the Government of Thailand intends to decentralize the present extreme situations of over concentration in Bangkok.

For this purpose, the entire country is divided into three zones centering on the surrounding area of Bangkok, and privileges are granted to the respective zones to encourage investments much more in local zones.

In other words, the Bangkok Metropolitan Region (BMR) is specified to be zone 1, the central region of Thailand is specified to be zone 2 and all of the other regions are specified to be zone 3 to grant special privileges depending on the level of development in each zone.

Table 2.4-1 Incentives for Investment in Local Regions

Item	Zone 1	Zone 2	Zone 3
Import Duties on machine and Equipment	50 % of Exemption	50 % of Exemption	100 % of Exemption
Corporate Tax	3 years Exemption	7 years Exemption	8 years Exemption
Import Duties on Raw Materials	Yearly Exemption	Yearly Exemption	5 years Exemption

Zone 1 : Bangkok, Samut Sakhon, Pathum Thani, Nonthaburi, Nakhon Pathom, Samut Prakan.

Zone 2 : Samut Songkhram, Ratchaburi, Kanchanaburi, Suphan Buri, Ang Thong, Ayutthaya, Saraburi, Nakhon Nayok, Chachoengsao, Chon Buri.

Zone 3 : Other Provinces.

According to the data of the Board of Investment (BOI), 46.9% of the total industrial parks throughout the country are located in zone 3 in August 1994, and when compared with 22.2 % in zone 1 and 30.9 % in zone 2, it can be seen how much emphasis has been placed on zone 3. As even 45.4 % of industrial parks (dead stocks) have been left unsold throughout the country during the same period, the industrial parks tend to be over-supply also from the recent trend. Moreover, the surplus industrial site in the BMR has been reduced considerably to 27.6 % when compared with the other zones. Therefore, it can be said to have become easier to shift future new investment to zones 2 and 3

from zone 1 centering on the BMR reflecting the incentives taken in the taxation system.

Table 2.4-2 Industrial Parks and Dead Stocks by Zone

Item	Industrial Parks (km ²)		Dead Stocks (km ²)	
1st Zone	30.3	22.2 %	8.4	27.6 %
2nd Zone	42.1	30.9 %	17.4	41.3 %
3rd Zone	64.0	46.9 %	36.1	56.4 %
Whole Country	136.4	100.0 %	61.9	45.4 %

Source : Board of Investment as of August 1994

The major development projects around Bangkok are as presented below:

- (1) The second international airport construction project with an area of 32km² in Samut Prakan Province about 30 km east of Bangkok is going forward. The second Bangkok international airport will be constructed at the Nong Ngu Hao site for operating the international line and major domestic lines by 2000.

This airport will initially be equipped with two 3.7 km runways scheduled to be opened in 2000, and is scheduled to be expanded to a large scale airport ultimately equipped with four 4.0 km runways. Thereby, as many as 100 million passengers are expected to use this airport. Subsequent to completion of this Nong Ngu Hao International Airport, the existing Dong Muang International Airport will be used as a domestic Airport.

Along with construction of this new airport, the city development projects in the surrounding areas have also been proposed in addition to such access means as railway and road. Since international business parks and science garden park are scheduled to be constructed around Nong Ngu Hao, moreover, these projects are expected to offer employment opportunities for as many as 3.50 million people as an economic benefit by 2010. Consequently, a considerably large number of people are predicted to migrate from Bangkok to the surrounding areas.

(2) Government Center development project

The plan for relocating government agencies and state-owned enterprises has been studied as a countermeasure for solving miscellaneous city problems such as traffic congestion and deterioration of environment in Bangkok resulting from rapid growth of economy in recent years.

According to this plan, 50 % of the government agencies and state-owned enterprises which are not directly involved in the services to the people will be relocated to the Government Center New Town scheduled to be developed around Thatakieb and Sanam Chai Khet of Chachoengsao about 120 km east of Bangkok. Out of a proposed total area of 320 km², 112 km² is scheduled to be used for the inner city, and the remaining area will be used systematically as an agricultural land and forestry area.

In this area, about 1 million people are predicted to live here in the future.

(3) Development of mass transportation means (systems) in Bangkok so far, the following projects have been proposed :

(a) Hopewell Project

This project is intended to construct an elevated railway line and a highway by using the land along the existing line route of the State Railway of Thailand (SRT). For this project, a Build, Operate and Transfer (BOT) agreement was concluded with the SRT and Hopewell in December 1991. The route consists of a 25.9 km section between Taling Chan and Hua Mak and a 34.2 km section between Ponimit and Rangsit running respectively in the east-west and north-south directions crossing on the center of Bangkok. Meanwhile, this project is scheduled to be completed by 1999.

(b) Thanayong Project

Two lines consisting of a Sukumvit Line and a Victory Line totally 23.7 km are scheduled to be constructed according to a BOT agreement signed by and between the Bangkok Metropolitan Authority (BMA) and Thanayong and scheduled to be opened in 1998.

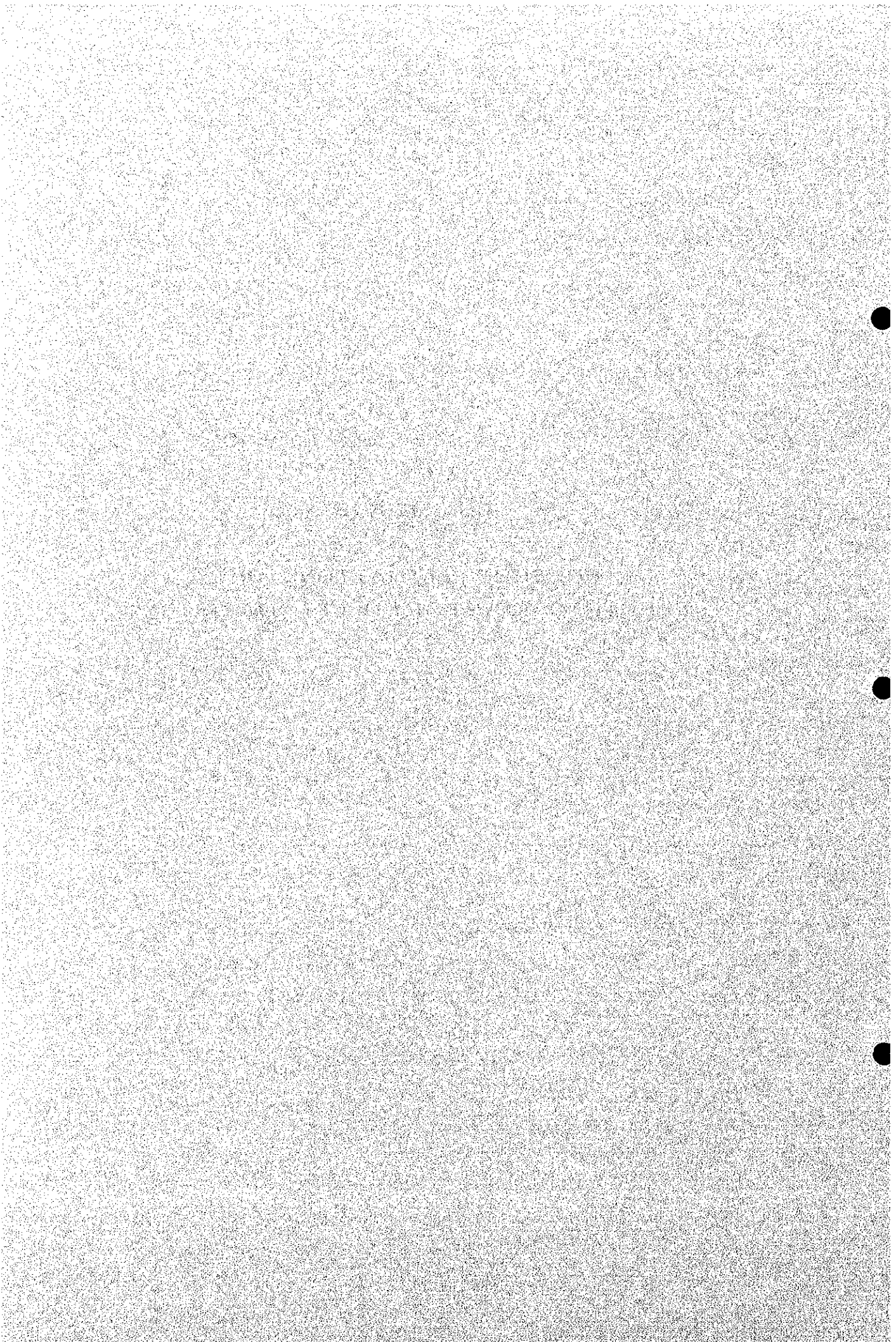
(c) MRTA Project

This project has been proposed by the Metropolitan Rapid Transit Authority (MRTA) to form a loop railway line with the existing line of SRT through connection between Bangsu and Hua Lum Pong. Although this project was planned initially on the basis of elevated line, it is now being reviewed taking into account the necessity of adopting subway in the city center area.



CHAPTER 3

PRESENT SITUATIONS OF ELECTRIC POWER UTILITY INDUSTRY



CHAPTER 3 PRESENT SITUATIONS OF ELECTRIC POWER UTILITY INDUSTRY

3.1 General

(1) Growth of electric energy consumption

In Thailand, the electric energy (hereinafter referred to as "energy") consumption has recently undergoing rapid increase constantly exceeding 10% since FY 1987. When the shares of the MEA and PEA by regions including direct customers of EGAT are compared, it can be seen that the energy consumption in the PEA area has been increasing particularly rapidly.

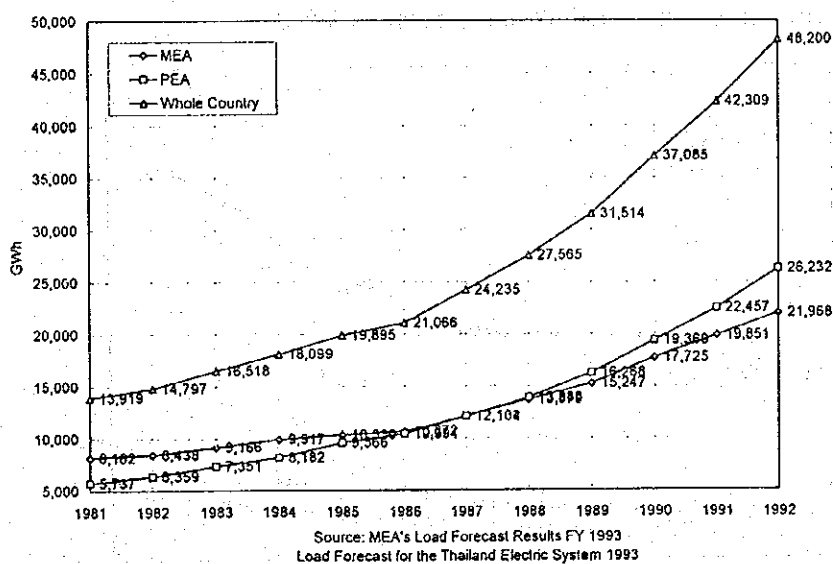


Fig. 3.1-1 Energy Consumptions by MEA's and PEA's Regions
Included EGAT's Direct Customers

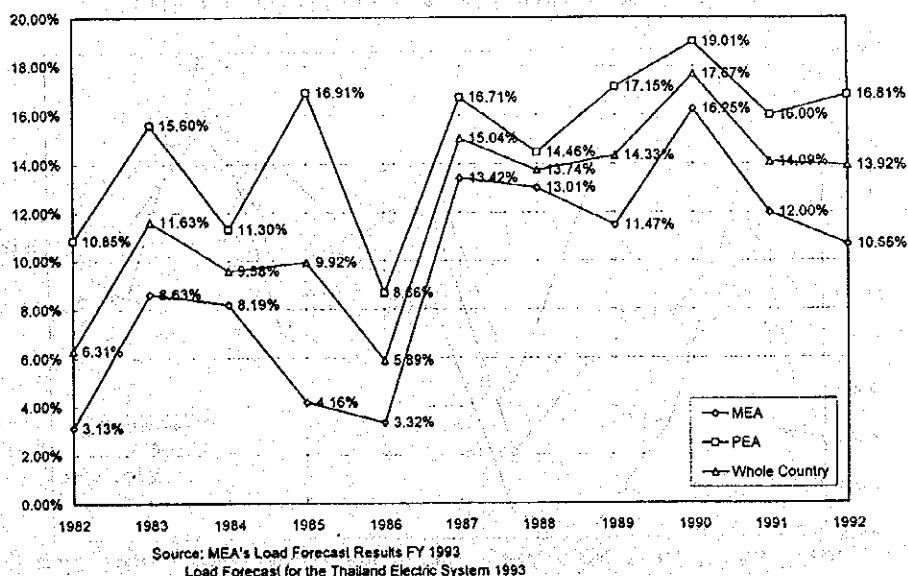


Fig. 3.1-2 Growth Rate of Energy Consumptions by MEA's and PEA's Regions
Included EGAT's Direct Customers

Therefore, the MEA area, which occupied 58.8% of the total nationwide electricity consumption in FY 1981, was outstripped by the consumption in the PEA area in FY 1987, and the MEA's share went down to 45.6% in FY 1992.

From the growth of power demand per capita, it can be seen that the nationwide average energy consumption which was 291 kWh/person in FY 1981 increased substantially to 834 kWh/person in FY 1992.

When the consumption is viewed in terms of regional one, the consumption in the PEA area expanded to 3.8 times from 138 kWh/person to 518 kWh/person during the same period. As the energy consumption in the MEA area also increased to 2.4 times during the period, the regional gap in absolute values may be said to have been widened.

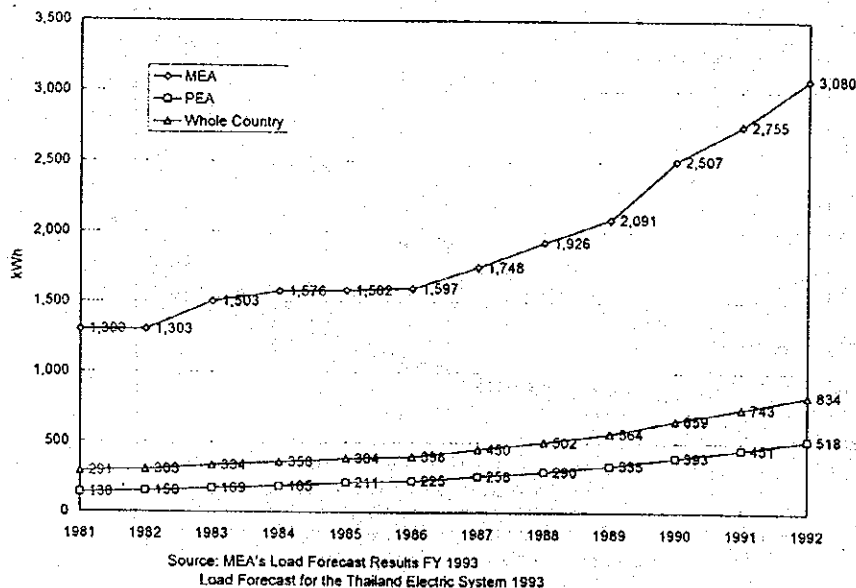


Fig. 3.1-3 Energy Consumption by MEA's and PEA's Regions per Capita

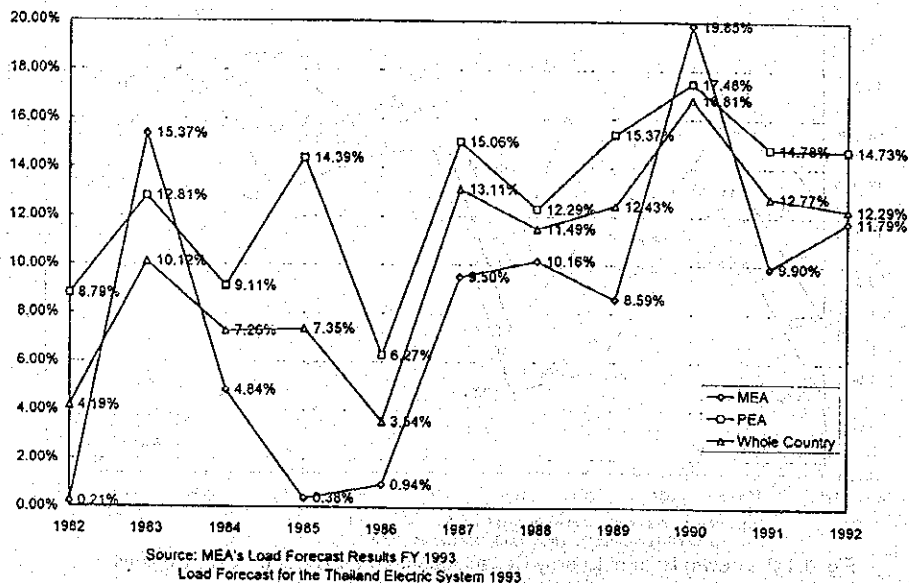


Fig. 3.1-4 Energy Consumption Growth Rate per Capita by Regions Included EGAT's Direct Customers

However, it is apparent that the growth rate of energy consumption in the MEA area had become lower than that in the PEA area.

When viewed from the elasticity value of energy consumption to GDP, the elasticity value of the MEA area is 1.0 in contrast to 2.0 in the PEA area, where the nationwide basic elasticity value in FY 1982 through to FY 1992 is 1.48. In other words, the growth rate of energy consumption in the MEA area is much lower than that in the PEA area, and there is a clear-cut gap in the energy consumption to elasticity value of GDP. This gap is deemed to reflect the difference in the energy consumption structures in both of the areas.

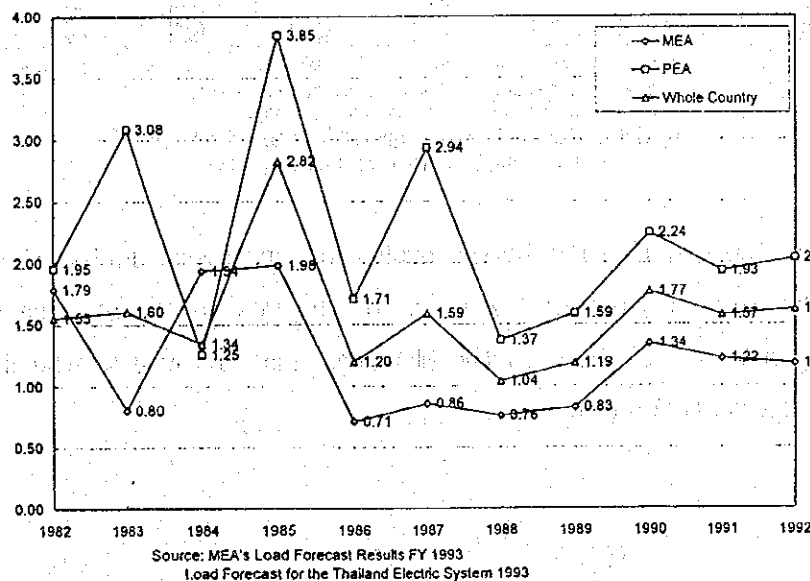


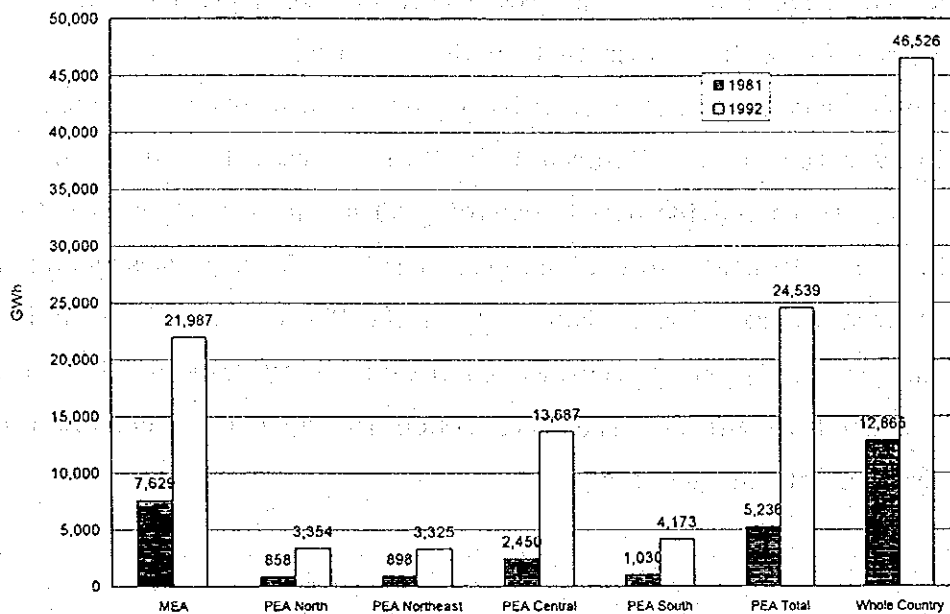
Fig. 3.1-5 Energy Consumption to GDP Elasticity by Regions

(2) Trend of energy consumption in the respective areas

The nationwide energy consumption areas are further sub-divided into the following five areas : Namely, the MEA area, PEA north area, PEA northeast area, PEA central area and PEA south area.

According to this division of areas, let us see the growth rate of energy consumption of the direct customers of the MEA and PEA (excluding those of EGAT) over a period from FY 1981 through to FY 1992.

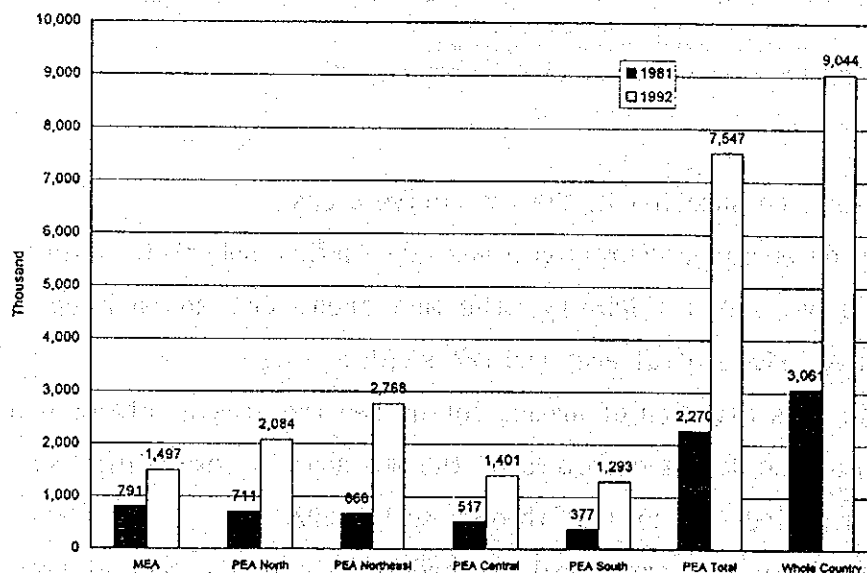
As a result, it is noteworthy that the growth rate in the central area of the PEA is as high as 5.6 times when compared with the lowest rate of 2.9 times in the MEA area.



Source: Load Forecast for the Thailand Electric System Volume 2,
Thailand Load Forecast Subcommittee, June 1993

Fig. 3.1-6 Comparison of Regional Energy Consumptions
Excluded EGAT's Direct Customers

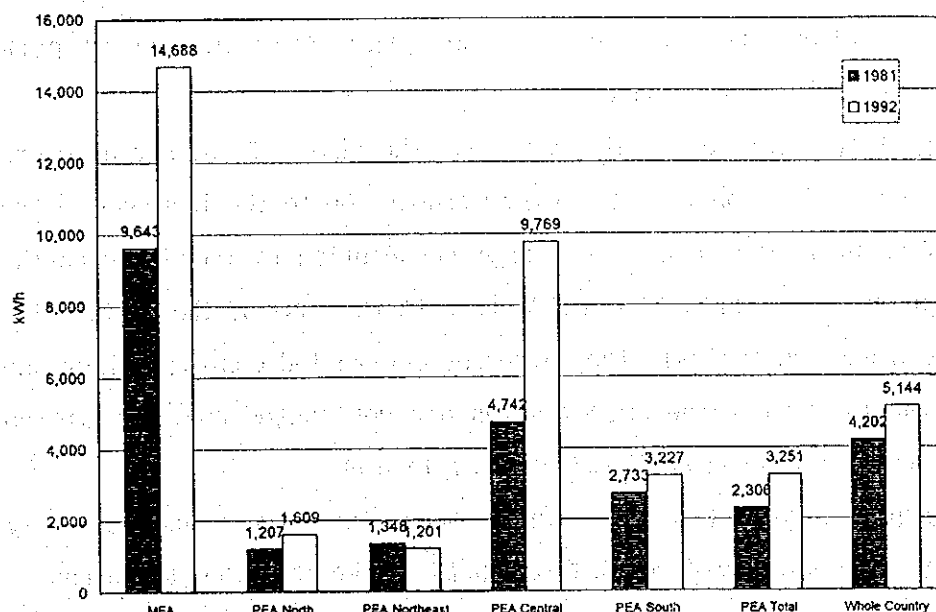
Speaking of the growth rate in the number of customers during the same period, the highest rate is 4.2 times in the PEA northeast area while the lowest one is 1.9 times in the MEA area and followed by the second lowest is PEA central area.



Source: Load Forecast for the Thailand Electricity System Volume 2,
Thailand Load Forecast Subcommittee, June 1993

Fig. 3.1-7 Comparison of Regional Customers
Excluded EGAT's Direct Customers

When the regional energy consumption per customer in FY 1981 through to FY 1992 is compared, the consumption in the central area of PEA increased to 2.1 times in contrast to 1.5 times in the MEA area. However, there was not so much change in the other areas.



Source: Load Forecast for the Thailand Electric System Volume 2,
Thailand Load Forecast Committee, June 1993

Fig. 3.1-8 Comparison of Regional Energy Consumption Per Customer

From the above, the number of customers had been increasing rapidly due chiefly to increase in the number of general residential and small customers throughout the entire PEA area. Moreover, the gap between the central and other areas of the PEA area has been widened significantly. So that, this fact indicates that the central area of PEA has been contributing for economic development of Thailand together with the MEA area.

When the share (configuration) of energy consumption in FY 1981 in the MEA area is compared with that in FY 1991, while the business energy consumption increased substantially from 25.7% to 32.8% while, the industrial energy consumption decreased from 42.1% to 36.5%. During this period, the share of residential energy consumption remained at a roughly same level of 19%.

The share of industrial energy consumption was lowered due to reduction of respectively 3% of share of small and large industrial consumption, whereas, the share of the business energy consumption was expanded as a

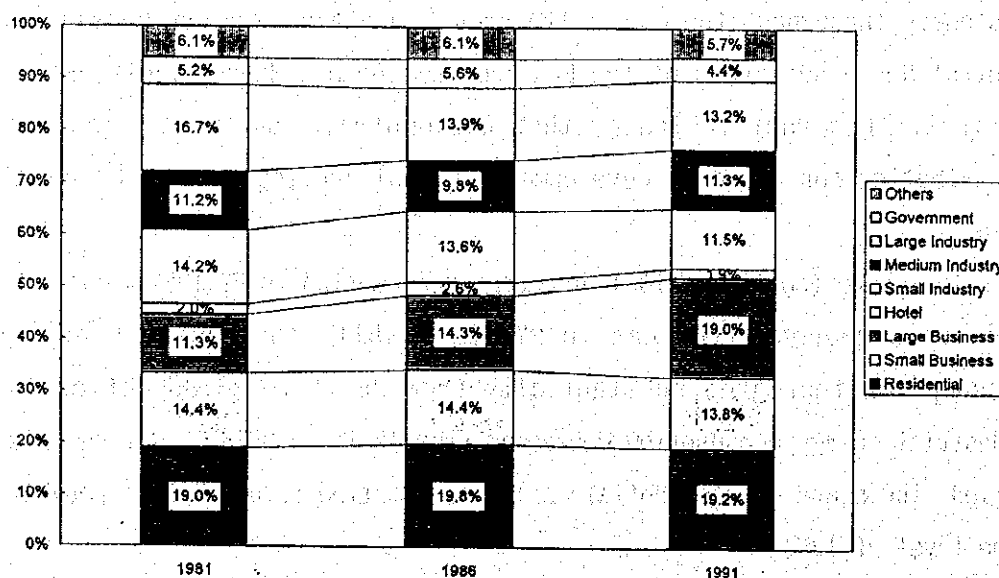
result of increase in the share of large business consumption by as much as 7.9% from 11.3% to 19.2%. These facts indicates that buildings and other business facilities have been located increasingly in Bangkok reflecting rather downward trend in location on the part of large industries. In other words, these facts can be said to indicate an important future trend as there is no large scale industrial parks development project in Bangkok.

Speaking of the features of the PEA area, the share of industrial energy consumption has been on the decrease in proportion to the increase in the share of residential and business energy consumption in all of the north, northeast and south parts of the PEA area. In the case of the residential energy consumption (sales), the number of contracted customers increased so substantially that the energy sales per contracted customer did not show so much increase from FY 1981 through FY 1991.

In the central area of PEA, on the other hand, the large industrial energy sales increased largely form 18.6% to 39.1% unlike the other PEA areas.

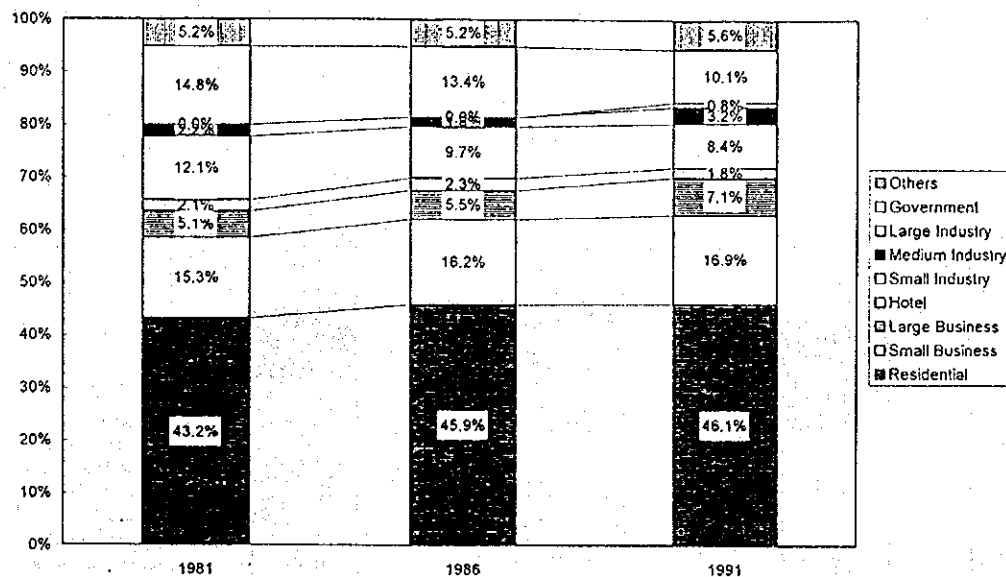
Although the residential and business energy sales increased respectively, the shares of these sectors were reduced as a result.

This fact indicates that location of industrial parks and so forth are under way in the central part of the PEA area.



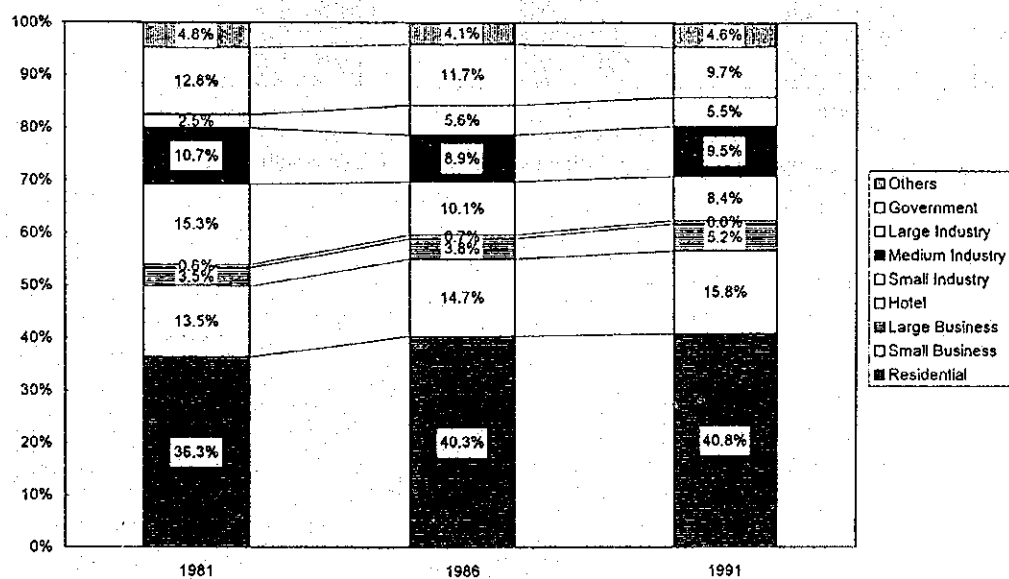
Source: Load Forecast for the Thailand Electric System 1993

Fig. 3.1-9 Comparison of Energy Sales by Category in MEA's Area



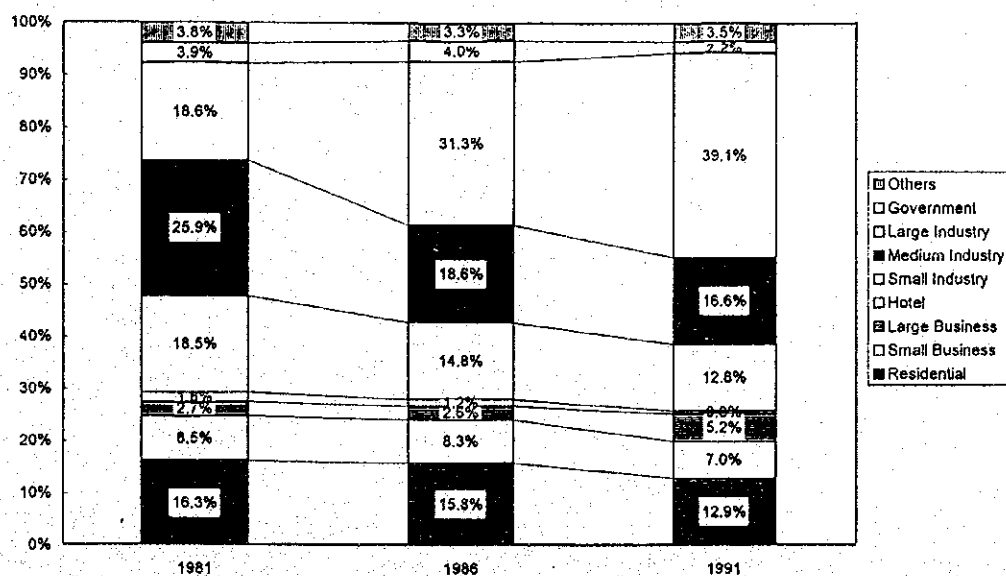
Source: Load Forecast for the Thailand Electric System 1993

Fig. 3.1-10 Comparison of Energy Sales by Category in PEA's North Area



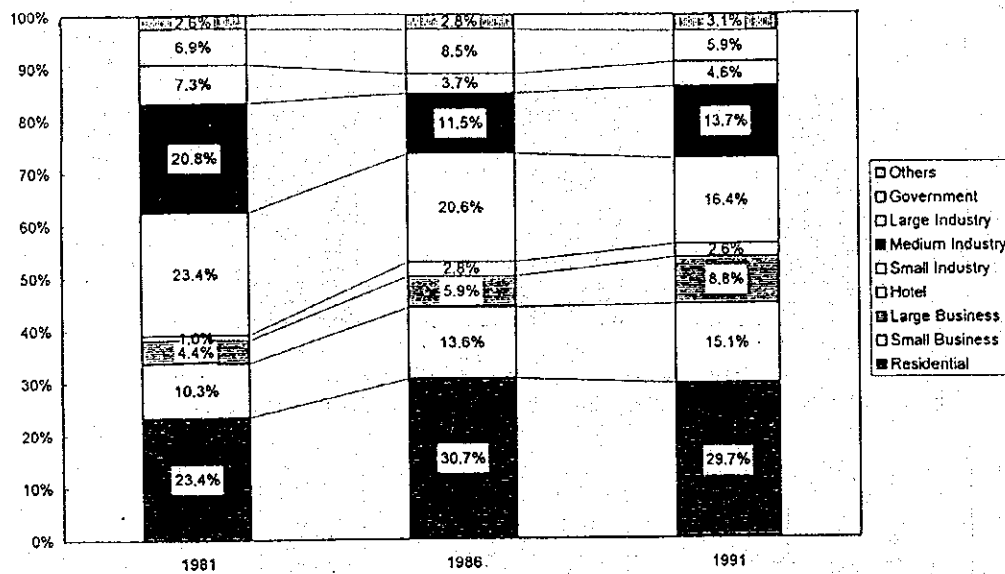
Source: Load Forecast for the Thailand Electric System 1993

Fig. 3.1-11 Comparison of Energy Sales by Category in PEA's Northeast Area



Source: Load Forecast for the Thailand Electric System 1993

Fig. 3.1-12 Comparison of Energy Sales by Category in PEA's Central Area



Source: Load Forecast for the Thailand Electric System 1993

Fig. 3.1-13 Comparison of Energy Sales by Category in PEA's South Area

3.2 Power Sector of the Kingdom of Thailand

The majority of the electric power sector of Thailand is under direct control of the Government.

Therefore, in FY 1992 the private power facilities owned by private companies share only 8% (1,074 MW) of the total facilities throughout the country. As the EGAT is promoting privatization at present by making use of independent power producers (IPP), the generating facilities of the private sector are predicted to undergo rapid growth in the future.

The overall administration and management of electric power is under direct control of the National Energy Policy Committee (NEPC) headed by the Prime Minister as its chairman.

With regard to the responsibility for electric power supply, generation and transmission is under the responsibility of the EGAT, and distribution is undertaken by the two organizations, namely, the MEA and PEA.

3.2.1 National Energy Policy Office (NEPO)

The National Energy Policy Office (NEPO) is a secretariat of the NEPC undertaking the responsibility for management of the overall energy policy of the country.

Power source development plans are submitted to the NEPC after examination of the NEPO. Subsequent to approval of NEPC, these development plan will be approved officially by the Cabinet.

3.2.2 Electricity Generating Authority of Thailand (EGAT)

(1) Present status of EGAT

In May 1969, the EGAT was inaugurated by merging the five authorities : the Yanhee Electricity Authority (YEA), Northeast Electricity Authority (NEEA) and Lignite Authority (LA). Under direct control of the Prime Minister's Office, the EGAT is undertaking the responsibility for executing the following objectives based upon the EGAT Act set forth in 1968.

(a) To generate and/or acquire (purchase) electricity, and transmit or distribute it to :

- 1) MEA (Metropolitan Electricity Authority), PEA (Provincial Electricity Authority) and other specified public distribution authorities ;
- 2) Other customers specified according to the proclamation of the King ;
- 3) Neighboring countries.

(b) Execution of various activities pertaining to energy resources originating from natural resources including such minerals or fuels as water power, wind, natural heat, solar energy, oil/coal/gas as well as nuclear power source, as well as such miscellaneous activities as to promote the plans of the EGAT.

(c) Execution of joint research and other activities pertaining to electrical energy.

(d) To produce and market lignite and chemical products obtained by using lignite. Or to execute such activities in cooperation with the other organizations.

The scope of the responsibility given to the EGAT from the Government in order to achieve the above objectives are as follows:

(a) To construct and operate dam, reservoir and/or other facilities related to electric power generation.

(b) To construct thermal, hydro-electric, nuclear power and other types of power generating facilities.

(c) To extend and improve the transmission system and substation including equipment and materials related to power transmission and distribution.

(d) To set forth the standards, types and scales pertaining to substation, transmission system, power station, lignite chemical plant, power plant fuel and other equipment and facilities.

(e) To establish public and private companies to execute the other related businesses and those related to electric power.

- (f) To carry out joint research with international, private and/or national institutions to acquire the share of public or private company for benefits.
- (g) To execute related activities for achieving the above-mentioned objectives.
- (h) To formulate the policies related to production and sales of electricity, lignite and its byproducts.

To achieve the above objectives, the EGAT established a basic policy to guarantee constantly supply of sufficient electric power and reliable service, as well as to sell electric power at as low rate as possible. The reliability of power supply has been improved continuously up to now, and the service level has also considerably enhanced as compared with before.

The EGAT, as a self-supporting organization, has an independent authority in the management of the organization.

It draws up the plan independently to cover all costs of power generation and transmission, although the decision of power rates is subject to approval of the Cabinet.

In addition to issuing bonds after obtaining approval from the Government, the EGAT uses loans from domestic and overseas financial institutions. Financially, therefore, it relies on the Government.

The EGAT is purchasing electric power from the Nam Ngum Power Station of Laos and transmitting it through the distribution lines located in Thakhek and Savannakhet. In addition to this, the power system of Thailand has been connected with that in Malaysia through 115 kV/132 kV transmission line since August 1980 to enable mutual transaction of electric power.

(2) Flow of privatization of EGAT

In FY 1986, the final year of the Fifth Five Year Plan, the peak load and power generation of EGAT were 4,180 MW and 24,779 GWh, respectively. Five years later in FY 1991, the final fiscal year of the Sixth Five-Year Plan, however, the peak load and power generation were doubled respectively to 8,045 MW and 49,225 GWh.

Such a rapid increase in the electric power sales/demand has also caused the increase of financial burden of the Government. To reduce such a burden, the Government has promoted privatization of state-owned enterprises by letting the private sector participate in the management. The electricity industry is no exception in Thailand as privatization of the EGAT is now in progress in combination with utilization of independent power producers (IPP). In addition, privatization of the MEA and PEA is also put into concrete practice in the future.

In September 1992, a new electric power policy for FY 1992 through to 1996 was adopted by the Cabinet. According to this policy, the shares of EGAT will be opened to the public to lower the ratio of the Shares owned by the Government to 50% or less based on the following schedule:

(a) First stage (October 1992 - September 1993)

- 1) The EGAT was specified as a good state enterprise. Thereby, the EGAT will be able to operate a self-governing company as a organization independent from the Government.

a) Qualification of good state enterprise

- i) 30% of the net profit shall be paid to the national treasury.
- ii) The management and personnel costs shall be reduced to not more than 20% of the generation cost.
- iii) The ratio of remuneration shall be 6% or over.
- iv) The growth rate of productivity shall be 2% or over.

- 2) The Electricity Generating Company (EGCO) was established as a generation company through 99.99% capital investment of the EGAT. The EGCO will be listed on the stock exchange, and the share of the EGAT at that time will be 48%.

(b) Second stage (October 1993 - September 1994)

- 1) In December 1994 EGCO purchased Rayong Combined Cycle Power Plant and sell generated electricity back to EGAT under a long term contract at the average selling price of THB 1.07 per kWh. EGCO would be enabled to expand its capacity in the future, and has the option to purchase Khanom Power Plant.
- 2) In accordance with the proceedings for participation of private sector set forth in the State-Owned Activities Act-1992, the EGAT announced a guideline for encouraging participation of private sector in power generation sector.
- 3) The roles of IPP and portion of the projects to be executed by IPP among power source development projects shall be determined exactly.
- 4) The MEA and PEA should be specified as good state enterprises.

(c) Third and fourth stages (October 1994 - September 1996)

- 1) Revision of the EGAT Act.
 - 2) Reorganization of the EGAT into a joint stock company.
 - 3) Promotion of IPP projects.
 - 4) Increase of EGAT's capital and selling of its shares to private sector, provided that the majority of the shares should be owned by the government.
- (3) Introduction of Independent Power Producers (IPP)

According to the General Information of EGAT Power Development Plan (PDP 95-01) announced by EGAT in April 1995, EGAT prospects 33,676 MW of new electric generating capacity till FY 2011. And for larger power generators, EGAT has given an opportunity to the private sector to enter in the power supply industry as an Independent Power Producer (IPP) with estimated capacity of 13,100 MW, in fact 38.9% of new facilities are expected of IPPs.

Table 3.2-1 New Generating Capacity (1995-2011)

Commissioning Year	Additional Capacity	Expect of IPPs
1995-2002	14,176 MW	4,100 MW
2002-2006	7,500 MW	4,000 MW
2007-2011	12,000 MW	5,000 MW
Total	33,676 MW	13,100 MW

In FY 2011, EGAT estimates the total capacity will be 43,917.8MW. So, the share of IPPs will be 29.8%.

The fuels to be used are natural gas including LNG, hydrocarbon gas and its associated liquid, coal and orimulsion, excluding hydro-power and nuclear power sources. The sites are located preferentially in the central area followed in order by the west bank of the Thai Bay (Prachuap Khiri Khan) and east part (Rayong).

Meanwhile, other domestic and foreign construction sites will be selected at the final stage.

3.2.3 Metropolitan Electricity Authority (MEA)

The MEA was established as an organization fully backed up financially by the government after merging the Bangkok Electricity Corporation which was under control of the Ministry of Interior and the Power Generating Bureau of the Government. Although the MEA does not own any power generating facilities, it undertakes the responsibility for distribution of power received from the EGAT to its customers through its transmission, distribution and substation systems.

Moreover, the construction and maintenance works of these transmission, distribution and substation facilities are also included in the scope of the responsibility of MEA.

Included in the range of its distribution are Bangkok, Nonthaburi and Samut Prakan adjacent to Bangkok. Meanwhile, the MEA is under direct control of the Public Works Department of the Ministry of Interior (PWD) together with the PEA.

MEA's power supply area is 3,192 km² with power supply started to the entire area in FY 1990. In 1994, toward strengthening the personnel training branch, the former Training and Development Office was reorganized into the present Human Resources Development Department. This reorganization indicates MEA's recognition of the importance of human resource development for future project deployment, and in line with this, it appropriated 3% of its corporate budget to personnel training, in FY 1995.

As of May 1995, MEA had 13,280 employees. With the adoption of private management in the future now being discussed, the employment of new personnel has basically been suspended.

Therefore, no personnel increase is probable and the current number is considered to be the peak. It is said that even expected major facility expansions will be undertaken without increasing the current personnel strength.

As of May 1995, the MEA Headquarters consisted of 21 Departments, 5 Offices, 58 Divisions and 246 Sections. In addition, MEA divides its power supply area into 13 districts, each with its own District Office. Under these 13 District Offices, there are 39 Divisions and 170 Sections. Within FY 1996, an additional District Office will be established to bring the total to 14 in all.

With 246 Sections within the Headquarters proper, business is fairly diversified. In view of a possible introduction of private management, organizational reform is presently under consideration toward attaining at a more simplified structure. At present, the functions of the Headquarters are not concentrated in a single location, but are executed at four locations. The Executive Committee and the Departments and Offices such as Personnel, Planning, Public Relations, and Accounting are housed in the Chidlom Office built in 1994, while other Departments are respectively housed in the Klong Toey District Office, Wat Liab District Office and the Samsen District Office. Although from a purely functional viewpoint, all the Branches should desirably be housed together at one location, the present distributed form may be seen as more advantageous, on the whole, when the transportation conditions in the city of Bangkok and the land utilization situations in the suburbs are taken into consideration.

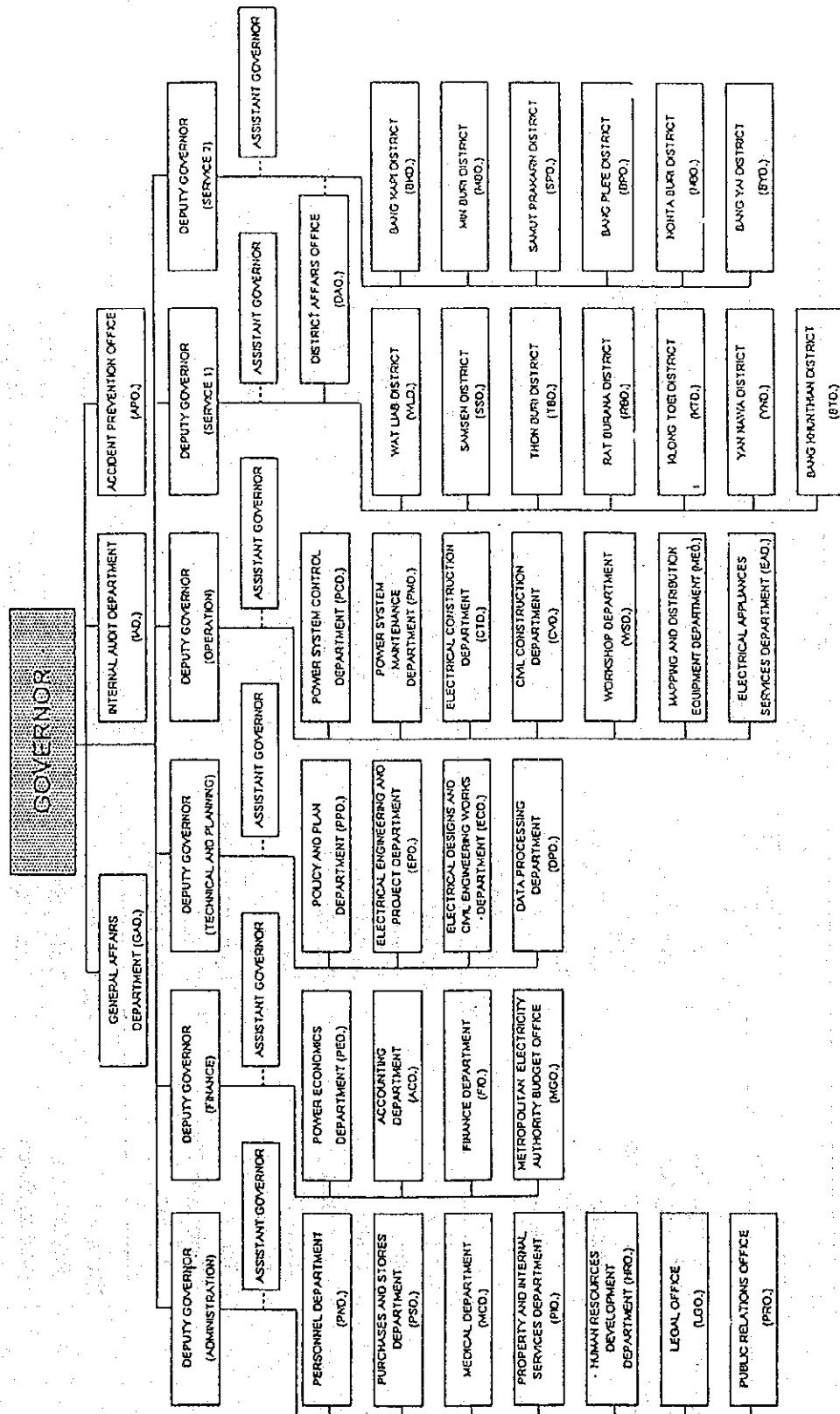
3.2.4 Provincial Electricity Authority (PEA)

The PEA is a public enterprise under control of the Ministry of Interior and undertakes the responsibility for electricity supply to a service area of 510,000 km² in 73 provinces other than the service territory of the MEA. This area is equivalent to 99% of the total land area of the country. The supply of electric power to its customers relies mainly on electric power received from the EGAT.

However, the PEA is promoting rural electrification by supplying electricity from small scale diesel power generating facilities owned by the PEA to isolated rural areas distant from the transmission line of EGAT.

Although the MEA owns distribution substation, the PEA owns only distribution lines and does not own any substation except in the area around Bangkok.

Metropolitan Electricity Authority Organization Chart

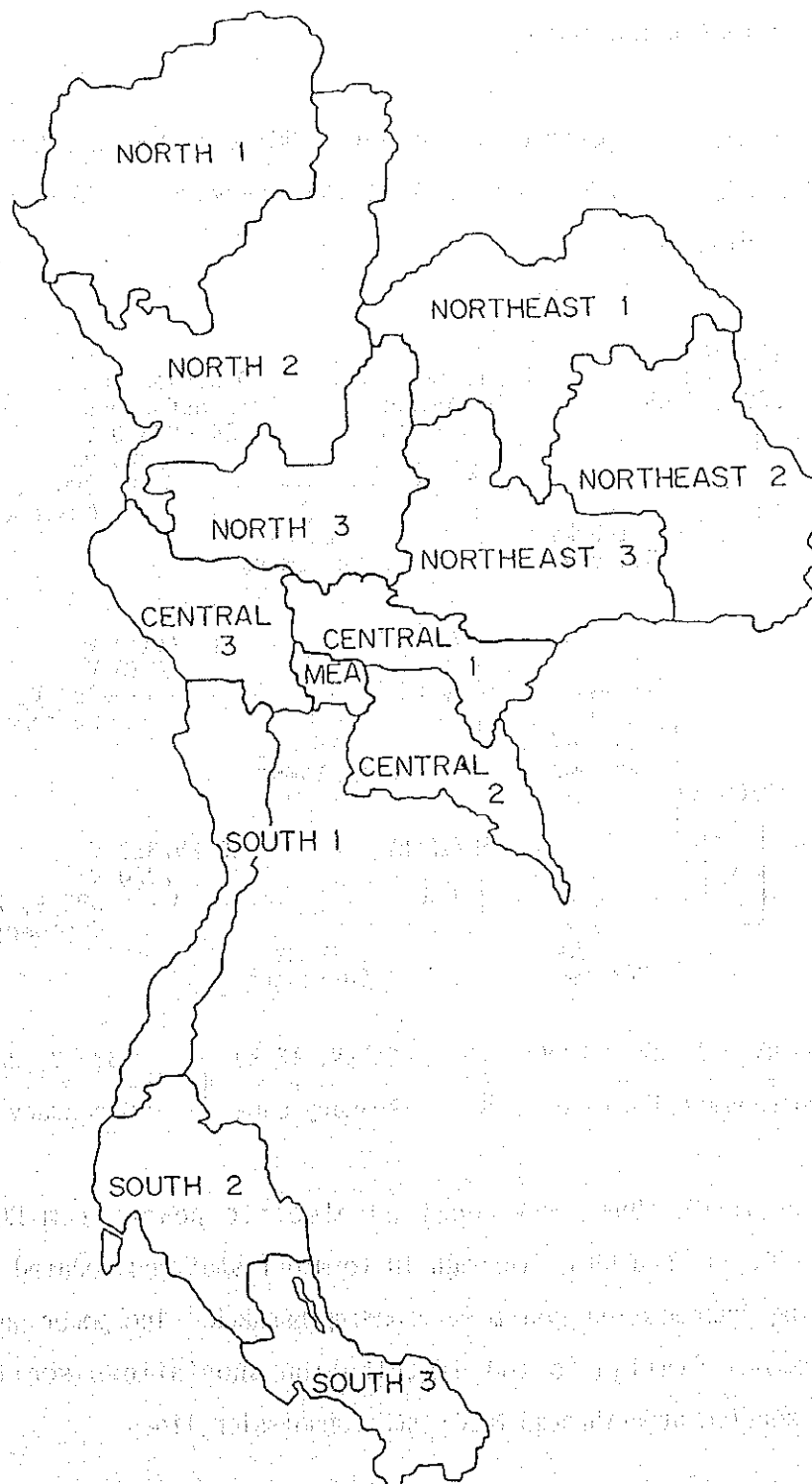


METROPOLITAN ELECTRICITY AUTHORITY
OCTOBER 1, 1984
ORGANIZATION AND METHOD SECTION

Provinces under the MEA and PEA Regions

MEA	PEA			
	North	Northeast	Central	South
Nonthaburi Bangkok Metropolis Samut Prakan	North 1 Chiang Rai Chiang Mai Mae Hong Son Phayao Lamphun Lampang	Northeast 1 Loei Udon Thani Nong Khai Nakhon Phanom Sakon Nakhon Khon Kaen Nong Bua Lam Phu	Central 1 Ang Thong Saraburi Ayutthaya Nakhon Nayok Prachin Buri Pathum Thani Sa Kaeo	South 1 Ratchaburi Samut Songkhram Phetchaburi Prachuap Khiri Khan Chumphon Ranong
	North 2 Nan Phare Uttaradit Sukhothai Phitsanulok Tak Kamphaeng Phet Phichit	Northeast 2 Mukdahan Kalasin Maha Sarakham Roi Et Yasothon Ubon Ratchathani Si Sa Ket Amnat Charoen	Central 2 Chachoengsao Chon Buri Rayong Chanthaburi Trat	South 2 Surat Thani Phangnga Phuket Krabi Nakhon Si Thammarat Trang
	North 3 Phetchabun Nakhon Sawan Uthai Thani Chai Nat Sing Buri Lop Buri	Northeast 3 Chaiyaphum Nakhon Ratchasima Buri Ram Surin	Central 3 Suphan Buri Kanchanaburi Nakhon Pathom Samut Sakhon	South 3 Phatthalung Songkhla Satun Pattani Yala Narathiwat

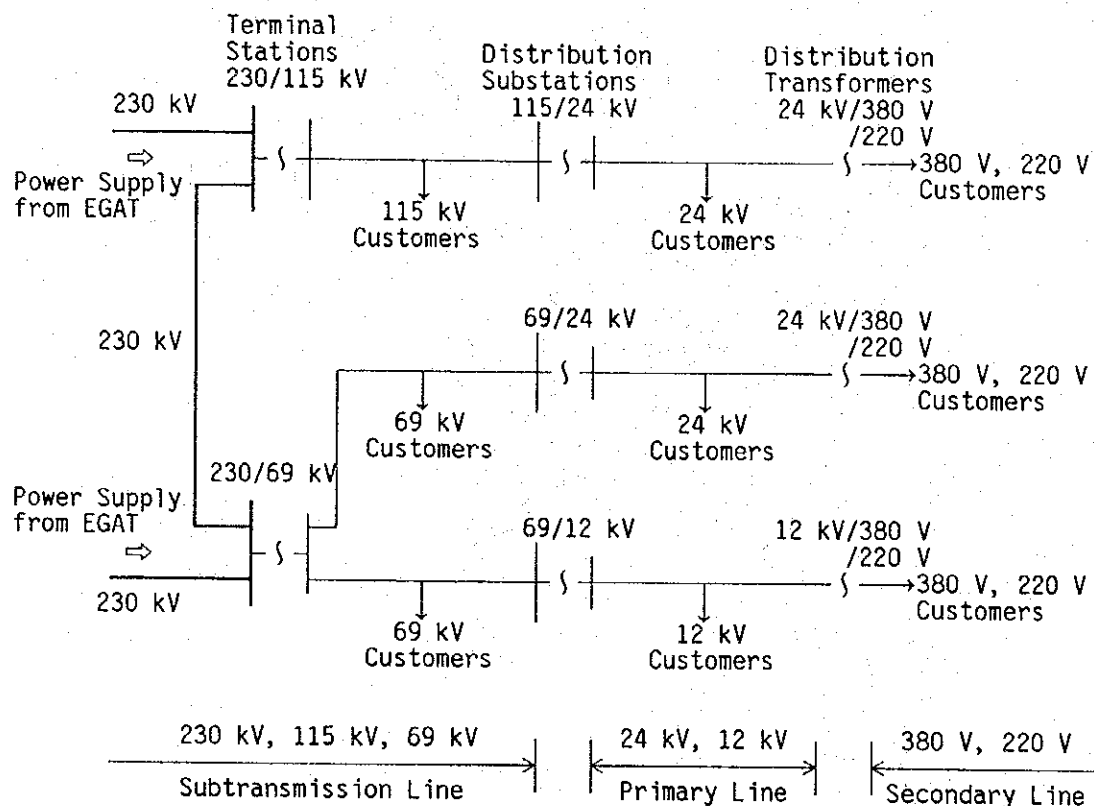
Area Map of MEA and PEA



3.3 Present Situations and Problems of Existing Power Distribution System Facilities in the Metropolitan Area

3.3.1 Power System Configuration

The standard voltages for power distribution in MEA's system are 230 kV, 115 kV, 69 kV, 24 kV, 12 kV, 380 V and 220 V at the frequency of 50 Hz as shown in the schematic diagram below.



As per the end of FY 1994, MEA received electric power from EGAT at voltage level 230, 115 and 69 kV through 10 terminal stations located within 230 kV outer ring transmission system surrounding Bangkok. The power was fed from each terminal station to 103 distribution substations scattering throughout the service area through MEA's subtransmission lines.

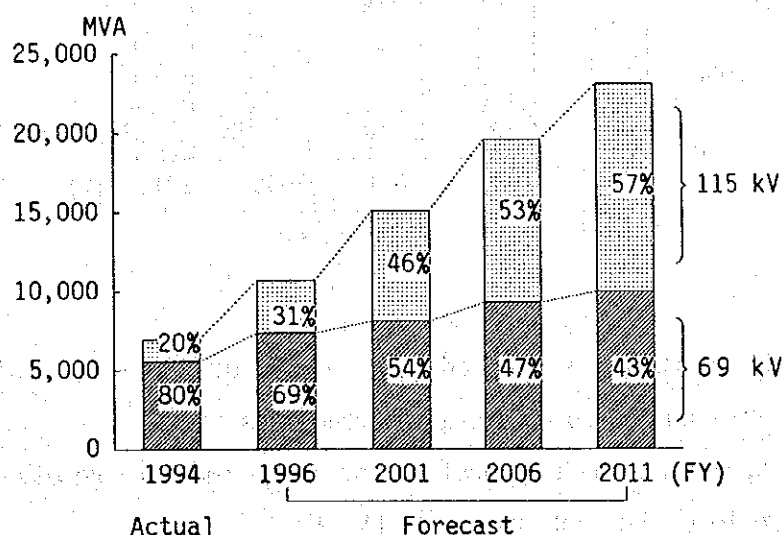
N.B.

The 230 kV substations of EGAT and MEA mentioned in this Report are hereinafter referred to as the "terminal stations" or "T/S".

At present, 115 kV system is mostly on the periphery of MEA's distribution area because of the need to transmit power a long distance. Meanwhile, 69 kV

system has been expanded in urban area. There seem to be no problems in respect of power flow and voltage in each line and in each bus bar. In urban area, however, expansion of 115 kV system will be desirable from the point of view of enhancing the capability of the power supply to cope with the fast increasing demand in future. According to the draft MEA's long-term plan till FY 2011 as presented in Section 5.5, 115 kV system will be expanded rapidly as the result of conversion from 69 kV to 115 kV as indicated below.

Installed Capacity of Terminal Stations



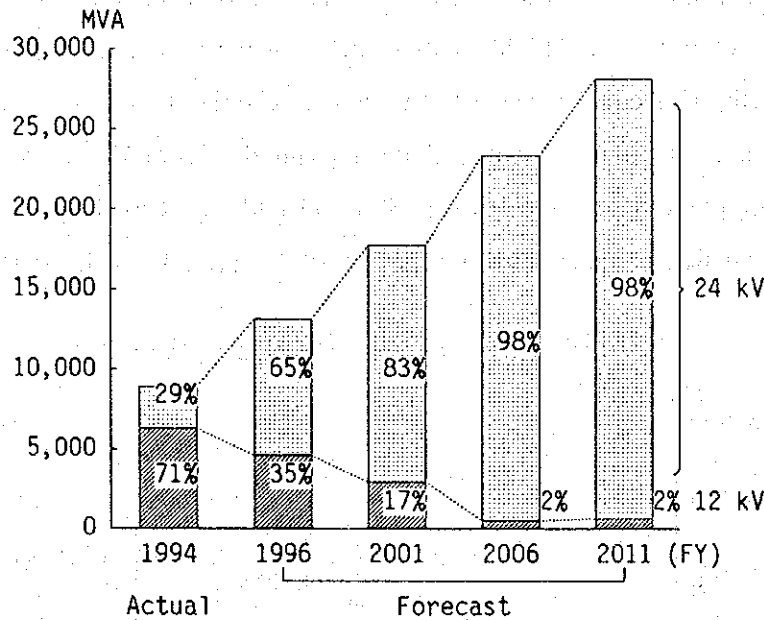
At distribution substations, the power at 115 or 69 kV is stepped down to 24 kV or 12 kV. After that, the power from the distribution substations is supplied to distribution transformers and 24 kV or 12 kV customers.

MEA's distribution area at present is separated into 24 kV and 12 kV primary line systems. The 24 kV primary line system is mostly on the periphery of the distribution area while the 12 kV primary line system is in the city.

However, as in future the urban area will encounter high load growth and the land acquisition for substation construction will be scarcely available, the problems on right of way, voltage drop and high load loss will consequently arise towards 12 kV primary supply.

MEA will tackle these problems by the increase of 24 kV line system areas except network area. According to the draft MEA's long-term plan till FY 2011 as presented in Section 5.5, 24 kV system will be expanded rapidly as the result of conversion from 12 kV to 24 kV as indicated below.

Installed Capacity of Distribution Substations



The power at 24 or 12 kV is stepped down to 380 or 220 V by distribution transformers fixing on the poles along the roadsides.

Some customer categories such as business or large industry receive electric power at voltage level 115, 69, 24 and 12 kV.

According to the latest MEA Monthly Report (March 1995), a number of customers was 1,741,516 at the end of January 1995, the maximum monthly energy received from EGAT was 2,794,341,006 kWh in March 1995, and the maximum 30-minute power demand recorded on April 25, 1995 was 5,308.1 MW, up 11.6% from FY 1994.