CHAPTER 2

Industrial Estates, Ports, Airports and City Transport in the Greater Bangkok Area for Promoting Connectivity in the Mekong Region

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CHAPTER 2

INDUSTRIAL ESTATES, PORTS, AIRPORTS AND CITY TRANSPORT IN THE GREATER BANGKOK AREA FOR PROMOTING CONNECTIVITY IN THE MEKONG REGION

Nucharee Supatn

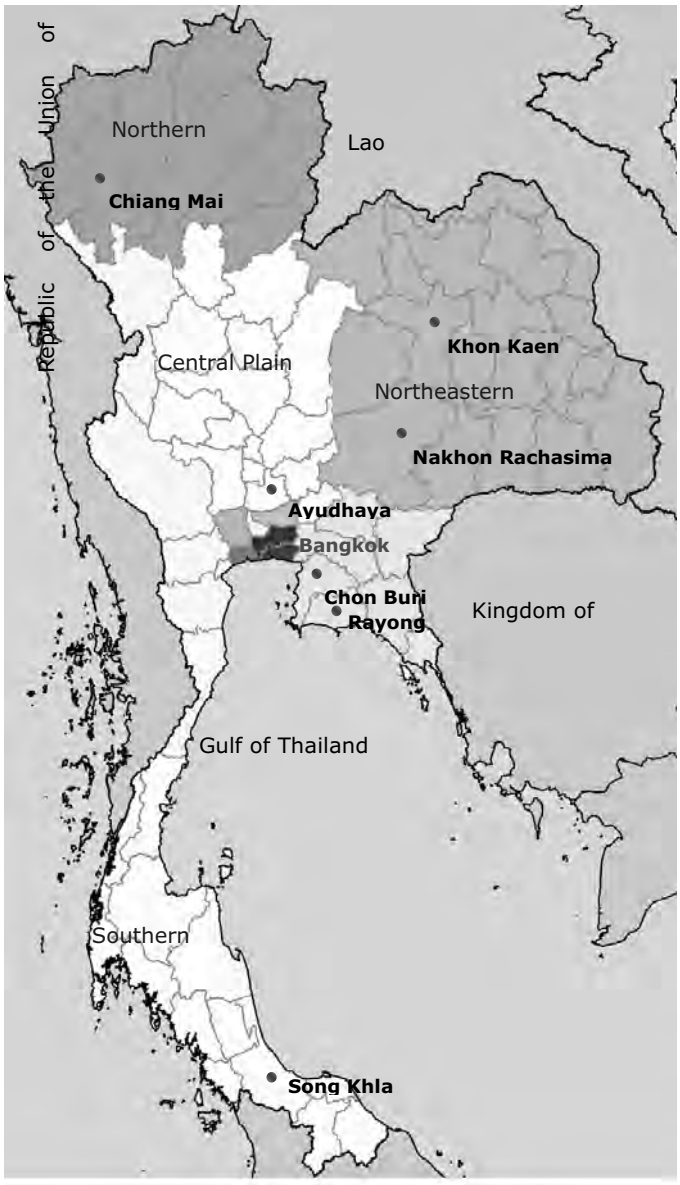
INTRODUCTION

Thailand, being located in the heart of Asia, plays an important role in ASEAN connectivity, which is key for development of the Mekong Region. Thailand shares borders with Myanmar to the west and north, Laos to the northeast, Cambodia to the east, and Malaysia to the south. The country is divided geographically into six regions: the North, the Northeast, the West, the South, the East, and the Central Plain (Royal Institute of Thailand, 1982). Sunny and rainy tropical climate is prevalent throughout the whole country. The total population is currently about 67.2 million, with a population growth rate of 0.60 percent. Thai-speaking Buddhists make up about 95 percent of the population, and Thai is also the official language of the country. The size of the work force (in 2009) exceeds 39 million, with the majority of workers under 35 years of age. Each year about 800,000 people join this force (National Statistical Office, Bank of Thailand, and CIA World Fact, 2010).

Even though there are major cities in each region such as Chiang Mai, Songkhla, and Nakhon Ratchasima, and many provinces, Bangkok is the most important city since it is not only the national capital city and main city of the Central Plain but also the country's center of government, economic activity, communication, and education. With a population of around 11 million, Bangkok's per capita gross regional product accounts for more than 25 percent of the nation's gross domestic product (GDP). The city also plays a central role in transportation, communication, and business operation, as facilitated by its extensive transportation infrastructure. This includes the two international airports, Suvarnabhumi and Don Mueang; a major port; road networks; and the mass rapid transit systems known as the aboveground BTS Skytrain and the MRT underground train. As such, Bangkok ranks as one of the top 20 megacities in the world. Moreover, as government policies place great emphasis on private investment and provide full facilitation and support for investors, it is attractive for both local and foreign investors to operate their businesses in Bangkok and its surrounding provinces. In view of this, Bangkok is said to be one of the fastest-growing economic markets in the region. The map of Thailand and the major city of each region can be seen in Figure 1.

Even though substantial investment has been made in the transportation infrastructure – including the construction of expressways, roads and overpasses – in the past three decades, the inconvenient personal transportation and severe traffic problems in Bangkok persist while traffic management remains inefficient. Hence, the traffic problem is the main potential obstacle to development of the country.

Figure 1: Maps of Thailand and the Regional Major Cities



Source: Adapted from http://www.bangkok-hotel.ws; http://commons.wikimedia.org; http://www.mobot.org.

1. GREATER BANGKOK: HISTORY AND CURRENT SITUATION

1.1. Bangkok: Origin of the City

Bangkok was named the capital of Thailand in 1782. It was initially situated on the east bank of the Chao Phraya River with the name “Phra Nakhon,” while the west bank was the location of the old capital named “Thonburi.” Both Phra Nakhon and Thonburi were combined and stated as the capital city of Thailand in 1971 under the official name “Krung Thep Maha Nakhon,” which means the city of angles. The name “Bangkok” was used by foreigners and it became the official English name of the city, while the name “Krung Thep” is commonly used by Thai people.

1.1.1. Feature and Districts

Bangkok, with an area of 1,568.7 square kilometers, is located at the edge of the Chao Praya as the river heads toward the Gulf of Thailand about 30 kilometers south of the city center. The Chao Praya River basin, which comprises a series of plains and deltas, is the main geographical feature of the city. Bangkok borders five other provinces: Pathum Thani, Nonthaburi, Nakhon Pathom, Samut Prakan, and Samut Sakhon. Bangkok has 50 districts called “khet.” It is under the authority of the Bangkok Metropolitan Administration, which is the special administration zone of Thailand. An important landmark of Bangkok is the Victory Monument that has stood in the northeast of the city since 1941. Victory Monument, as a traffic circle, is a major intersection of three main city roads: Phahonyothin Road, Phaya Thai Road, and Ratchawithi Road. Many Bangkok Mass Transit Authority (BMTA) bus lines and public van lines stop around the monument’s traffic circle. This is also an expressway exit and a BTS Skytrain station. As

such, Victory Monument is one of Bangkok's centers of personal transportation.

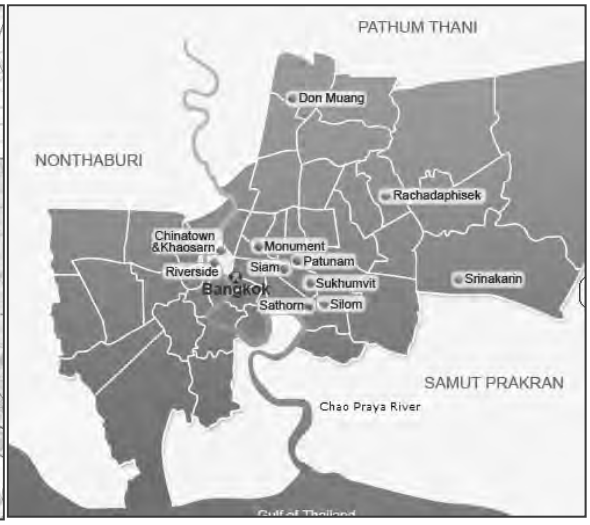
However, areas of Bangkok's central business district are located on Sukhumvit, Silom, Sathorn, Ploenchit, and Wireless roads. These areas are the most important business and financial centers of the city. There are many luxury hotels, offices, banks, financial firms, insurance companies, airline offices, restaurants, shopping arcades, department stores, entertainment establishments, export-import houses and high-end residential condominiums. The district has grown into a sprawling mass of skyscrapers and towering apartments. Housing has also expanded from the center of the city to the outlying vicinities in the five provinces that are adjacent to Bangkok. As the boundaries of Bangkok city and the five provinces are hardly determined, the whole area is usually perceived as one. The term "Greater Bangkok" is commonly used when referring to Bangkok and areas of the five adjacent provinces. Bangkok city and Greater Bangkok can be seen graphically in Figure 2.

Of the 1,568,737 square kilometers in total area, 29.64 percent is under commercial, industrial, and government use, 23.58 percent is for agriculture, and 23 percent for residential and housing. The remaining 23.78 percent is for other uses (www.bangkok.go.th). The total population in the Greater Bangkok area is about 11 million while the population in Bangkok city is currently about 6.8 million, with the labor force at 3.94 million. About 5.7 million are Bangkok residents while the rest commute from rural areas to work in the city and its surrounding areas. The population density of Bangkok is the highest, followed in order by those of Nonthaburi, Samut Prakan, Prathum Thani, Samut Sakhon, and Nakhon Pathom. Bangkok's population density is 3,643.88 inh/km2 while that of the entire Greater Bangkok area is 1,312.99 inh/km2. The detailed population density of Greater Bangkok is presented in Table 1.

Figure 2: Maps of Bangkok and Greater Bangkok

Greater Bangkok Area

Bangkok Metropolitan



Source: http://www.bangkok-hotel.ws; http://commons.wikimedia.org; http://www.mobot.org.

Table 1: Population Density in Greater Bangkok

Province	Area (km²)	Population (2008)	Pop. Density (Inh/km²)
Bangkok	1,568.737	6,355,144	3,643.88
Nonthaburi	622.30	1,060,320	1,703.87
Samut Prakan	1,004.50	1,152,107	1,146.95
Pathum Thani	1,525.90	937,224	614.21
Samut Sakhon	872.30	480,998	551.34
Nakhon Pathom	2,168.30	845,769	390.06
Total	7,761.50	11,971,000	1,312.99

Source: Department of Provincial Administration, Ministry of Interior, Royal Thai Government. As of August 16, 2010.

Due to the high population density and exorbitant land prices of the central business district, new housing projects are often located in the outskirts of Bangkok. This is generating substantial expansion of the Greater Bangkok area especially into Nonthaburi and Samut Prakan provinces.

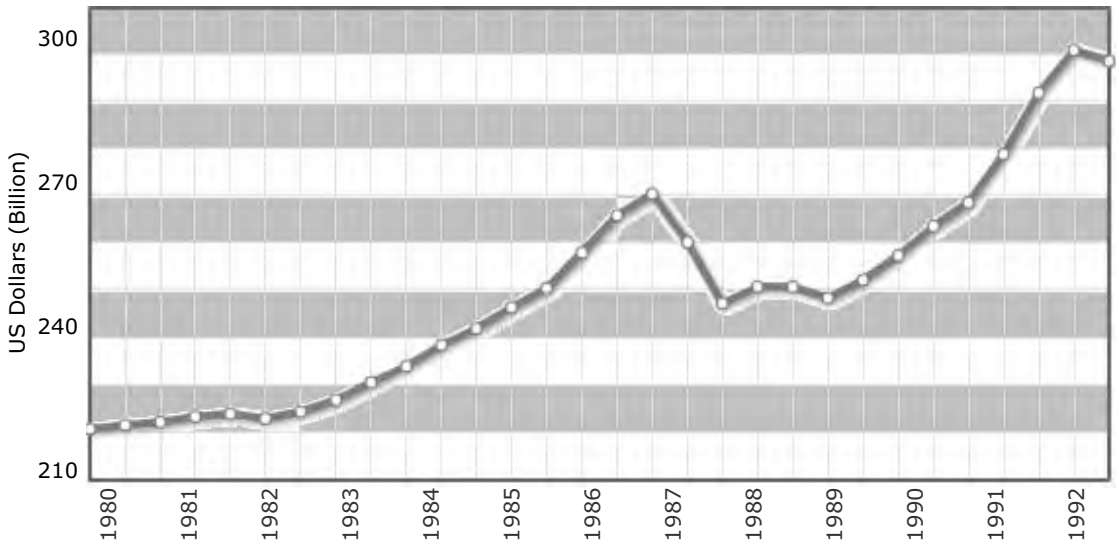
1.1.2. Gross Regional Product

Thailand is making the transition from an agricultural-based to an industrial-based economy. Industrialization has increased since the mid-1970s. Investment has been directed towards export-oriented activities and the services industries. Major exports include rice, textiles, footwear, fishery products, rubber, jewelry, cars, computers, and electrical appliances.

The most rapid economic expansion occurred from 1984 to 1994. Thailand's economic growth was temporary obstructed in 1997 by a critical economic crisis in the country. The economic situation continued to improve from 2001 and has recovered to the pre-crisis highs of 2006 (The Government Public Relations Department, 2006). Currently, the Thai economy continues to grow, after the GDP suffered negative growth of 2.52 percent in 2009 due to the world economic crisis. The GDP change is shown graphically in Figure 3.

The Thai GDP is usually categorized as agricultural and non-agricultural groups, prior to classification by industry type. Bangkok's gross regional product is proportional to the GDP of the whole country, and it accounts for 25 to 28 percent of Thailand's GDP. Bangkok's agriculture production is proportionately much less than that of the whole country. However, the per capita GDP of Bangkok is almost three times larger than the country's as a whole. The GDP classified by types of industry can

Figure 3: GDP at Current Market Prices in 1982-2009 (Billions US$)



Source: International Monetary Fund-2009 World Economic Outlook (http://www.imf.org).

Table 2: GDP at Current Market Prices (Billions US$)

Industry	2005		2008		2009	
	WHOLE	BKK	WHOLE	BKK	WHOLE	BKK
Agriculture	18.089	.066	32.064	.141	30.651	.164
Non-Agriculture	158.132	50.323	243.284	69.342	232.911	68.333
Gross Domestic Product (GDP)	176.221	50.389	275.349	69.483	263.562	68.497
GDP Per capita (US$)	2,707	7,429	4,142	10,135	3,939	9,977
Population (1,000 persons)	**65,099**	**6,782**	**66,482**	**6,856**	**66,903**	**6,866**

Notes: Average currency rate 1US$=40.25 Baht (2005); 32.96 Baht (2008); 34.34 (2009)
WHOLE refers the Whole kingdom; BKK refers to the Bangkok area.

Source: Office of the National Economic and Social Development Board, 2010
(http://www.nesdb.go.th).

be seen in detail in Appendix A. Table 2 shows a brief picture of the GDP of the whole Kingdom and that of the Bangkok area for 2005, 2008 and 2009.

The cost of living in Bangkok when compared to other countries of the region is higher in some categories and lower in the rest. For example, Bangkok's Consumer Price Index and grocery prices are 12.17 percent and 21.75 percent higher than in Ho Chi Min City, while Bangkok's restaurant prices, rental prices, and local purchasing power are 10.60 percent, 27.34 percent, and 137.06 percent lower in comparison (http://www.numbeo.com). The cost of living in Bangkok is lower than Singapore's and Tokyo's in all categories.

1.2. City Transportation

Currently, various types of city transportation can be seen in Bangkok. The road network is the main means of transportation, while mass rapid transit such as the BTS Skytrain and MRT underground train are alternatives.

1.2.1. Development of City Transportation

As the city is expanding and people who live in the outskirts have to work in the inner area of the city, the transportation is chaotic. Every business day, there is terrible rush-hour traffic congestion from 6-9 a.m. and 4-7 p.m. as commuters go to work and then return home. The large numbers of vehicles and the distance between housing and working areas cause extensive traffic problems. Bangkok's road system is inadequate. Throughout the city and its outskirts, the road network consists of very wide primary roads, medium-width roads, and small local side streets known as "soi." In previous decades, there were fewer public roads and limited traffic congestion. To reduce the

traffic problem, the first urban expressway was constructed and opened in 1981. The success of this first stage led to a series of expressway projects that went into service between 1993 and 1999. These urban and suburban expressways include the second-stage expressway, Don Mueang Toll Way, Ramintra-Atnarong Expressway, and Bangna-Bangpakong Expressway. The routes connect the first-stage expressway in the inner part of the city and end at the main roads to the north, west, south, and east in the outskirts of Bangkok. The Bangkok-Chonburi Highway, which is the expressway that links Bangkok to the Eastern Seaboard, was opened in 1993. In addition, many bridges crossing the busy road intersections have been constructed.

In the middle of 2010, the Kanchanaphisek Outer Ring Road that connects all outskirt areas was fully opened. With these six to eight lanes connecting around Bangkok and neighboring provinces, road travel from outskirt areas to the opposite sides of the city could be done without approaching the congested districts of Bangkok. This outer ring road is designed to facilitate both personal and freight transportation from industrial areas in Samut Prakarn, Ayuthaya, and other areas to Bangkok Port in Klong Toey and other parts of the country.

The types of the vehicles used in Thailand are various and depend on the area and socioeconomic status of the owners or passengers. The number of cars in Bangkok and the whole country are shown in Table 3.

Private cars are popular among residents of middle to high socioeconomic status in Greater Bangkok, as in all major cities and urban areas. Motorcycles are also popular in urban as well as rural areas. There are plenty of taxis and motorcycle taxis available for hire in Greater Bangkok. Motorcycle taxis are also found in the other large cities. Inter-city buses are available for long-distance travel between provinces. The number

of sedan cars in Bangkok is about 54 percent of those in the whole country, while the vans and pickups are only 20 percent of the national total. Therefore, it can be inferred that Bangkok residents most prefer private cars. The ratio of 2.19 million cars to 3.94 million workers in Bangkok confirms this. The most numerous vehicles in Bangkok are the more than 2 million private cars, the nearly 2.5 million motorcycles, and the 100,000 taxis and "tuk tuks," or small passenger-carrying pickup trucks.

Table 3: Number of Vehicle Registered in Thailand as of 31 December 2009

No.	Type of Vehicle	Whole Kingdom	Bangkok	
			Amount	% of the Whole kingdom
1	Sedan (Not more than 7 Passenger)	4,078,547	**2,190,150**	**54**
2	Microbus & Passenger Van	383,684	192,911	**50**
3	Van & Pick Up	**4,696,897**	960,645	20
4	Urban Taxi	90,999	90,005	**99**
5	Tuk Tuk	21,615	9,034	42
6	Motorcycle	**16,549,307**	**2,390,366**	14
7	Automobile Trailer	1,987	1,213	61
8	Public Motorcycle	**157,144**	**70,531**	45
9	Bus	127,553	34,695	27
10	Truck	791,414	114,570	14
Others		285,430	49,599	17
Grand Total		27,184,577	6,103,719	22

Notes: No. 1-8 are registered under Motor Vehicle Act.
No. 9-10 are registered under Land Transport Act.

Source: Transport Statistics Sub-Division, Planning Division, Department of Land Transport (2010).

Cars, pickups, and motorcycles are privately used on the road, while buses are the backbone of the public transportation system in Bangkok. Bus services are managed by the BMTA, which operates a fleet of 3,506 buses on 105 routes. Both air-conditioned and non-air-conditioned buses are provided. The BMTA also allows subcontractors to operate bus services on some routes. There are about 4,082 buses with 104 routes provided by subcontractors at present (www.bmta.co.th). The number of passengers riding buses fell from a peak of 3.1-4.0 million per day in 1995-1999 to 1.1-1.6 million daily (not including those passengers who use free government buses) after the opening of the BTS Skytrain.

Air-conditioned vans are another public transportation means that provide point-to-point service. They started illegally at first after the 1997 financial crisis. As the number of such vans grew, this service became legally regulated and controlled by the BMTA in 2002. Apart from city buses, inter-city bus services are also operated from three terminals in suburban Bangkok. A terminal in the north of Bangkok (Bang Su) serves the country's northern and northeastern regions, the one in the west of the city provides trips to Thailand's southern and western regions, and the last terminal at the east (Soi Ekkamai, Sukhumvit) serves travelers to the country's eastern region. Inter-city bus operations are controlled by a state-enterprise, namely The Transport Co., Ltd. Besides that, water transport services operated in the Chao Phraya River and two major canals are also provided. However, due to the limitation of water routes, this caters to those who wish to travel to the serviced areas.

To reduce city road traffic, mass rapid transit was developed. The first phase of the BTS Skytrain went into service in December 1999 and the MRT underground train began operation in July 2004. The MRT connects the northern train station of Bang

Sue to the Hua Lamphong railway station near the city center. It also connects with three BTS stations at Mo Chit, Asok, and Sala Daeng. The first phases of both types of mass rapid transit were limited, covering only the center of Bangkok city. However, five expansion projects named the Red, Dark & Light Green, Purple, Blue, and Purple lines are planned. These projects involve a distance of 141 kilometers from the city center to the outskirts of Bangkok. The BTS Skytrain is operated by Bangkok Mass Transit System Public Company Limited (BTSC), with issued capital of 21,036 million baht and total registered capital of 10,058 million baht. Recently, the Bangkok Metropolitan Administrator (BMA) launched a bus rapid transit (BRT) service in an attempt to provide a more economical alternative for city transportation. The BRT service is now operated as a pilot project. The first BRT line is expected to be fully operated in January 2011.

1.2.2. BTS Skytrain

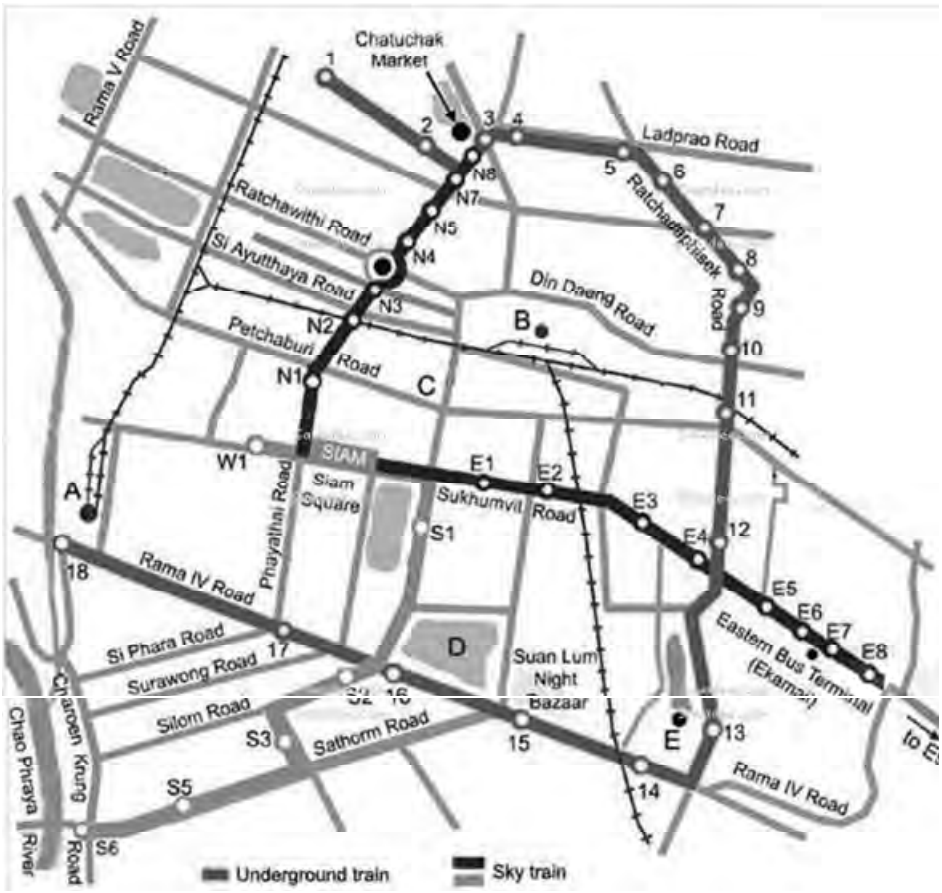
The overhead tracks of the BTS Skytrain were developed to help alleviate traffic on Bangkok's roads. The system covers 22.9 kilometers, serves 25 stations on two lines, and carries approximately 450,000 passengers per day. Each train can hold over 1,000 passengers. The trains run daily between 6 a.m. and 12 midnight with frequent service throughout the day. The frequency of trips increases during rush hour. The fare is based on distance traveled starting from US$0.50.

Most of the BTS infrastructure was designed to be above ground in order to avoid cluttering up existing street-level facilities and contributing to further traffic congestion. The elevated track and most stations have a single-column support structure, and each station is 150 meters in length (www.bts.co.th). There are two types of stations: side

and center platform. The side-platform stations have two platforms at each side with two train tracks running through the center. The center-platform stations are designed for the interchange stations. There is one large platform in the center with tracks at each side. There are three levels in each BTS station: street, concourse, and platform. Street level is the entry point to the station. Stairways, escalators, and elevators (available in some stations only) lead passengers up to the station concourse. The concourse is divided into a public area and the internal area. The public area is for those who have not yet entered the BTS system through the ticket gate. Automatic ticket machines, a ticket office, and the ticket gates, small shops, cafes, banking services, and ATMs are available in this area. The internal station area leads from the ticket gates to the platform using stairways and escalators. The platform is located at the highest level of each station, except for the Siam interchange station, which has two platform levels to facilitate passenger transfers between the Sukhumvit and Silom lines. Currently, those are the two routes: the Sukhumvit Line and the Silom Line. They cover much of the central city and its many commercial, residential and tourist areas, with extensions planned to outlying areas. The details of the routing and the stations can be seen in Figure 4.

The Sukhumvit Line travels from Mo Chit Station at the north of Bangkok to Bangna Station near Samut Prakarn province. The Silom Line starts at National Stadium in the middle of the city and goes to Wong Wien Yai in the Thonburi area. Various types of tickets are available. Passengers can purchase ones suitable for their trips. Examples include the Single Journey Ticket, One-Day Pass, and Smartpass card for adults and students.

Figure 4: BTS and MRT Map



Source: www.sawadee.com.

1.2.3. MRT Underground Train

Bangkok's underground train system, operated by the Mass Rapid Transit Authority of Thailand (MRTA), opened in April 2004. The first route, called the Blue Line, provides service at 18 stations traveling 21 kilometers from the Hua Lamphong railway station near the city center to the Bang Sue northern train station. Its carrying capacity is 50,000 people per hour or 600,000 passengers per day, with speeds up to 80 kilometer per hour. The MRT stations' entrances are raised about 1 meter above ground

level to prevent flooding down into the stations due to Bangkok's low-lying-plain geographical structure. Built-in floodgates can also be used to stop floodwater from inundating the system. Lifts and ramps are found at all stations to facilitate passengers who use wheelchairs. The routing can be seen in Figure 4.

The MRT underground train together with the BTS Skytrain can provide a mass rapid transit core network of only 42 kilometers, which is considered inadequate for improving traffic circulation in Bangkok. Therefore, the Thai government made a resolution in 2004 to extend the mass rapid transit network. Three lines totaling 91 kilometers are emphasized in the first phase. Construction on the MRT Purple Line started in 2010. Its route covers 40 kilometers from Bang Yai to Rat Burana. The Blue Line, which travels 13 kilometers from Bang Sue to Bang Phat, will form a lariat-shaped loop around the city. The last one, the Orange Line, goes 37.5 kilometers from Din Daeng to Taling Chan.

1.2.4. Traffic Problems in Bangkok

Even though there are currently a lot of alternatives, the personal transportation problems still exist. The routes not covered by the BTS Skytrain and the MRT underground train, along with the unavailability of parking at the stations, inhibit most private car owners from giving up driving to use public transportation. The BTS Skytrain and MRT underground train can facilitate those who use BMTA buses and other forms of public transportation more easily than private car drivers. As discussed previously, the number of passengers who use BMTA buses reduced significantly from as much as 4 million to as little as 1 million per day. However, the use of cars, pickups, and motorcycles in Bangkok instead has grown over time. The large number of vehicles

on the roads causes not only economic and energy losses due to traffic congestion but also lessens the quality of life through time lost traveling, noise and air pollution, and general stress from bad driving behavior and frustrating delays.

The negative image of Bangkok's traffic congestion may affect foreign investors' decisions on whether to conduct businesses in Thailand. Traffic problems in Bangkok are a result of the transportation infrastructure being insufficient to serve the needs of commuters. More roads may help solve the problem but only on a limited level. To solve the problem effectively and permanently, the specific causes of traffic congestion should be scrutinized. The transportation infrastructure itself should be the initial focus, while the social values, culture, and lifestyles of the Bangkok residents should be considered as additional causes of the traffic problem. As for the transportation infrastructure, new roads and the expansion of existing roads are needed when considering the current number of vehicles. However, the construction of tunnels or bridges at road intersections should also be considered, since excessive traffic congestion is usually seen at the intersections of roads.

Apart from that, the mass rapid transit network should be expanded to cover the whole of the Greater Bangkok area. The limited routes of mass transportation would not change the lifestyles of people who usually drive in Bangkok. Using multiple modes of transport in one trip, such as riding on BMTA buses and then the BTS Skytrain and then walking, is inconvenient and would not persuade Bangkok residents to switch from driving to mass transportation. Even though the Thai government has five projects to expand the mass rapid transit network a longer distance from the city center to the outskirts of Bangkok, these are still insufficient since the extended network would not cover all parts of the city. Moreover, parking space should be

provided at each station and a “park & ride” policy should be implemented and promoted. As this mega project requires a huge monetary investment, it seems impossible that it would be accomplished in the near future, even though the mass rapid transit network is the most suitable and efficient mode of moving large numbers of people with minimal impact on the environment.

The excessive personal transportation demand is in part a result of the social values, culture, and lifestyles of Bangkok residents. As the city land prices are expensive, i.e. up to US$12,500 per square meter in the Silom business district, it is impossible for ordinary workers to own land downtown. The prices of condominiums in the city are also too high for the regular work force. Therefore, workers have no choice but to buy homes in the outskirts where land prices are cheaper at around US$100 to US$300 per square meter. As such, most Bangkok area residents live in the outskirts of the city or in the neighboring provinces. Even though the residential area is broadening out to the fringes of Bangkok, public functions are still situated in the city. Government agencies, major enterprises, the first-class shopping malls, and well-known universities and schools are located the inner part of the city. Therefore, most Bangkok area residents travel from their homes in the outskirts into the inner city for a range of purposes.

The groups of people who have the largest demand in personal transportation are those who send their children to well-known schools in the city and those who work in the central business district. These people have to travel back and forth between their homes in the outskirts and the inner city every day. As working hours and school hours are in the daytime, traffic congestion is a severe problem during the rush-hour periods of 6-9 a.m. and 4-7 p.m. In some business districts and the center of the city, traffic is a

problem all day long.

The fact that traffic problems are less intense during the school semester breaks is good evidence of the large demand for traveling from homes to schools. Even though there are many local schools in the outskirts, those are not the most popular schools. The well-known schools are valued for their reputations and quality, especially by parents of the middle to high socioeconomic level. However, most of the well-known schools are located in the inner city. As most parents drive their children to school on their own, with school bus services being less popular, tremendous numbers of private cars are seen on the roads during rush hour. The traffic problems in Bangkok would significantly diminish if children were sent to schools near their homes. But to achieve this, the overall educational system must be reformed. The same educational quality must be provided by all schools. At such time, the popularity of sending children to the well-known schools would decrease.

1.3. Country Transportation

The big picture of the road system, rail system, and sea and air transportation are provided in this section.

1.3.1. Road System

While there are various transport means in Thailand and Bangkok, the roads seem to be the dominant means in all areas for both freight and passengers. The 4,000-kilometer-long primary road system comprises four national roads that link the North to the South, the East to the West: Route 1 to the north, namely Phahonyothin Road; Route 2 to the northeast, namely Mittraphap Road; Route 3 to the east, namely

Sukhumvit Road; and Route 4 to the south, namely Phetkasem Road. All are centered in Bangkok except Route 2, which starts at Saraburi. The road networks that lead to all areas in Thailand are more than 60,000 kilometers long and consist of special highways or so-called motorways, rural highways, local highways, and concession highways.

As Bangkok is expanding and people who live in the outskirts have to work in the inner area of the city, the city transportation is chaotic. Terrible traffic congestion is usually seen in rush hour both in the morning and in the evening. Most Bangkok residents who live in the outskirts of the city have to travel far to their workplaces in the morning and back home in the evening. The large number of vehicles and the distance between housing and working areas cause extensive traffic problems. Bangkok's road system is inadequate. The extensive city road traffic can be seen in all areas of Bangkok and its outlying vicinities especially in rush hour from 6-9 a.m. and 4-7 p.m. every business day. With such excessive congestion, a number of traffic accidents occur each year. Table 4 shows the traffic accidents in 2009. The number of cars that are involved in the accidents is also presented.

There were more than 80,000 accidents in 2009, half of them in Bangkok. In 2005, an estimated 72,243 cars, 7,230 trucks, and 52,046 motorcycles were involved in accidents in the whole of the country. Out of this, in Bangkok about 60 percent of cars, 45 percent of trucks, and 40 percent of motorcycles were involved in the accidents.

Table 4: Number of Traffic Accidents in 2009

Type of Vehicle	Whole Kingdom	Bangkok	
		Amount	% of the Whole kingdom
Number of accidents (times)	84,188	41,848	49.71
Cars, Pick ups, Taxis, Buses	72,243	42,926	59.42
Trucks	7,230	3,257	45.05
Motorcycles	52,046	21,082	40.51
Bicycle, Tricycle, Passengers, & Others	7,746	2,835	36.60

Source: Royal Thai Police, 2010 (http://statistic.ftp.police.go.th).

1.3.2. Rail System

Both people and goods can also be transported by train. The trains run regularly from Bangkok to the outer surrounding areas as well as to farther destinations north, south, east, and west. The State Railway of Thailand (SRT) was established in 1868 and began operating officially in 1910. At present, it has a total route length of 4,041 kilometers on three lines that intersect in Bangkok. The system offers affordable transportation from the Malaysian border to the northernmost provinces and Kanchanaburi in the west. Today, the SRT is the largest state enterprise of Thailand in terms of manpower, with a total of 26,412 employees, among whom 10,354 are officers and 16,058 technical staff and skilled laborers. The main station is Hua Lamphong or Krungthep Station, the terminus of all routes in Bangkok. ICD Ladkrabang is the main freight terminal. The SRT also operates international service to Butterworth in Penang, Malaysia. It connects with Malaysia's national system, providing direct linkage down to Singapore. A railway link across the Mekong is under construction at Nong Khai. A link across the Friendship

Bridge to Tha Na Laeng near Vientiane in Laos opened in March 2009. Moreover, the SRT plans to reopen rail links with Cambodia via Poipet from the railhead at Aranyaprathet. However, railway connections to Myanmar (Burma), notably the infamous Death Railway, are now defunct. The rail network is illustrated in Figure 5.

1.3.3. Sea and Air Transportation

In addition to road, rail, and mass rapid transportation, there are other means of transport, namely by air and by sea. There are two airports located in the Greater Bangkok area: Don Mueang Airport for domestic and chartered flights and Suvanabhumi International Airport for international and domestic flights. Both airports also serve airfreight domestically and internationally. There is also a seaport in Bangkok, known as Bangkok Port or Klong Toey Port, located on the Chao Phraya River in the south of the city. With a depth of 8.5 meters and a length of 1,500 meters, it can serve sea freight transportation. Even though the port cannot handle super-size or mega vessels, its location makes it very competitive in terms of convenience in transferring goods to the city, since it is only 15 kilometers from the city center.

Figure 5: **Thai Railway Network**

Source: State Railway of Thailand.

1.4. Investment Situation

The Thai government has a policy to stimulate foreign investment and economic activity through several mega projects. The number of wholly owned foreign firms in Thailand stood at 9,359 in 2009 (http://www.bangkokcompanies.com). There are also a lot of joint ventures and other kinds of foreign investments in Thailand. The current investors are from many countries, especially Japan, the United States, China, Singapore, and countries in Europe. The Thai government has emphasized investment in six sectors that are considered key to the country's development. These are agriculture and agro-industry, alternative energy, automotives, electronics and ICT, fashion, and value-added services such as entertainment, healthcare and tourism (http://www.boi.go.th/).

One attractive factor that encourages foreign investment is Thailand's inexpensive wage rate, which currently varies from US$4.72 to US$6.44 per day. Even though the wage rate is not the lowest among all countries in the region, it is one of the most cost-efficient in the world. Moreover, the Thai work force has earned a reputation as being qualified, efficient, diligent, adaptable, and friendly. The minimum wage rates vary in the different provinces and are based on the living index of each area. The details of the minimum wage rate in the Greater Bangkok area are presented in Table 5. The minimum wage rates of all provinces can be seen in Appendix B.

To promote foreign investment, the Thai government has a policy to support and assist investors in terms of resources and facilities. The Industrial Estate Authority of Thailand (I-EA-T) and the Office of the Board of Investment (BOI) were established to support both Thai and foreign entrepreneurs and investors. A number of industrial estates have been developed. Both tax and non-tax privileges as well as one-stop service are provided in the industrial estates.

Table 5: Minimum Wage Rate in Greater Bangkok Area (as of April 2010)

Area (Province)	Wage rate (per day)	
	US$	Baht
Bangkok, Samut Prakan	6.44	206
Nonthaburi, Nakhon Pathom, Prathum Thani,Samut Sakhon	6.41	205
Chon Buri	5.75	184
Phra Nakhon Si Ayutthaya	5.66	181
Chachoengsao	5.63	180
Rayong	5.56	178

Source: Department of Labor Protection and Welfare, 2010 (*http://www.labour.go.th/*).

2. INDUSTRIAL ESTATES IN THAILAND

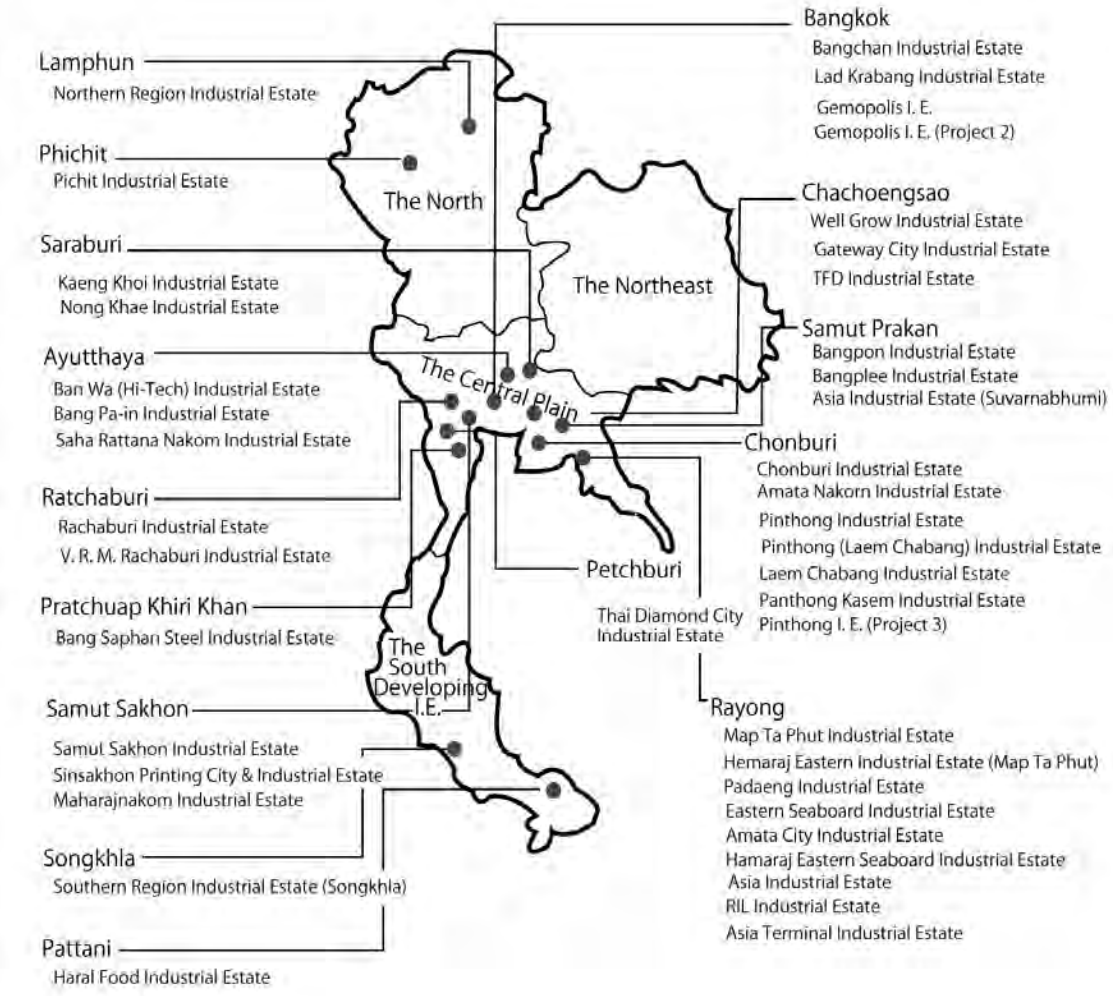
2.1. Characteristics of the Industrial Estates in Thailand

Industrial estate zones are categorized into two types: General Industrial Zone and I-EA-T Free Zone (Table 6). General Industrial Zone is reserved for the location of industries manufacturing for domestic and/or export consumption. I-EA-T Free Zone, previously called Export Processing Zone, is reserved for the location of industries manufacturing for export only. Investments in the Free Zone would obtain privileges such as exemptions or reductions on the import/export tax, value-added tax, and excise tax on machinery, equipment, components, raw materials, and supplies used for the production of goods. Supplies taken into a so-called Free Processing Zone are entitled to additional tax breaks in accordance with the appropriate legislation. General privileges such as the right to own land, bring in technicians, experts, and their family members, and the ability to remit foreign currency to home countries could also be gained. More details on the privileges obtained from the General Industrial Zone and the

I-EA-T Free Zone can be seen in Appendix C.

Most industrial estates are located in areas that are accessible to seaports and airports. Generally, they are developed as industrial towns or industrial parks that provide sufficient infrastructure for industrial operations such as electricity, water supply, flood protection, wastewater treatment, solid waste disposal, and other facilities needed for investors and workers. By law, each industrial estate must be larger than 80 hectares (500 rai) with 60-70 percent allocated to factories. Industrial property comprises the sale of lands and the rental of the land or ready-built factories. Most industrial estates are either developed solely the I-EA-T or jointly with the I-EA-T. However, some are entirely developed by the private sector. Industrial estates developed by private sector concerns are usually called “industrial parks.” Industrial estates can be categorized by their locations into three zones. Zone 1 covers four provinces in the Greater Bangkok area, which are Bangkok, Samut Prakarn, Pathumthani, and Samut Sakorn. Zone 2 includes six provinces around the Greater Bangkok area, namely Ayutthaya, Saraburi, Ratchaburi, Chachoengsao, Chonburi, and Rayong. Zone 3 is composed of industrial estates and industrial parks located in Singburi, Prachin Buri, Khon Kaen, Nakhon Ratchasima, Lamphun, Pichit, Pattani, and Songkhla (BOI, 2010). The main focus has been on Zone 1 and some provinces in Zone 2 as these are in the Greater Bangkok area and surrounding provinces. The locations of provinces where industrial estates are located can be seen in Figure 6.

Figure 6: Industrial Estates in Thailand



Note: Details of industrial estates in Greater Bangkok area are shown in Table 6.
Source: Drawn by author and editor in accordance with IEAT, 2010 (*www.ieat.go.th*).

Currently, there are 34 industrial estates owned and managed by the I-EA-T located in 15 provinces countrywide. The overall area of industrial estates is 22,134.24 hectares (138,339 rai). The remaining area for sales or rental totals 2,360 hectares (14,750 rai) (IEAT, 2010).

Table 6: Industrial Estates in the Greater Bangkok area and Surrounding Provinces (Continues)

Name	Type	Year of Completion	Industrial Zone (ha)*	Available Area (ha)*	Selling/ rental Price (US$/m^2)	Fee (US$)				Min Wage (US$/day)
						Maintenance (per1,600 m^2/)	Water (per m^3)	Electricity (per m^3)	Waste water (per m^3)	
BANGKOK										
Bang Chan Industrial Estate 5	GIZ	1989	108.320	-	-	25.00	0.56-0.66	MEA		6.44
Banthongkasem Industrial Estate	GIZ	2010	128.000	-	62.84	-	-			
Gemopolis Industrial Estate 1, 2, 3, 6	GIZ	1990	27.200	-	-	62.50	0.59	0.167	0.334	
	Free Zone	2009	0.352	0.352	8,985/unit *11.5/ m^2**	0.78 /m^2	0.63			
Jong Stit Industrial Park 2	GIZ	1995	240.000	-	-	-	-	MEA		
Lat Krabang Industrial Estate 5	GIZ	1989	196.480	196.480	146.62	28.13	0.56-0.66	MEA		
	Free Zone	1989	109.280	109.280	-	34.38	0.56-0.66			
SAMUT PRAKARN										
Bangplee Industrial Estate 5	GIZ	1988	160.64	160.64	-	25.00	-	MEA		6.44
Bangpoo Industrial Estate 5	GIZ	1990	585.76		75.40			MEA		
	Free Zone	1990	60.48		83.78 – 94.26			MEA		
	Rental Fac.				5.63			MEA		
PATHUMTHANI										
Bangkadi Industrial Park 2	GIZ	1987	195.52	-	-	-	0.22	MEA		6.41
Navanakorn Industrial Zone 2, 6	GIZ		1,037.60	52.32	107.42	18.75	0.56-0.94	MEA		
	Free Zone		21.92	6.13-14.90	87.89	37.50	0.56-0.94	MEA		
Thailand Science Park	GIZ	2010	32.00	26.56		-	0.2	MEA		
	Rental Fac.				6.25			MEA		

Notes: * Gemopolis Industrial Estate provides 5-storyCommercial building (450 m^2) with the selling price of 8,985 US$/unit and Showroom Rental at 11.5US$/ m^2.

** Maintenance cost is charged in "rai" which is a Thai measurement scale; 1 rai =1,600 m^2.

Table 6: Industrial Estates in the Greater Bangkok area and Surrounding Provinces (Continued)

Name	Type	Year of Completion	Industrial Zone (ha)*	Available Area (ha)*	Selling/ rental Price (US$/m^2)	Fee (US$)				Min Wage (US$/day)
						Maintenance (per1,600 m$^{2/}$)	Water (per m^3)	Electricity (per m^3)	Waste water (per m^3)	
SAMUT SAKORN										
Maharajnakorn Industrial Estate	(under construction)		22.3136							6.41
Samut Sakhon Industrial Estate1	GIZ		166.5600	66.41	21.88	0.5625	PEA	0.37		
Sinsakhon Printing City and Industrial Estate Phase I	GIZ		95.2000	78.13			PEA	0.23		
Phase II			595.0000	78.13			PEA	0.23		
Samut Sakhon Industrial Estate1	GIZ		1,041.000	66.41	21.88	18.000	PEA	0.37		
AYUTTHAYA										
Bangpa-In Industrial Estate	GIZ	1989	187.52	2.88	83.01	21.88	0.70	PEA	0.45	5.66
1, 2, 3, 4	EPZ	1989	26.56	1.6	83.01	25.00	0.70	PEA		
	GIZ	2000	289.60	-	58.59	21.88	0.50	PEA	0.45	
Hi-Tech Industrial Estate 1-6	EPZ	2000	98.24	-	68.36	28.13	0.50	PEA		
	Free Zone	2003	38.40	-	68.36	28.13	0.50	PEA		
	GIZ	1989	1900.859	831.584	66.41	25.00	0.31	PEA		
Rojana Ayutthaya 2, 3, 4, 6	Free Zone		28.80	28.8	70.31	28.13	0.31	PEA		
	Rental Fac.		34 units	29 units				PEA		
Saha Rattana Nakorn 1	GIZ	1994	138.72	66.016	68.36	21.88	0.44	PEA	0.27	
CHACHOENGSAO										
304 Industrial Park 2 2, 3, 6	GIZ	2008	160.00	96.00	31.25	31.25	0.56	PEA		5.63
	Free Zone	2008	32.00	24.00	42.97	46.88	0.56	PEA		
Gateway City Industrial Estate 1,2,3	GIZ	1989	520.16	71.20	46.88	18.75	0.34	PEA	Up to	
	Free Zone	1989	68.96	19.04	50.78	18.75	0.34	PEA	0.29*	
TFD Industrial Estate		2007		-	117.19			PEA		
Wellgrow Industrial Estate1,2	GIZ	2002	560 ha.	22.40	117.19 -146.48	21.88	0.54	PEA	0.06$	

Table 6: Industrial Estates in the Greater Bangkok area and Surrounding Provinces (Continued)

Name	Type	Year of Completion	Industrial Zone (ha)*	Available Area (ha)*	Selling/ rental Price (US$/m^2)	Fee (US$)				Min Wage (US$/day)
						Maintenance (per1,600 m$^{2/}$)	Water (per m^3)	Electricity (per m^3)	Waste water (per m^3)	
CHON BURI										
Amata Nakorn Industrial Estate1,2,4	GIZ		2,400.00	-		21.88	0.44	PEA	Up to 0.8$*	5.75
	Free Zone		73.60	-		28.13	6.25-6.88	PEA		
	Rental Fac.		6 units	-				PEA		
Eastern Industrial Estate (Map Ta Phut) (Hemaraj EIE) 1, 2, 3	GIZ		421.12	29.76	87.890	31.25	0.58	PEA		
Hemaraj Chonburi Industrial Estate (Hemaraj CIE) 1, 2, 3, 6	GIZ		381.92	86.56	41.020	26.56	0.59	PEA		
	Free Zone		73.60	20.48	42.970	26.56	0.59	PEA		
	Rental Fac.		7 units	1 unit	6.093			PEA		
Laem Chabang Industrial Estate 1,2,3	GIZ (rent)	1993	291.84		3.120	31.25	0.55	PEA		
	Free Zone (rent)		156.64		3.900	37.50	0.55	PEA		
Nongbon Garden Industrial Zone4	Free Zone		38.40	-	35.160	-	0.69	PEA		
Pinthong Industrial Estate (Laem Chabang) 1, 2, 3, 4	GIZ	2005	112.64	24.00	46.880	31.25	0.54	PEA		
	Rental Fac.	2008	20 units	3 units	4.380			PEA		
Saha Group Industrial Sriracha 2	GIZ	1977	153.60	32.00	97.660	15.00	0.32-0.47	PEA		
	Rental Fac.	1990	49 units	4 units	4.690			PEA		
RAYONG										
Amata City Industrial Estate 1,2	GIZ	1999	1,352.96	320.00	44.92	21.88	0.44	PEA		5.56
	Free Zone		37.92	-	50.78	28.13	0.44	PEA		
Asia Industrial Estate 1, 2	GIZ	2004	504.00	34.40	93.75	31.25	0.39	PEA		

Table 6: Industrial Estates in the Greater Bangkok Area and Surrounding Provinces (Continued)

Name	Type	Year of Completion	Industrial Zone (ha)*	Available Area (ha)*	Selling/ rental Price (US$/m^2)	Fee (US$)				Min Wage (US$/day)
						Maintenance (per1,600 m$^{2/}$)	Water (per m^3)	Electricity (per m^3)	Waste water (per m^3)	
RAYONG										
Eastern Seaboard Industrial Estate (ESIE) 1, 2, 3, 6	GIZ		977.76	245.60	48.83	31.25	0.59	PEA		5.56
	Free Zone		62.56	8.00	48.83	31.25	0.59	PEA		
	Rental Fac.		45 units	9 units	*5.78-6.09*			PEA		
GK Land Industrial Park 2, 4	GIZ		103.04	33.92	35.16-44.92	25.00	-	PEA		
Hemaraj Eastern Seaboard Industrial Estate (Hemaraj ESIE) 1, 2, 3, 6	GIZ		953.60	823.84	48.83	31.25	0.59	PEA		
	Free Zone		111.84	197.04	48.83	31.25	0.59	PEA		
Map Ta Phut Industrial Estate 4,5	GIZ	1989	1134.72	-	-	34.38	0.50	PEA		
Padaeng Industrial Estate 1	GIZ	1995	86.40	-	62.5	28.13	0.55	PEA		
Rayong Industrial Land (Rayong IL) 2, 4	GIZ		446.40	280.32	39.06	28.13	0.49	PEA		
Rojana Industrial Park, Rayong2-4, 6	GIZ		400.00	191.52	39.06	25.00	0.31	PEA		
Siam Eastern Industrial Park Co., Ltd. 2	GIZ	1993	220.16	31.84	48.83	28.13	0.50	PEA		
SSP Industrial Park Rayong 2	GIZ	1996	336.00	89.60	-	-	0.30	PEA		

Notes: *1)* Industrial Estates are developed and managed by the Industrial Estate Authority of Thailand (IEAT).
2) Industrial Zones are under the Ministry of Industry (MOI).
3) Industrial Parks are established entirely by the private sector.
4) Rental Fac. refers to Factory for rent;
5) IEAT stands for the Industrial Estate Authority of Thailand.
6) MEA stands for Metropolitan electricity authority; electricity charge is the normal rate charged by PEA.
7) PEA stands for Provincial electricity authority; electricity charge is the normal rate charged by PEA.

* refers to progressive rate; The price shown is the highest rate charge
Source: Adapted from IEAT, 2010 (www.ieat.go.th).

2.2. Differences among Industrial Estates

The industrial estates can be categorized by several criteria, including location, specification, and size. The advantages and disadvantages are discussed in this section.

2.2.1. Differences among Industrial Estates by Location

The three groups of industrial estates can also be categorized by location. Each group has different characteristics, as well as pros and cons. The first group consists of those industrial estates located in Bangkok, Samut Prakarn, and Chachoengsao. These are located in or very near Bangkok city. As such, transportation and communication between the industrial estates and the city center, Bangkok Port, and both airports are easily done. However, these industrial estates suffer from traffic problems just like the people who live in the Bangkok area, even when located in the outlying vicinities.

The second group comprises industrial estates located in Ayutthaya. The short distance for these estates to Bangkok city (65 kilometers) is an advantage for them. The distances between the industrial estates and important destinations are shown in Table 7.

Table 7: Distance between Industrial Estates and Some Important Destinations

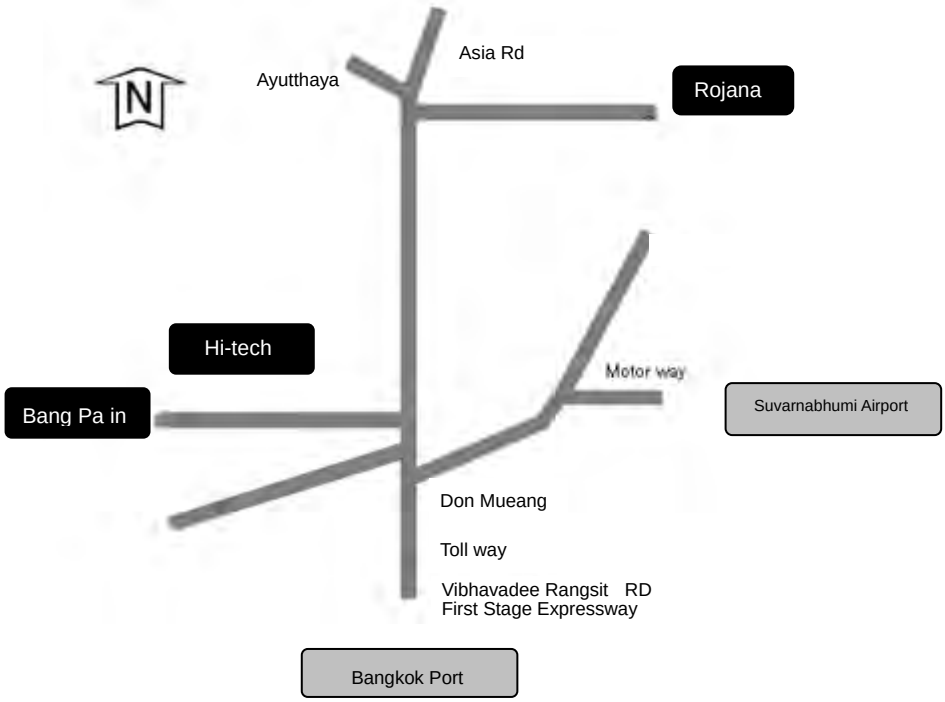
Destinations (Point to Point: Km)	Location of the Industrial Estates			
	Ayutthaya	Chachoengsao	Chonburi	Rayong
Bangkok (Central)	65	82	57	117
Laem Chabang Sea Port	197	85	46	30
Map Ta Phut Sea Port	270	130	-	51
Bangkok Port (Klong Toey)	75	107	-	-
Suvarnabhumi Airport	75	50	42	92
Don Mueang Airport	26	120	85	137

Source: Adapted from IEAT, 2010 (www.ieat.go.th) and www.hemaraj.com.

The distances from the industrial estates to seaports and airports are all less than 100 kilometers. For example, it is 26 kilometers to Don Meuang Airport, 75 kilometers to Bangkok Port and 75 kilometers to Suvarnabhumi International Airport. Freight can be transported straight from the industrial estates in Ayutthaya to Don Meuang Airport by using the Don Mueang Toll Way. The same route can be used to transport to Bangkok Port by just connecting to the First Stage Expressway that leads directly to the seaport at Klong Toey. As the routes are all expressways, transportation can be done at any time in the day without experiencing traffic problems, except during rush hour when even the expressway have congestion. When the destination is Suvarnbhumi International Airport, the outer ring road can be utilized. With six to eight lanes along the way, any traffic problems are not critical. Traffic congestion is seen at the tollbooths only during rush hour. The transportation routes are shown graphically in Figure 7.

The last group consists of the industrial estates in Chonburi and Rayong in the country's Eastern Seaboard area. There is sufficient infrastructure and plenty of resources there since this area is appointed as the national major industrial zone. There are two deep-sea ports, Laem Chabang and Map Ta Phut, to serve all import-export tasks. Customs houses and one-stop service are available at the seaports. The air transportation is also convenient since the distance to Suvarnabhumi International Airport is 42 kilometers from Chonburi and 92 kilometers from Rayong. As such, the industrial estates in this area are excellent places in which to invest.

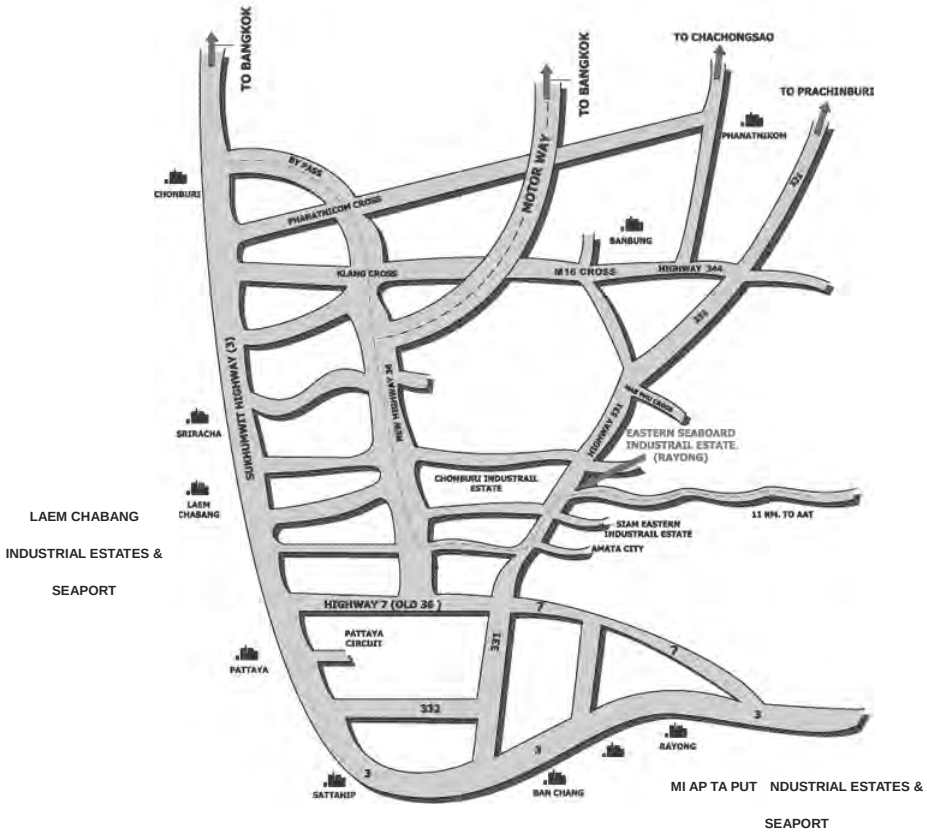
Figure 7: Autthaya Industrial Estates and their Important Destinations



Source: Adapted from www.attc-hitech.com

Regarding transportation, many roads were developed and constructed to facilitate freight movement within the region, including Sukhumvit Highway (No. 3), the Motorway (No. 7), the Bypass (No. 36), and many local and rural highways that connect these roads together. Traffic problems are rare since the number of vehicles is much lower than in urban areas. Moreover, the main highways have four to eight lanes, which is sufficient to support transportation to and from the industrial estates. The transportation routes are shown graphically in Figure 8.

Figure 8: Chon Buri & Rayong Industrial Estates and their Important Destinations



Source: Adapted from www.autoalliance.co.th.

2.2.2. Differences among Industrial Estates by Size

As regulated by law, each industrial estate must be larger than 80 hectares (500 rai). There are no small industrial estates, as only medium and large ones exist. Full facilities are provided in the large industrial estates such as the Rojana Industrial Parks (Ayutthaya and Rayong), the Map Ta Put, Laem Chabang, Hemaraj, and Amata Industrial Estates (Chonburi and Rayong), the Navanakorn Industrial Zone (Pathumthani), and the Bangpoo Industrial Estate (Samut Prakarn). Mostly, basic infrastructures such as electricity and water are provided by national state enterprises such as the Provincial Electricity Authority and the Provincial Waterworks Authority. The charge rates are similar throughout the country in Table 8 and 9.

Wastewater treatment systems are different between large and medium industrial estates. All large estates have sufficient wastewater treatment systems to serve all customers, while only some medium-size estates can accommodate this. Other facilities are different across estates. The charge for wastewater varies from US$0.20 to US$0.80 per cubic meter and the maintenance fee ranges from US$0.05 to US$0.80 per cubic meter.

Two very large industrial estates, Laem Chabang and Map Ta Phut, enjoy a competitive advantage over others since each has a deep-sea port next to the industrial zone. As such, the freight transportation cost would be low. Business operators, especially those in heavy industrial products, would gain an edge over others who operate their businesses further away.

Table 8: Electricity Fee

At Voltage of (KV)	**Demand Charge** (Baht/kW.)			**Energy Charge** (US$/kWh.)	**Total** (US$/kWh)
	Peak	Partial	Off Peak		
69 kV. and above	224.30	29.91	0	1.6660	0.05-7.06
22-33 kV.	285.05	58.88	0	1.7034	0.05-8.96
less than 22 kV.	332.71	68.22	0	1.7314	0.05-10.45

Notes: Service Charge =7.13 US$/Month;

Peak: 06.30PM - 09.30PM everyday;

Partial: 08.00AM - 06.30PM only the excess demand over Peak Recorded On Peak period;

Off Peak: 09.30PM - 08.00AM everyday.

Source: www.pea.or.th.

Table 9: Water Tariff

Water Volume (m^3)	**Areas**	
	Laem Chabang (US$)	**Other Area (US$)**
0-10	0.52	0.39
11-20	0.61	0.48
21-30	0.70	0.58
31-50	0.80	0.67
51-1000	0.88	0.76
>3000	0.86	0.73

Source: www.pwa.co.th.

2.2.3. Differences among Industrial Estates by Specification

Even though each industrial estate is open for all investors of any types of products, there are some industrial zones/estates that specialize. Heavy industry is conducted in the Eastern Seaboard zone to gain advantages in transportation cost due to the short distance between factories and the port. Moreover, with a depth of 14 meters and the capacity to support 50,000 TEU vessels, the deep-sea ports at Laem Chabang and Map Ta Phut ensure that products can be exported by large and even mega-size ships to reap

the lowest exporting cost.

The petroleum and the agro-industry investments in the Map Ta Phut Industrial Estate are a logical result of the estate originally being developed to serve the petrochemical and agricultural fertilizer industries. Suitable and sufficient infrastructures and facilities are provided. The automotive industry is an emphasis at Laem Chabang and nearby industrial estates. Laem Chabang Port has devoted one terminal to serving car exports. Special areas and management are provided for this industry. As such, there are currently a lot of automobile and automotive parts companies operating in Laem Chabang and the Eastern Seaboard.

Specific industry types is also a characteristic of the Ban Wa High-Tech Industrial Estate in Ayutthaya for electronics and ICT products (one of the key industries for development in Thailand) and the Sinsakhon Printing City and Industrial Estate in Samut Sakorn for printing and packaging products. Another well-known facility is the Gemopolis Industrial Estate located in Bangkok near Suvarnabhumi International Airport. This estate specializes in the jewelry business. Ready-made showrooms and factories are available for investors. Both foreign and local customers visit this industrial estate and place orders. As such, Gemopolis is considered a wholesaling and trading center for jewelry products.

3. PORTS AND HARBORS

Currently, there are eight international deep-sea ports in Thailand. These are Bangkok Port, Laem Chabang Port, Map Ta Phut Port, Sonkhla Port, Satun Port, Narathiwat Port, Phuket Port, and Ranong Port. Bangkok Port is located at Klong Toey in Bangkok, Laem

Chabang and Map Ta Phut are on the Eastern Seaboard, and the rest are located in the South. There are also two international river ports at Chieng Saen and Chieng Khong, both in the north of the country. The major ports that play leading roles in Thailand's import-export activities are Bangkok Port and Laem Chabang Port. The details of each are discussed in the following sections.

3.1. Bangkok Port

Bangkok Port was constructed in 1938 with the purpose of enabling large seagoing ships to transport goods directly to Bangkok. Construction was paused during World War II and completed after the war ended. Management is by the Port Authority of Thailand (PAT), which is under the Ministry of Transport and Communications.

Bangkok Port is located on the left side of the Chao Phraya River in Klong Toey District. It is well connected to highways, expressway and the rail system, which helps to transport cargo between the port and the city quickly and economically. However, Klong Teoy District at present is one of the busiest areas of Bangkok. There is people and traffic congestion around the port most of the day.

Bangkok Port's total area of 9.41 hectares comprises the Customs Department, transit sheds, warehouses, open storage areas, administration buildings, and wharves. The jurisdiction under the PAT's responsibility covers about 66 kilometers. The approach to the port is made through the bar channel, which is 18 kilometers long, 150 meters wide in the reaches, and 250 meters wide in the bend. The channel is maintained to a depth of 8.5 meters MSL. The depth of the river within the port area varies from 8.5 meters to 11 meters below MSL. (www.bkp.port.co.th). The port is divided into two sections: the East Quay for containers only and the West Quay for all

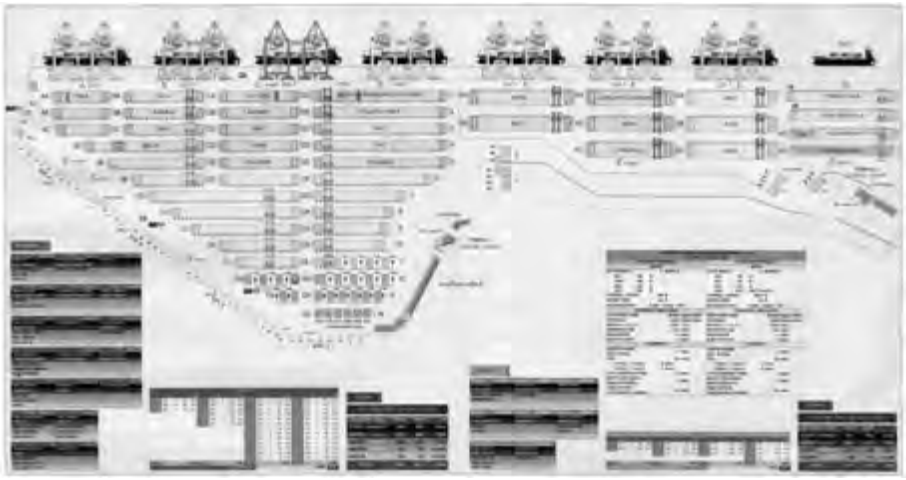
other types of transport. The layout of the port is shown in Figure 9.

The details of capacities and services are summarized in Table 10 and 11.

The container terminal is divided into two operational areas: Container Terminal 1 and Container Terminal 2. FCL (full container load) and LCL (less than container load) containers are serviced. For imports, the FCL containers are stored in the terminal's marshalling yard until the shippers' or agents' withdrawal. Dangerous goods (Group A) must be transported out of the port once they are discharged. The goods in LCL containers are delivered directly out of the port or stored in transit sheds. Goods that cannot be stored in the sheds are separately kept in the open storage area. Valuable goods are kept in valuable-cargo rooms. In-transit cargo to Laos is directly moved to their special warehouses. For exports**,** Bangkok Port provides exporting cargo in FCL containers, and the empty containers are to be transported into the port three hours before the expected time of departure for checking, stacking in the marshalling yard, and waiting for loading. Sufficient major equipment is seen.

The storage area at Bangkok Port comprises both yards and warehouses. The **CFS transit shed and warehouse cover 88,850 square meters. The open storage area and container yard is 431,472 square meters in size. There are 660 electric reefer points available for refrigerated cargo.** The details of the storage area are shown in Table 12.

Figure 9: Bangkok Port Layout & Terminals



Source: WWW. BKP.port.co.th.

Table 10: Berth/Dolphin/Buoy at Bangkok Port

Berth/Dolphin/Buoy	Length (m)	Berth (Number)	Size of Vessel Length / Draught (m.)	Capacity
East Quay	1,528	8	172.26/8.23: 91.46/4.57	7/1
West Quay	1,660	10	172.26/8.23	10
Klongtoey Dolphin	1,400	36	172.26/8.23	7
Bang Hua Sua Dolphin	1,520	25	172.26/8.23	8
Mooring Buoy at Sathupradit	1,580	5	137.19/7.62: 91.46/7.00	4/1

Source: Bangkok Port, Port Authority of Thailand (www.bkkport.co.th).

Table 11: Major Equipment at Bangkok Port

Equipment	Capacity		Quantity
Rail Mounted Shoreside Gantry Crane	32.5 - 40	Tons	14
Rubber Tyred Gantry Crane	30 - 40	Tons	36
Top Loader	40	Tons	35
Empty Container Reach Stacker	7	Tons	25
Mobile Crane	10/50	Tons	3/7
Tractor for Container	30 - 40	Tons	154
Container Chassis	30/45	Tons	57/94
Tractor for Trailer	30/20	Tons	2/4
Towing Tractor	10	Tons	14
Multi purpose Trailer	5 - 7	Tons	11
Towing Tractor	12,000	Lbs.	14
Tractor for Trailer	8	Tons	3
Forklift Truck	Various Size		222
Motor Truck	5 - 7	Tons	45
Tug Boat	1,225 - 2,400	hp	11

Source: Bangkok Port, Port Authority of Thailand (www.bkkport.co.th).

Table 12: Storage Area at Bangkok Port

Storage Area	Area (Square Meter)			
	Inside	Outside	Yard	Total
Transit Sheds (9, 11, 13 - 17)	46,738	43,674	40,890	131,302
Supplementary Transit Sheds (4 - 5)	4,000	-	-	4,000
Open Yard for Stuffing	-	-	2,208 TEUs	2,208 TEUs
Empty Container Yard	-	-	8,520 TEUs	8,520 TEUs
Intransit Warehouse	7,800	4,584	13,740	26,124
Bonded Warehouse (Red Building)	6,434	-	-	6,434
Bonded Warehouse (New Building)	3,120	-	-	3,120
Overtime Cargo Warehouse	8,955	1,120	-	10,075
Vehicle Warehouse	1,000	6,870	-	7,870
Dangerous Cargo Warehouse				
Dangerous Cargo	967	-	16,912	17,879
Jute, Cotton, Kapok	2,104	-	3,156	5,260
Container Terminal 1	-	-	98,600	98,600
Container Terminal 2	-	-	49,000	49,000

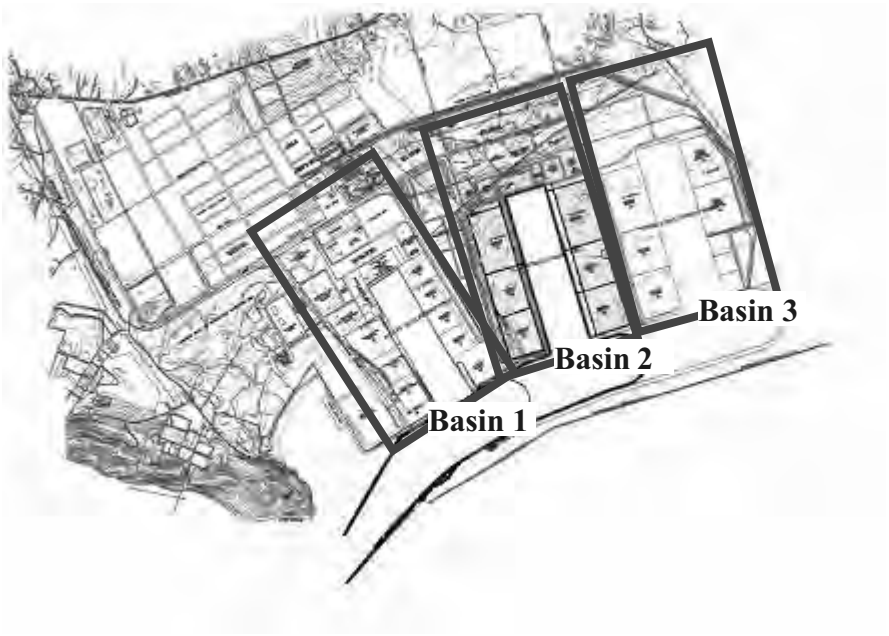
Source: Bangkok Port, Port Authority of Thailand (www.bkkport.co.th).

3.2. Laem Chabang Port

In 1961, the Royal Thai Government started its effort to construct a new deep-sea port at Laem Chabang, Chonburi province, to accommodate the larger vessels which could not enter Bangkok Port. However, due to the economic recession, the project was suspended. In 1978, the government decreed a law of eminent domain covering 1,014.56 hectares of land for the construction of Laem Chabang Port and started Phase 1 in 1982 after receiving funding support from the OECF. Construction was completed and operations commenced on January 21, 1991, with eight multipurpose terminals in service.

There are overall three basins at Laem Chabang Port (Figure 10). Terminals A and B are located in Basin 1. The construction of this phase is complete with full operational service. Basin 2 comprises Terminals C and D. At present, Terminal C is

Figure 10: Laem Chabang Basins and Terminals



Notes: Basin 1: Length 3,600 meter; Capacity 4.03 million TEU
Vessel Size > 30,000-50,000 DWT
Basin 2: Capacity 6.8 million TEU; Fully operated in 2014
Source: *www.laemchabangport.com.*

partly open while Terminal D is still under construction. Construction of Basin 3 is planned.

In 1997, Laem Chabang Port hit the target of 1 million TEUs in becoming Thailand's main port. The PAT, therefore, accelerated construction of Phase 2 to cope with the rapidly increasing number of containers. The construction cost of Phase 1 under the original project was 2,029 million baht (70 percent from the OECF of Japan and 30 percent from local currency). Later the PAT extended the project at an additional cost of 426 million baht, making the total cost 2,455 million baht.

The operation and management of Bangkok Port and Laem Chabang Port are

different. The PAT has managed the Bangkok Port on its own, while the operation of each terminal of Laem Chabang Port is subcontracted to the private sector. In the first phase, PAT announced open bidding for the private sector to lease and operate the terminals at Laem Chabang Port in accordance with government policy. Of the eight operating terminals, seven are private sector-run while the remaining one is administered by Laem Chabang Port.

Hence, investment in the equipment can be done by each operator but ownership of the port and all equipment is by the PAT. The PAT assumes the roles of only facilitator and controller. Under the management and investment of the private sector, Laem Chabang Port has achieved rapid development and progress. Total capacity is 7,253 million tons/year with a dredged channel of 14 meters MSL in depth and 2.5 kilometers in length. The total breakwater length is 1,300 meters with an infrastructure of transit sheds, open storage area, office buildings, road, railway and other utilities. The sufficient equipment provided at all terminals is shown in Table 13.

Table 13: The Major Equipments at Laem Chabang Port

Equipments	Capacity		Quantity (units)
Yard Gantry Cranes	30.5-41	tons	60
Rail Mounted Gantry Crane	35-50	tons	32
Top Loader	8-35	tons	24
Reach Stacker	40-45	tons	33
Forklift	2.5-10	tons	77
Tugboat	800/ 3000/ 3200	hp	7
Tractor for Trailer	36	tons	292
General Cargo Truck	6	tons	10
Container Chassis			310

Source: Port Authority of Thailand (www.port.co.th)

The details of the capacity and service provided at each terminal are as follows:

- Terminal A.0 (Domestic and Services Boat Terminal)

This is located at the end of Basin 1 with a 150-meter berth length and a depth of 6.5 meters MSL. The terminal provides services for accommodating domestic coastal and ferry ro/ro vessels, together with domestic cargo handling of approximately 2 million tons per year.

- Terminal A.1 (Coastal and Domestic Terminal)

This has a 300-meter berth length, a depth of 6.5 meters MSL, and a 1,000 DWT vessel capacity. The terminal provides services for the handling of general cargo at approximately 0.163 million tons annually. It is operated by Laem Chabang Port.

- Terminal A.2 (Multipurpose Terminal)

The berth length is 400 meters and the depth is 14.0 meters MSL. Thai Laem Chabang Terminal Co., Ltd. has leased this since October 1, 1996, with a concession period of 30 years. The terminal's capacity is 50,000 DWT container and conventional vessels, with containers and general cargo of about 0.2 million TEUs and 2.0 million tons per year, respectively.

- Terminal A.3 (Conventional Terminal)

With a berth length of 350 meters and a depth of 14.0 meters MSL, this facility is operated by Hutchison Laem Chabang Terminal Co. as a multipurpose terminal. Capacity is approximately 0.4 million TEUs per year.

- Terminal A.4 (Agri-Bulk Terminal)

This has a berth length of 250 meters with a depth of 14.0 meters MSL. It provides handling of export-oriented sugar and molasses. Aaw Thai Warehouses Co., Ltd. has leased and operated the terminal since March 17, 1993, with a concession period of 25 years. Capacity is 40,000 DWT vessels and 0.7 million tons of commodities per year. The facility is also available for general cargo now.

- Terminal A.5 (General and Automobile Cargo Terminal)

With a berth length of 450 meters and a depth of 14.0 meters MSL, the terminal handles automotive exports. Exporting capacity is 700,000 cars per year. It is operated by Namyong Terminal Co., Ltd.

- Terminal B.1

With a berth length of 300 meters and a depth of 14.0 meters MSL, the terminal provides services to handle container cargo. Laem Chabang Container Terminal 1 Co., Ltd. has leased and operated it since November 1, 1995, with a leasing period of 27 years. The terminal's is designed to accommodate up to 50,000 DWT container vessels and 0.2 million TEUs per year.

- Terminals B.2, B.3 and B.4

The berth length is 300 meters with a depth of 14.0 meters MSL. Each terminal has a capacity of about 50,000 DWT for container vessels and approximately 0.3 million TEUs per year. For B.2, Evergreen Container Terminal (Thailand) Co., Ltd. has been the

lessee and operator since March 30, 1993, with a leasing period of 27 years. For B.3, Eastern Sea Laem Chabang Terminal Co., Ltd. has been the lessee and operator since December 17, 1990, with a leasing period of 27 years. For B.4, TIPS Co., Ltd has been the lessee and operator since December 18, 1990, with a leasing period of 27 years.

- Terminal B.5

The berth length is 400 meters with a depth of 14.0 meters MSL. Its capacity is 50,000 DWT vessels and 0.6 million TEUs per year. Laem Chabang International Terminal Co., Ltd. has been the lessee, developer and operator since May 1, 1996, with a concession period of 30 years.

4. AIRPORTS

There are 28 commercial airports, providing a countrywide air transportation network. The biggest and newest facility is the Suvarnabhumi International Airport, which has been in operation since 2006. The airport is located in Samut Prakarn in the east of Bangkok. Currently, it has the capacity to serve 45 million passengers per year, with 76 flights per hour and 3 million tons of cargo annually. This will be expanded to 65 million passengers per year in 2013 after the second phase of construction. The airport was developed to ease congestion at Don Mueang Airport, which now serves domestic flights for passengers and cargo. The Chiang Mai, Chiang Rai, Phuket, and Hat Yai airports are the international airports located in the northern and southern regions of Thailand. The two major airports located in the Greater Bangkok Area – Don Mueang and Suvarnabhumi – and their import-export related roles are discussed in the following

part.

4.1. Don Mueang Airport

Don Mueang Airport is located on Vibhavadee Rangsit Road in the north of Bangkok, with a total area of 621 hectares (3,881 rai). The airport was officially opened on March 27, 1914, to serve the Royal Thai Air Force. Commercial service at Don Muang began in 1924. The asphaltic concrete runways were constructed in 1935 and renovated and expanded in 1980. The current terminals were constructed in the period of 1980 to 1987. The facility was formally called Bangkok International Airport from 1955 to 2006. The official name was then changed to Don Mueang International Airport in March 2007, with the IATA code of DMK. Currently, the airport serves general aviation, state aircraft, military aircraft, government aircraft, pure technical landings and pure charter flights as well as domestic commercial flights (point to point, by Thai Airways, Nok Air, Orient Thai Airlines and PB Air). It also accommodates non-scheduled flights, both domestic and international. There are two runways, the first measuring 3,700 meters long and 60 meters wide and the second being 3,500 meters long and 45 meters wide, with a total of 23 taxiways. There are 94 aircraft parking stands, of which 36 are contact gates (28 at the international passenger terminal and eight at the domestic passenger terminal). There are also 58 remote parking bays.

The airport has three passenger terminals: one domestic and two international. However, only Terminal 1 and the domestic terminal are operating at present. The total area of International Passenger Terminal 1 is 109,033 square meters, as divided into 28,469.39 square meters for the arrival area, 27,262.90 square meters for the departure area, and 1,802.50 square meters for the transit area. The domestic terminal's total area

is 22,266 square meters. The arrival area covers 5,623 square meters, the departure area is 8,433 square meters, and additional service areas cover 18,569 square meters. There are 167 check-in counters, 124 counters at International Passenger Terminal 1, and 43 counters at the domestic passenger terminal. Don Meung Airport can accommodate 60 flights per hour, and 16 million passengers and 12,490 tons of air cargo per year. The airport also provides a car park building in front of the domestic terminal which can accommodate around 500 cars.

The easiest way to access the airport is via Vibhavadee Rangsit Road. Drive time from the airport to the city center is about 30 minutes. There is also a railroad station opposite the airport but this does not seem to be a popular option because travelers would have to walk and cross the street to this station.

4.2. Suvarnabhumi International Airport

Suvarnabhumi International Airport is located on Bangna-Trad Road, 25 kilometers from the Bangkok city center. It covers 3,200 hectares (20,000 rai). The airport was officially opened for service on September 28, 2006, with the IATA code of BKK. Second-phase operation was planned for 2013. There is a single passenger terminal with a usable area of around 563,000 square meters. This seven-floor terminal serves both domestic and international passengers. The first floor provides bus and taxi services, the second floor is for domestic and international arrivals, the third floor offers shops and restaurants, and the fourth floor is for domestic and international departures. International premium passenger service, immigration, customs, airline check-in counters, and airport information counters are also located in the fourth floor. The fifth floor is reserved for the airline offices, the sixth floor is a one-stop service center for the

airport, and the seventh floor is a viewing point. The two basements are service areas for the luggage conveyor transport system and the airport express station.

There are seven concourse buildings of four stories each, namely A, B, C, D, E, F, and G. Building A serves domestic passengers, Building B handles international passengers from 9 p.m. to 4 a.m., and Buildings C, D, E, F, and G also serve international passengers. There are 51 contact gates and 69 remote parking bays. Eight parking bays facilitate the Airbus A380,[1] five of which are contact gates. In this initial phase, two runways are operating. The east runway is 4,000 meters long and 60 meters wide, and the west runway is 3,700 meters long and 60 meters wide. This yields a total of 52 taxiways. As such, in the initial phase, Suvarnabhumi International Airport can accommodate 76 flights per hour with 45 million passengers and 3 million tons of cargos per year.

As for its other facilities, the airport provides two car park buildings in front of the passenger terminal that can accommodate about 5,000 cars. There is also a 30,000-square-meter car park area that can accommodate 1,000 cars. Moreover, the Public Transport Center that covers 42,000 square meters comprises a car park and a waiting area for various modes of transportation, including taxis, limousines, and rental cars. In addition, there is a terminal for BMTA and Transport Company Limited buses.

To access Suvarnabhumi International Airport, the two alternative ways are by road and by the Airport Link service. The airport has five main access routes but the easiest ones are the Bangkok Chonburi Motorway and the expressway from Bang Na to Bang Pakong. Normally, there are no traffic problems on these two routes. Another

1 Currently, the Airbus A380 is the largest passenger airliner with a 72.73-meter length, a 79.75-meter wingspan, and a 24.45-meter height.

alternative, the Airport Link train, connects Suvarnabhumi to downtown Bangkok from 6 a.m. to midnight. These trains run every 15 minutes on the City Line and every 30 minutes on the Express Line. The City Line has eight stops across the capital, heading to Phaya Thai station. The ride takes 30 minutes between Suvarnabhumi and Phaya Thai. The Express Line is a 15-minute non-stop trip between Suvarnabhumi and Makkasan. Operations started in August 2010. The city check-in system is in the process of being set up and should be fully utilized at the Makkasan station in the near future. This would give passengers the opportunity to check in their luggage at the City Air Terminal before boarding the express train to Suvarnabhumi. The service will connect to the city's mass transit underground system (MRT), with the City Line linking with both the MRT underground trains and the above-ground BTS Skytrain.

4.3. Capacities of Suvarnabhumi and Don Mueang Airports

The data illustrates that the size and service capacity of Suvarnbhumi International Airport are larger than those of Don Mueang Airport, as seen in Table 14.

Accessibility to Suvarnabhumi International Airport is much easier. There are many roads that can access to this airport, and the traffic congestion around the airport is low. The new Airport Link express train makes it quick and easy to arrive at Suvanabhumi. In contrast, Vibhavadee Rangsit is only road that can access the airport, and its traffic congestion especially in rush hour would cause passengers to spend more time.

Table 14: Capacity of Suvarnabhumi and Don Mueang Airports

Aspects	**Suvarnabhumi**	**Don Mueang**
Location	Samut Prakarn	Bangkok
First Operation	1914	2006
Accommodation capacity for passenger		
Total (passengers/year)	45 million	16 million
Accommodation capacity for flight		
For all flights	76 flights per hour	
For charter flight		140 flight/month
Infrastructure		
Runway	2	2
	4,000m/60m	3,700m/60m
	3,700m/60m	3,500 m/45m
Terminal Area (m^2)	563,000	131,299
	(1 Building; 7 story)	(3 Building; 2 story each)
Access to the Airport	Road	Road
	Airport Link	Rail

Source: Airport of Thailand (www.airportthai.co.th) and www.suvanabhumiairport.com.

The utilization rates of both airports can be seen from the flights to and from them. Table 15 shows the number of flights between 2006 and 2009 as categorized by the type of flight.

Table 15: Number of Flights Utilizing the Airports

A: Don Mueang International Airport

Fiscal Year	International					Domestic					Total	Change (%)
	Civil	General Aviation	State Aircraft	Military/ Police	Over Flight	Civil	General Aviation	State Aircraft	Military/ Police	Over Flight		
2006	170,774	528	3	342	526	91,061	9,776	420	14,145	8,014	**295,589**	-
2007	185	1,112	8	281	9	27,648	27,353	358	34,702	1,720	**93,376**	- 68.41
2008	561	1,917	18	331	77	41,512	18,002	242	29,190	1,580	**93,430**	0.06
2009	238	1,118	8	235	678	20,392	16,148	141	29,240	2,554	**70,752**	-24.38

Source: Aeronautical Radio of Thailand Limited (AEROTHAI), 2010 (http://www.aerothai.co.th).

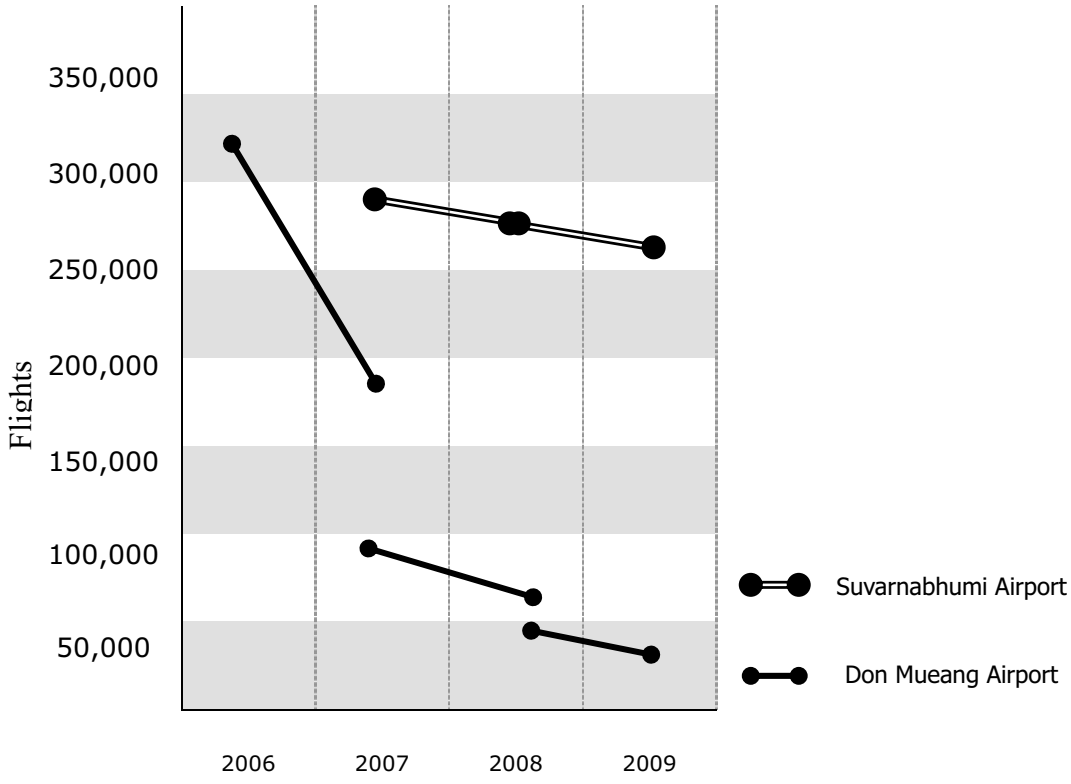
B: Suvarnabhumi International Airport

Fiscal Year	International					Domestic					Total	Change (%)
	Civil	General Aviation	State Aircraft	Military Police	Over light	Civil	General Aviation	State Aircraft	Military /Police	Over Flight		
2007	187,330	0	0	0	1,775	79,075	0	0	3,878	0	**272,058**	-
2008	195,879	0	0	0	1,880	60,580	0	0	0	4,095	**262,434**	- 3.54
2009	173,928	0	0	0	1,541	68,471	0	0	0	3,757	**247,697**	- 5.62

Source: Aeronautical Radio of Thailand Limited (AEROTHAI), 2010 (http://www.aerothai.co.th).

Prior to the opening of Suvarnabhumi, the Don Mueang Airport serviced nearly 300,000 flights per year including all kinds. But after the new airport opened, Don Mueang's flights diminished. It served only 93,376 flights in 2007, a 68.41 percent decrease. That was followed by 93,430 and 70,652 flights in 2008 and 2009, respectively. Suvarnabhumi has served more than 250,000 flights each year since it opened. However, its number of flights also decreased in 2008 due to the political rallies in Thailand and fell again in 2009 during the world economic crisis. The total flights that utilized Suvarnabhumi and Don Mueang airports are compared graphically in Figure 11.

Figure 11: Total Flights Utilizing Suvarnabhumi and Don Mueang Airport



Source: Aeronautical Radio of Thailand Limited (AEROTHAI), 2010 (http://www.aerothai.co.th).

5. LINKAGE AMONG INDUSTRIAL ESTATES, PORTS AND HARBORS

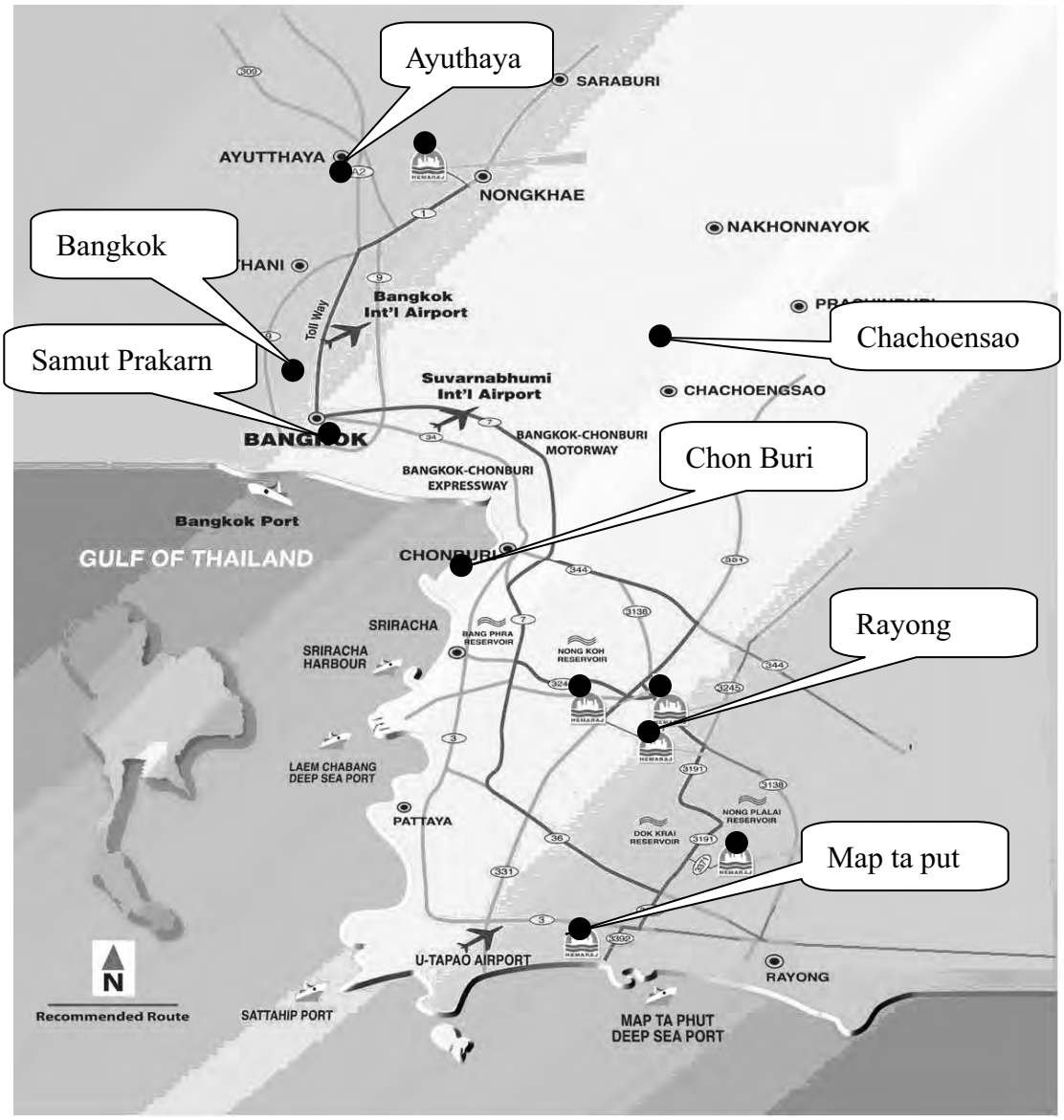
Thailand is widely acknowledged as having an extensive road transportation network of 390,026 kilometers, with 384,176 kilometers or 98.5 percent paved by concrete or asphalt. Some 51,776 kilometers of this forms a national highway network connecting each region of the country.

The signing of the Asian Highway Agreement on April 26, 2004, strengthened Thailand's connection to 32 countries in Europe and Asia for land-based trade and transportation. The importance of these interconnections will increase dramatically as Thailand's free trade agreements with China, ASEAN and India kick in, making Thailand a crucial hub for international production and trade.

The Greater Mekong area's road network already involves a southern economic corridor inclusive of Thailand, Cambodia and Vietnam; the east-west economic corridor linking Myanmar, Thailand, Laos and Vietnam; the north-south economic corridor which runs from southern China through Laos, Myanmar and Thailand; and the southern coastal economic corridor also connecting Thailand, Cambodia and Vietnam.

In addition to the main highways, there are many roads that facilitate the industrial estates, especially those located in the Eastern Seaboard. Without traffic from the industrial estates to Laem Chabang Port, freight transportation runs smoothly (Figure 12).

Figure 12: Transportation Network for Industrial Estates



Source: Adapted from www.hemaraj.com.

SUMMARY

As Thailand is a developing country making the transition from an agriculture-based to an industry-based economy, foreign investment is emphasized. Even though the current number of wholly owned foreign firms is large at almost 10,000 and there are also joint ventures and other related projects, more foreign investment is needed. As such, the Thai government has a policy to stimulate foreign investment and economic activity through several means. The I-EA-T and the BOI have been developed to regulate and promote investment in Thailand, especially in the six industries that are appointed as key for the country's development. These are the agriculture and agro-industry, alternative energy, automotives, electronics and ICT, fashion, and value-added services such as entertainment, healthcare, and tourism.

Thirty-four industrial estates developed by the I-EA-T together with more than 10 industrial estates developed by the private sector are available for investors at three major areas: Bangkok and its outlying vicinities, Auytthaya, and the Eastern Seaboard such as in Chonburi and Rayong. The internal infrastructure of each industrial estate is well developed. The electricity, water, and telephone lines are provided by the national state enterprises at the normal charge. Internet accessibility is countrywide with service provided by private firms. Wastewater treatment systems are available in all of the large and some of the medium-size industrial estates. Investors could gain ample benefits when they conduct their business in the industrial estates, both in the General Industrial Zone and the Free Zone. Besides being exempt from fees such as import taxes and duties and value-added tax, investors are also permitted to hold title over land in industrial estates. Other benefits are also provided under the investment

promotion policy. Apart from the industrial estates, the transportation infrastructure is sufficient. The two main airports, Suvarnabhumi and Don Meuang, are capable of supporting all airfreight transportation, while the two main seaports are more than sufficient for handling import and export activities. Bangkok Port's capacity is limited due to its water depth. The 8.5-meter depth may be inadequate for facilitating large-size vessels but the port gains a competitive advantage by its location near the center of the capital city. Laem Chabang Port is farther away from Bangkok but it is located in the Eastern Seaboard area near many major industrial estates. The 14-meter depth of the water and the large size of the terminals can serve all vessels. This includes the world's largest mega-vessel, with a capacity of more than 10,000 TUEs, which visited Laem Chabang Port last year.

The road system in the Eastern Seaboard is sufficient for serving the immediate area and from the industrial estates to Suvarnabhumi International Airport. For the industrial estates in Ayutthaya, all internal facilities are sufficient but there are neither seaports nor airports available in that area. Therefore, export-import activities have to be done at Bangkok Port for sea freight and at Don Meuang or Suvarnbhumi for airfreight. However, the toll roads, expressways, and motorways are available for avoiding the urban traffic problems.

APPENDIX A:

Gross Domestic Product at Current Market Prices (Millions US$)

Industry	2005		2008		2009	
	WHOLE	**BKK**	**WHOLE**	**BKK**	**WHOLE**	**BKK**
Agriculture	18,089.27	66.24	32,064.26	140.69	30,651.25	164.21
Agriculture, Hunting and Forestry	15,496.60	57.49	28,848.94	128.13	27,156.90	150.61
Fishing	2,592.67	8.77	3,215.32	12.53	3,494.35	13.63
Non-Agriculture	158,131.68	50,323.13	243,284.44	69,342.29	232,910.63	68,332.59
Mining and Quarrying	5,530.86	0.00	9,551.67	0.00	8,879.50	0.00
Manufacturing	61,150.16	10,238.29	96,165.93	14,555.76	89,809.46	14,218.64
Electricity, Gas and Water Supply	5,476.02	968.92	7,952.76	1,143.42	8,357.19	1,148.89
Construction	5,316.87	1,633.17	7,910.10	2,605.79	7,108.01	2,237.27
Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods	25,889.27	11,759.48	38,925.64	16,228.58	37,266.66	16,583.98
Hotels and Restaurants	8,617.76	5,343.23	13,279.88	8,240.14	12,769.77	7,834.45
Transport, Storage and Communications	12,909.89	7,954.01	19,515.90	8,700.39	18,918.03	8,531.28
Financial Intermediation	6,581.27	3,849.39	10,627.73	5,825.09	10,688.67	6,114.50
Real Estate, Renting and Business Activities	4,932.20	1,789.59	6,571.63	2,430.07	6,198.49	2,245.52
Public Administration and Defence; Compulsory Social Security	8,100.65	2,970.61	12,149.24	4,362.44	12,335.06	4,553.32
Education	6,980.82	981.34	11,461.01	1,660.71	11,513.77	1,436.66
Health and Social Work	3,359.60	800.37	5,138.47	1,108.04	5,183.26	1,026.62
Other Community, Social and Personal Services Activities	3,074.36	1,914.71	3,740.72	2,316.57	3,587.45	2,235.41
Private Households with Employed Persons	211.95	120.07	293.75	165.32	295.31	166.05
Gross Domestic Product (GDP)	**176,220.94**	**50,389.37**	**275,348.70**	**69,482.98**	**263,561.88**	**68,496.80**
GDP Per capita (US$)	2,706.98	7,429.49	4,141.72	10135.10	3,939.46	9976.85
Population (1,000 persons)	**65,099**	**6,782**	**66,482**	**6,856**	**66,903**	**6,866**

Notes: Average currency rate 1US$=40.25 Baht (2005); 32.96 Baht (2008); 34.34 (2009).

Source: Office of the National Economic and Social Development Board (http://www.nesdb.go.th).

APPENDIX B:

The Minimum Wage Rate Enforced as of April 2010

Area	Wage per Day	
	Baht	US$
Bangkok, Samut Prakan	206	6.44
Nonthaburi, Nakhon Pathom, Prathum Thani, Samut Sakhon	205	6.41
Phuket	204	6.38
Saraburi, Chon Buri	184	5.75
Phra Nakhon Si Ayutthaya	181	5,66
Chachoengsao	180	5.62
Rayong	178	5.56
Phang-nga, Ranong , Nakhon Ratchasima	173	5.41
Chiang Mai	171	5.34
Prachin Buri, Lop Buri,Krabi	170	5.31
Kanchanaburi	169	5.28
Phetchaburi	168	5.25
Ratchaburi, Chanthaburi	167	5.22
Sing Buri, Ang Thong	165	5.16
Prachuap Khiri Khan	164	5.13
Samut Songkhram, Sa Kaeo, Loei	163	5.09
Trang	162	5.96
Songkhla	161	5.03
Chumphon, Naratiwat, Yala,Uthai Thani, Trat, Nakhon Nayok, Lamphun, Ubon Ratchathani	160	5.00
Nong Khai, Udon Thani, Satun, Surat Thani, Pattani, Phatthalung, Nakhon Si Thammarat	159	4.97
Kamphaeng Phet, Nakhon Sawan, Phetchabun, Chai Nat, Suphan Buri	158	4.94
Kalasin, Buri Ram, Yasothon, Sakon Nakhon, Chiang Rai, Khon Kaen, Roi Et	157	4.91
Lampang, Nong Bua Lam Phu,Chaiyaphum	156	4.88
Mookdahan,Amnajareon,Nakhon Panom	155	4.83
Maha Sarakham	154	4.81
Tak, Phitsanulok , Mae Hong Son, Sukhothai, Surin, Uttaradit	153	4.78
Si Sa Ket, Nan	152	4.75
Phayao, Phichit, Phrae	151	4.72

Source: Department of Labor Protection and Welfare, 2010 (www.labour.go.th).

APPENDIX C

PRIVILEGES AND FACILITATION OF THE INDUSTRIAL ESTATES

Privileges and facilitation which the Industrial Operator or Trader, or Service Provider in the Industrial Estate shall receive, under the Act Governing The Industrial Estate Authority of Thailand (4th Edition) B.E. 2550, as Amended

Non-Tax Privilege in General Industrial and I-EA-T Free Zone

1. Both Thai and alien industrial entrepreneurs or traders shall be permitted to **hold title over land in industrial estates** to operate business for areas which the Board of Directors of I-EA-T deems appropriate, to the extent of exceeding the limit prescribed by other laws.
2. An industrial entrepreneur or trader shall be permitted to bring in **aliens who are skilled persons, experts, their spouses and dependents, into the Kingdom and live in the Kingdom,** for the number and within the periods which the Board of Directors of I-EA-T deems appropriate.
3. An alien skilled person and expert who is permitted to stay in the Kingdom under Section 45 is allowed to work in the position which the Board of Directors of I-EA-T approves, throughout the period permitted to stay in the Kingdom.
4. An industrial entrepreneur or trader who has domicile outside the Kingdom shall be permitted to **remit money in foreign currencies** out of the Kingdom only when the said amount is an inward remitted investment, dividend or profit derived from such investment, foreign loan and the money which the operator has obligations in foreign

countries.

Tax Privileges and Facilitation in I-EA-T Free Zone

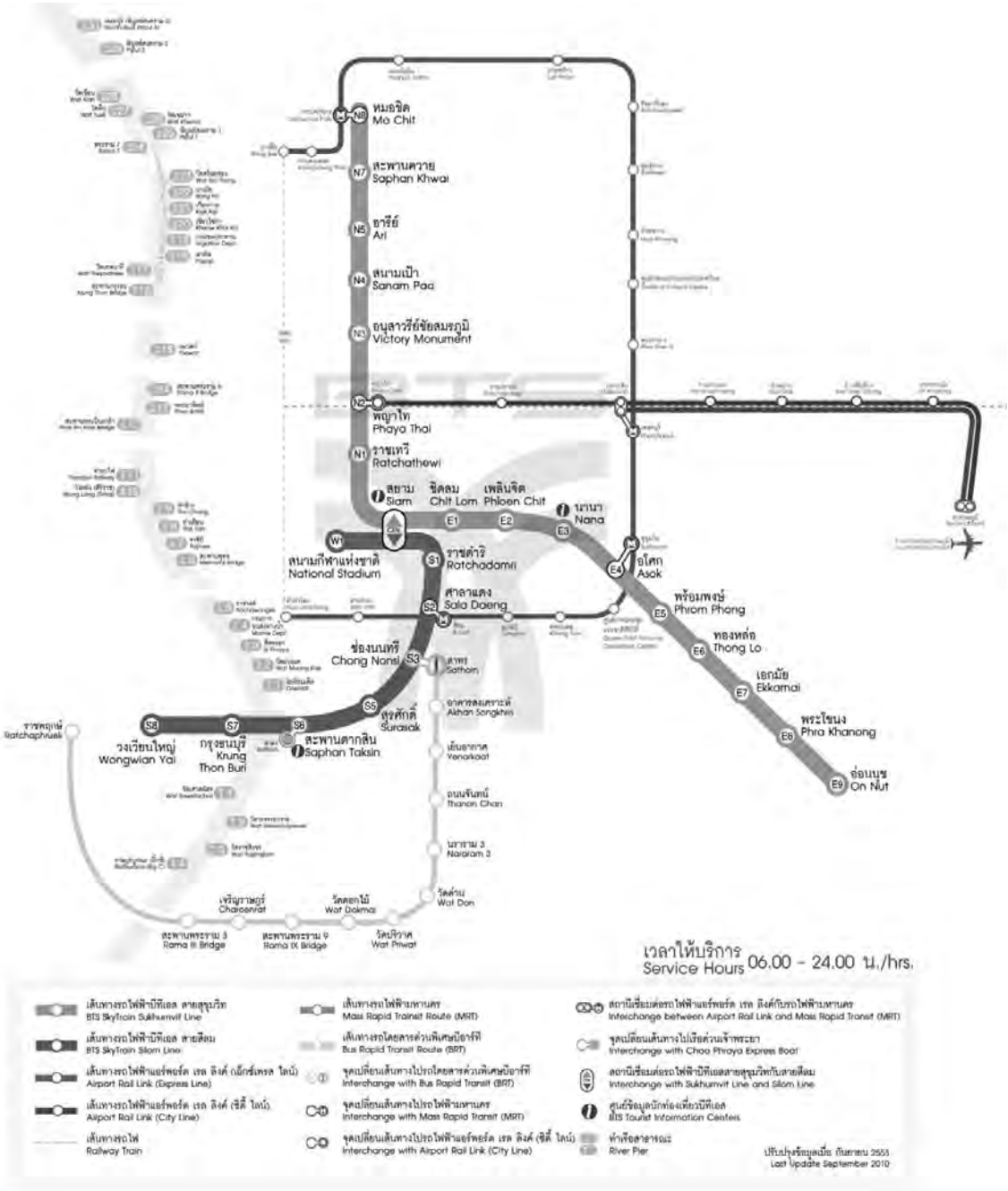
1. Tax incentives include **exemption from special fees** subject to the law on governing investment promotion, import taxes and duties, value-added tax and excise taxes on **machinery, equipment, tools, components, elements used for production of goods or commerce, or installation to manufacturing and building.** Importation of such material is not restricted to only industrial entrepreneurs or traders.
2. Tax incentives include **exemption** from special fees subject to the law on governing investment promotion, import taxes and duties, value-added tax and excise taxes on **raw materials and supplies used for production of goods or trading or services**. Importation of such material is not restricted to only industrial entrepreneurs or traders.
3. Tax incentives include **exemption from export duties**, **value-added tax and excise taxes** on raw materials and products, including by-products and items derived from such production.
4. Industrial entrepreneurs or traders in the I-EA-T Free Zone are afforded the privilege of **exporting products without any restrictions,** and the added **convenience of bringing merchandise, equipment, components, and raw materials into the I-EA-T Free Zone.**
5. Industrial entrepreneurs or traders in **the I-EA-T Free Zone** are afforded the privileges as **similar to the Free Zone of the Customs Department**.
6. Permission is for the production of export goods, and bringing supplies or raw

materials into the I-EA-T Free Zone for manufacturing, mixing, assembling, packing or any other operations, without requiring any import permits or particular seals or symbols, with **exemption from standard and quality control requirements under any other laws except the Customs Law**. Nonetheless, the importing of such materials that have an effect on national security, health or the environment is prohibited by ministerial regulation.

7. **Relief of tax burdens for products taken out of the I-EA-T Free Zone for domestic use or consumption**. Contrary to the previous Act, contents or components of raw materials, if produced domestically, shall be entitled to exemption of taxes and duties

APPENDIX D:

BTS SKY TRAIN ROUTES AND STATION



Source: Bangkok Mass Transit System Public Company Limited (www.bts.co.th).

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