

Chapter 1

Development of the High-Speed Railway, the EEC, and the Change of the Landscape

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Abstract: With the aim of moving toward Industry 4.0, the Thai government is promoting the Eastern Economic Corridor (EEC), whereby three Eastern provinces are to be developed by propelling creativity, innovation, and technology, and by the implementation of infrastructure projects, corporate tax exemption, low personal income tax for researchers and experts, urban planning, and bypassing bureaucratic procedures, for ten target industries. This study introduces the theoretical and empirical study that the high-speed railway (HSR) service will disperse the services sector over a shorter distance and the manufacturing sector over a longer distance. Based on this conclusion, this study argues that the Bangkok-Rayong route will significantly change the EEC from a basic manufacturing sector to a manufacturing plus services sector, in which research & development (R&D) centers, testing and laboratories, data centers, back office functions, as well as services related to tourism will agglomerate. However, any success will depend on how the amenity level in the EEC will improve. The study warns that the districts with HSR stations will benefit the most, while other EEC districts will lose, as the labor force will move from the inland cities to the cities serviced by the high-speed railway stations.

Keywords: SEZ; high-speed railway; tram; urban planning; services

JEL Classification: H54; L80; L92; N75; O18; O19; O32; O53; R41; R58

1. Introduction

Thailand is launching the Thailand 4.0 model. In the first development model, “Thailand 1.0,” the emphasis was placed on the agricultural sector. The second model, “Thailand 2.0,” focused on light industry, and the third model, “Thailand 3.0,” emphasized heavy industry to support the country's export-led economic growth. “Thailand 2.0” and “Thailand 3.0” helped upgrade the country's economy from a low-income to the middle-income status, but the country has become stuck in the “middle-

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income trap” and is facing many disparities also. In order to overcome the middle-income trap, Thailand is launching the “Thailand 4.0” or “Industry 4.0” program, whereby the country will grow based on a “Value-based economy” model by propelling creativity, innovation, and technology.

For this, the Thai Government has placed the top priority on development of the Eastern Economic Corridor (EEC), comprising the three provinces of Chachoengsao, Chonburi, and Rayong. Kanit Sangsuphan, the Secretary-General of the EEC Office, has stated that the EEC is the action plan's focus for the Thailand 4.0 model, and this area will be a new engine of growth to help Thailand escape the middle-income trap through massive new investment in the area.² The EEC development scheme contains several policy measures as follows:

1. 50 percent corporate tax special exemption for 5 years in addition to the normal 100 percent tax exemption period that are defined according to the relevant industry (if the normal 100 percent tax exemption period is 8 years, the total tax exemption period will be for 13 years, and if it is ten years, the total tax exemption period will be for 15 years);
2. Huge infrastructure projects will be implemented;
3. Urban planning of high-speed railway stations will comprise industrial parks, commercial areas, and housing developments;
4. Maximum personal income tax rate of 17% for management, investor, and experts;
5. A fast-tracked environmental impact assessment; and
6. Bypassing of the normal bureaucratic procedures.

In order to achieve Thailand 4.0, the Thai government is targeting 10 industries.³ The industries are (1) Next-generation cars; (2) Robotics for industry; (3) Smart electronics; (4) Digital technology; (5) Biofuels and biochemicals; (6) Logistics and aviation; (7) Affluent, medical, and wellness tourism; (8) Medical services; (9) Agriculture and biotechnology; and (10) Food products.

However, a question arises: what consequences and landscape changes will be brought about by the development of the EEC, if the above policy measures are implemented completely? The next section, Section 2, introduces the major transportation infrastructure projects to be implemented in the EEC. Section 3, discusses how the location of industry will disperse according to geographical distance, and how the HSR service will disperse the services sector within a short distance and manufacturing sector over a long distance. The last section, Section 4, provides a rough picture regarding the distribution of the manufacturing and services sectors when the HSR and other schemes have been implemented in the EEC area.

2. EEC Infrastructure Projects

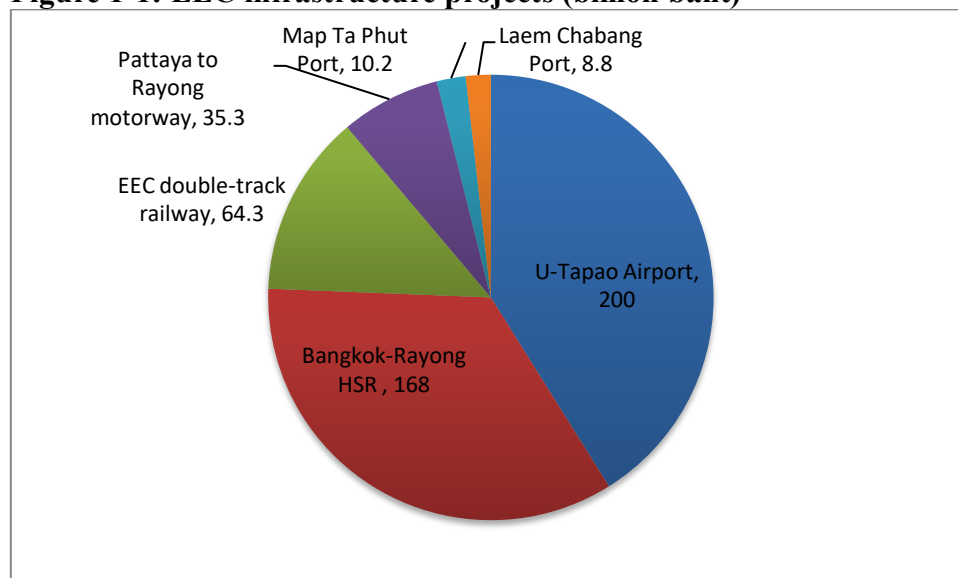
The EEC has three transportation channels by air, land, and sea. There are six major

² Bangkok Post, May 29, 2017 “SCG eyes innovations in the EEC.”

³ National Broadcast by General Prayut Chan-o-cha, Prime Minister – July 1, 2016, Thailand 4.0 policy

infrastructure projects for the development of the EEC. The total cost is 486.6 billion baht (see Figure 1-1). They are U-Tapao airport; Bangkok-Rayong HSR; double-track railway; Pattaya to U-Tapao motorway; Map Ta Phut deep sea port; and Laem Chabang commercial port.

Figure 1-1: EEC infrastructure projects (billion baht)



Source: EEC Office

(1) U-Tapao Airport

“this will serve a passenger link to Don Muang International Airport and Suvarnabhumi International Airport, while simultaneously supporting growth as a regionally important aviation hub.”⁴

Among the mega EEC infrastructure projects, U-Tapao airport project in Rayong Province is the biggest infrastructure project worth 200 billion baht. Currently, U-Tapao airport, which started commercial operation in 2015, has one runway and two terminals in the 17,000 rai (16,000 square meters), almost the same area can accommodate 5 million passengers per year.

However, the number of travelers using U-Tapao airport is expected to reach the maximum capacity within 2020. Furthermore, Suvarnabhumi and Don Muaeng airports will reach maximum capacity by 2024, although both will be expanded to accommodate 90 million travellers and 40 million passengers respectively.

Therefore, the expansion of U-Tapao airport's capacity is necessary to expand its capacity so as to accommodate the increasing demand. U-Tapao will have a new runway and a third terminal to accommodate 60 million passengers per year, which is greater than the current capacity at Suvarnabhumi airport. U-Tapao's new terminal building will have an underground station for the HSR so that passengers may travel directly from U-Tapao to Suvarnabhumi and Don Muaeng airports in Bangkok. The

⁴ See the Office of EEC (<https://www.eeco.or.th/en/project/infrastructure-development/u-tapao-airport>, March 19, 2018).

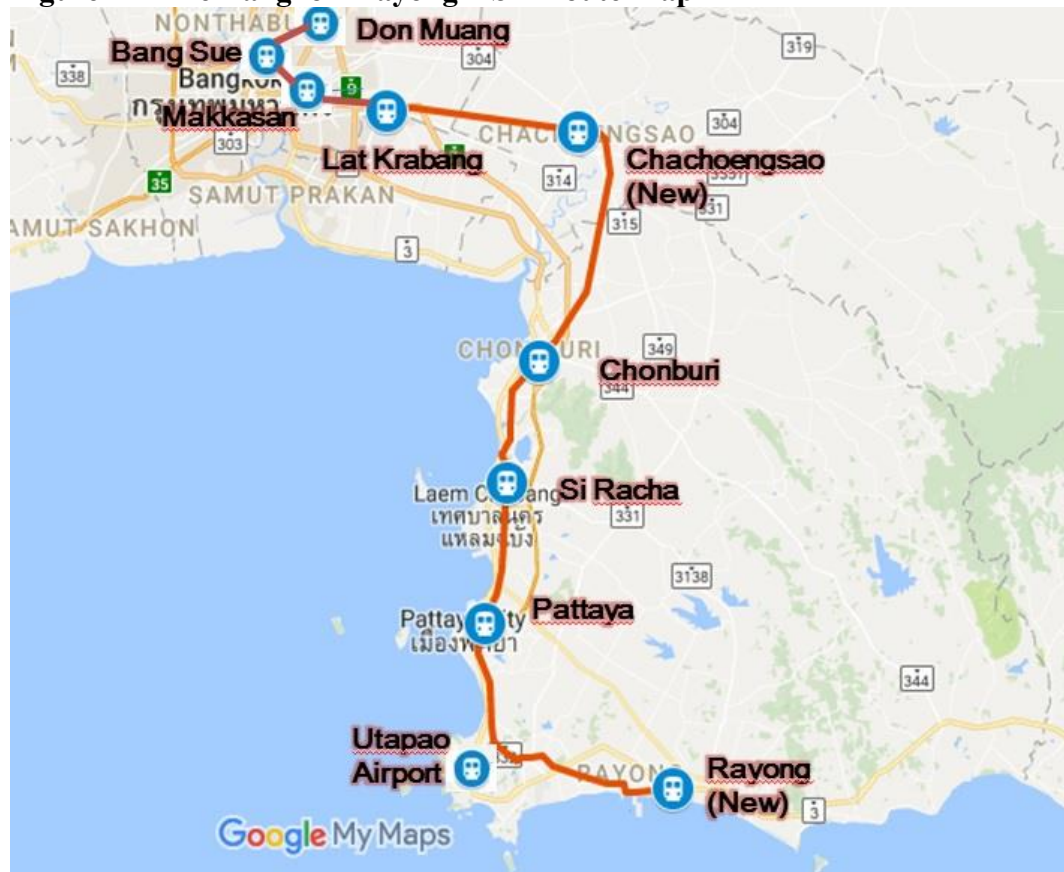
construction will be completed in 2021.

It should be noted that U-Tapao airport will provide a technical base for the aviation industry in Thailand. U-Tapao will have facilities for aircraft maintenance, repair, and an overhaul (MRO) center an aviation training and certification center for skilled technicians and maintenance engineers, and an air cargo and free trade zone to support the manufacturing sector's supply chains, which will complete the airport's development. Prime Minister Prayut Chan-o-cha declared that Thailand is ramping up its aviation industry in bid to become a regional powerhouse.⁵ However, currently, in Southeast Asia, Singapore is the crown jewel of the aircraft MRO business, servicing more than 100 aerospace companies.

(2) The Bangkok-Rayong HSR Route

The EEC's development plan will improve the land transportation infrastructure between Bangkok and the EEC. The Bangkok-Rayong HSR will cost 168 billion baht, the second largest infrastructure project in the EEC, and this project will link the three international airports of Don Muang, Suvarnabhumi, and U-Tapao. It will run at a maximum speed of 250kms/h on 1.4-metre standard gauge track. The project is due to be completed by 2023, with ticket prices starting at 20 baht plus 1.8 baht per km.

Figure 1-2 The Bangkok-Rayong HSR Route Map



Source: State Railway of Thailand

⁵ Bangkok Post, December 24, 2017, "Aviation hub potential exists but work must be done."

Table 1-1: The Bangkok-Rayong HSR Service Structure

Bangkok-Rayong HSR stations	Distance (km) from Bang Sue	Distance (km) between stations	Operation time (h:mm:ss)	Standing Time (minutes)
Don Mueang	13.72			
		13.72	0:07:30	
Bang Sue	0.00			2.0
		8.5	0:06:15	
Makkasan	8.50			1.0
		21.65	0:10:30	
Lat Krabang (Suvarnabhumi)	30.15			1.0
		34.25	0:10:45	
Chachoengsao	64.40			1.0
		46.8	0:13:45	
Chon Buri	111.20			1.0
		24.00	0:08:45	
Si Racha	135.20			1.0
		23.3	0:08:00	
Pattaya	158.50			1.0
		34.00	0:12:30	
U-Tapao airport	192.50			1.0
		31.00	0:11:03	
Rayong	223.50			
			1:38:30	

Source: State Railway of Thailand

The HSR service is planned to stop at 10 stations (see Table 1-1): from the north, Don Mueang Airport, Bang Sue, Lat Krabang (Suvarnabhumi airport), Chachoengsao, Chonburi, Si Racha, Pattaya, U-Tapao airport, and Rayong. If it stops at each station for one minute (Bang Sue for two minutes), it will take one and a half hours to travel from Don Mueang to Rayong. The stations at Suvarnabhumi and U-Tapao stations will be built underground,

The Bangkok-Rayong HSR project will be commercially successful, since a large number of passengers is expected. The State Railway of Thailand (SRT) estimates at least 103,920 people will use the city line route from Don Mueang to Suvarnabhumi daily, and the HSR route from Suvarnabhumi to Rayong is expected to carry 65,630 passengers, totally over 160,000 passengers are likely to use the service daily. Therefore, the Bangkok-Rayong HSR project will be the public-private partnership (PPP) project.

(3) The EEC double-track railway project

The EEC double-track railway project, worth 64.3 billion baht, will primarily transport cargo and connect the seaports of Laem Chabang, Map Ta Phut and Sattahip within the EEC. This project will enhance the regional cargo transportation.

(4) The Pattaya-Rayong motorway project

This motorway project is worth 35.3 billion baht. Currently, the motorway from Bangkok to Chonburi is open. The project features two routes. One route is the extension of the Bangkok-Chonburi motorway that extends the Chonburi-Si Racha-Pattaya-Rayong-Map Ta Phut route. The other route will run from Laem Chabang to Nakhon Ratchasima.

(5) The Map Ta Phut Port and Laem Chabang Port development projects

The Map Ta Phut deep-sea port under the Industrial Estates of Thailand, and the Laem Chabang commercial port under the responsibility of the Port Authority of Thailand, will be third phase port development projects.

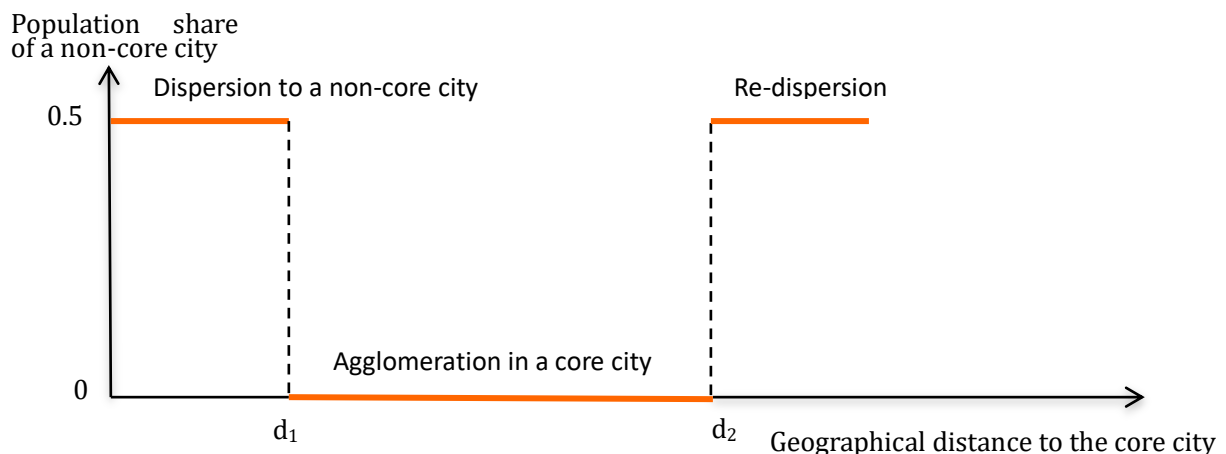
The Map Ta Phut deep-sea port expansion is expected to be completed in 2024. The Laem Chabang commercial seaport, the largest commercial seaport in the Mekong region and the gateway to the Mekong, will expand to handle over 18 million TEU containers and 3 million cars per year by 2025. The Laem Chabang port will become one of the world’s top 15 deep-sea ports.

3. Dispersion Forces Generated By the HSR Project

3.1 Dispersion of the manufacturing sector according to geographical distance

When the frequent and punctual HSR operation service is operational, what will happen? What landscape changes will this service generate? Some studies that have discussed the dispersion of industry in relation to geographical distance between the core city and non-core cities offer some ideas regarding such questions.

Figure 1-3: The Dispersion, Agglomeration, and Re-dispersion of the Core-Periphery Structure



Source: Ottaviano, Tabuchi, and Thisse (2002)

Ottaviano, Tabuchi, and Thisse (2002) discussed the location of the manufacturing sector in relation to geographical distance. They incorporated the concept of urban costs (costs arising from agglomeration) into the core-periphery model by Krugman (1991). Urban cost is defined by the commuting costs, the rental cost for accommodation at each location, and unattractive living conditions generated by agglomeration, such as overcrowding, commuting, and air pollution.

They argued that an increase in urban costs fosters dispersion forces to non-core cities, and the dispersion factors change according to distance between the core city and the non-core cities (see Figure 1-3). Firstly, as transport costs increase in proportion to distance, dispersion to non-core cities disappears beyond a certain point (d_1). If the distance between the core city and non-core cities is greater than point (d_2), and if the transportation costs increase further, then re-dispersion emerges beyond a certain distance.

Therefore, the study predicts dispersion to a non-core city, agglomeration in a core city, and re-dispersion to another non-core city. The first dispersion and the second dispersion trends emerge for very different reasons: the first reason is that the workers move to the non-core city due to the high urban costs, and then firms disperse in response to the high urban costs that the workers bear within a single agglomeration. On the other hand, in the second dispersion (re-dispersion), firms disperse in response to high inter-city transport costs they incur by supplying goods from a single agglomeration.

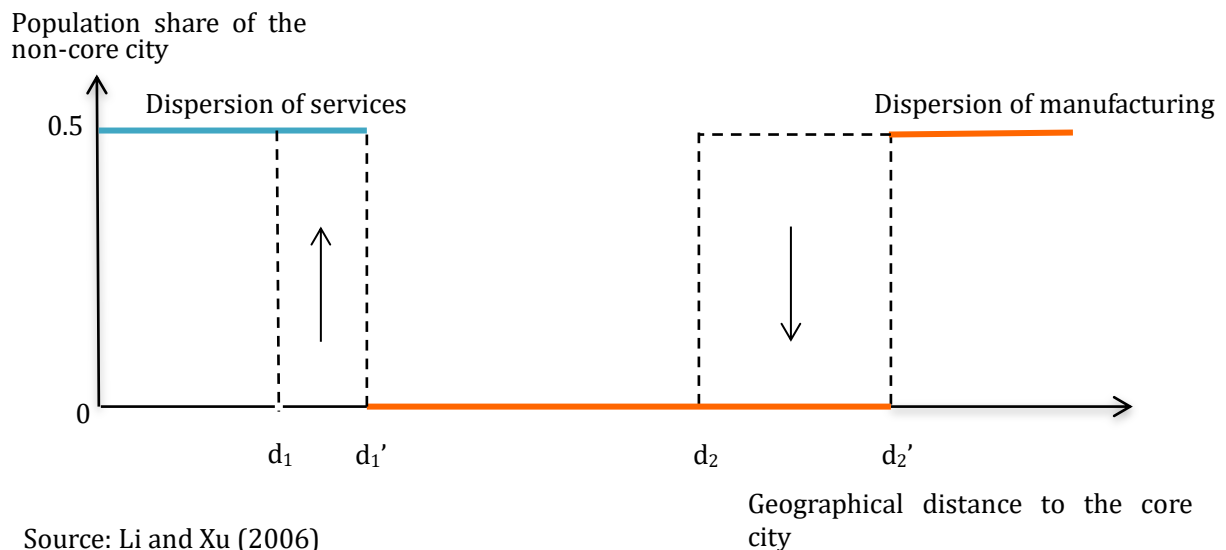
3.2 Dispersion of the services and manufacturing sectors according to geographical distance

Li and Xu (2006) incorporated the features of the HSR service (reduced travel time for inter-city passengers, but not for goods) into the model by Ottaviano, Tabuchi, and Thisse (2002). They argued that, when inter-city passengers' travel costs decrease relative to the urban cost in the core city, it becomes more attractive for workers to live and work in a "cheaper" non-core city, and then firms to move their offices to the non-core city in response to the higher urban costs that the workers bear in the core city.

The first dispersion of the services sector occurs when the HSR distance between the core city and non-core cities is shorter. In contrast, the manufacturing sector disperses to the non-core cities located at a greater distance from the core city, because the transportation cost between the core city and non-core city is too high to maintain the existing manufacturing facilities. Manufacturing firms adopt operational locations to achieve the maximum profit.

When the HSR starts operational services, the inter-city passenger's travel costs and journey time fall relative to that in the core city. Then, the services sector disperses beyond point (d_1) to point (d_1') (see Figure 1-4). Furthermore, this greater dispersion of the services sector will force further dispersion of the manufacturing sector from point (d_2) to point (d_2'). This shift means that the manufacturing sector will disperse beyond point (d_2).

Figure 1-4: Dispersion of the Services and Manufacturing Sectors Due to the Reduction of Travel Time



3.3 Findings from the empirical studies of Japan's HSRs

Given the above assumption, Li and Xu (2006) applied an econometric analysis to two HSR routes in Japan, the Tohoku Line (TL) and the Joetsu Line (JL), using the population and employment data by industrial sector (manufacturing and services) and by municipality (city) level. They obtained several interesting findings as follows:

- (1) Firstly, the effect of the Tohoku and Joetsu lines (TJL) on a non-core city varies by the distance to the core city. If the distance between a core city (Tokyo) and non-core city is short, rising urban costs dominate the dispersion force, leading to decentralization (positive impact). However, if the distance is greater, the TJL service leads to agglomeration of the population toward the core city (negative impact).
- (2) Secondly, the services sector's employment has increased in the non-core cities within a short distance from Tokyo (171km), but decreased in the non-core cities beyond this distance. By contrast, the manufacturing sector's employment has decreased within the shorter distance area up to 111kms from Tokyo, and increased in the non-core cities beyond that distance.
- (3) Thirdly, municipal cities within 60kms from the cities with a TJL station have suffered an outflow of the population, but municipal cities farther than 60kms away did not experience the same trend. This means that the cities neighboring the HSR stations suffer a negative impact due to the HSR service.

(4) Fourthly, the working-age population (15-64 years) was much more responsive to the TJL than the younger (less than 14 years) and older (over 65 years) population groups, and the younger population group was more responsive than the older group. These findings suggest that the relevant working age is the driver of migration, and children accompany their parents when they migrate.

4. The Change of the Landscape Due to the EEC's Development Scheme

Li and Xu (2006) predicted that the HSR service will reduce the travel time, and as a result the services sector will disperse from the core city to the non-core cities. Then, a simple question arises: when the Bangkok-Rayong HSR starts operating, what will happen within the EEC? The answer may be that the Bangkok-Rayong HSR will increase the services sector within the EEC region, but decrease in Bangkok. Then, what services sectors will increase within the EEC and decrease Bangkok, and what landscape changes will appear within the EEC?

4.1 Bangkok office functions

(1) The Tourism Country of Thailand

Bangkok is a great tourism city. The number of tourists visiting Thailand from overseas was 33.6 million in 2016, 9th place in the world ranking (Table 1-2). Considering the growth in the number of tourists in recent years, the country will achieve 6th place ranking by 2020.

Table 1-2 The World's Top 10 Countries by Number of Tourist Arrivals in 2016

	Tourist arrival (million persons)
1 France	82.6
2 United States	75.6
3 Spain	75.6
4 China	59.3
5 Italy	52.4
6 United Kingdom	35.8
7 Germany	35.6
8 Mexico	35.0
9 Thailand	32.6
10 Turkey	31.3

Source: United Nations World Tourism Organization

(2) Bangkok's Central Business District Function

Bangkok is more than the heart of a tourism city. Bangkok is becoming the central business district for southeast Asia. Various headquarters' functions are concentrated in Bangkok: (1) International procurement offices (IPO); (2) Regional headquarters offices (RHO); and (3) Trade and investment support offices.

Table 1-3 summarizes the number of BOI promoted companies whose activities include International purchasing offices (IPOs), Regional headquarters offices (RHOs), and Trade and investment support offices.

As of December 27, 2017, there are 556 International purchasing offices (IPOs) in Thailand. Among which 292 offices, 53 percent of the total, are located in Bangkok. As for the Regional headquarters offices (RHOs), there are 144 such offices in Thailand, of which 109 offices, 76 percent, are located in Bangkok. Similarly, there are 658 Trade and investment support offices in Thailand, of which 457 offices, 69 percent, are located in Bangkok.

These figures show that Bangkok is the central business district where various headquarters functions have agglomerated.

Table 1-3: The Number of BOI Promoted Companies with an International Procurement Office, Regional Headquarter Office, or a Trade and Investment Support Office Promoted Company, by Province, as of December 27, 2017

International Procurement Offices (IPO)			Regional Headquarter Offices (RHO)			Trade & Investment Support Offices		
Province	No. of company	% share	Province	No. of company	% share	Province	No. of company	% share
Bangkok	292	53%	Bangkok	109	76%	Bangkok	457	69%
Chon Buri	66	12%	Chon Buri	11	8%	Samut Prakan	58	9%
Samut Prakan	45	8%	Samut Prakan	8	6%	Chon Buri	43	7%
Rayong	43	8%	Ayudaya	6	4%	Rayong	31	5%
Ayudaya	40	7%	Pathum Thani	3	2%	Pathum Thani	24	4%
Pathum Thani	31	6%	Nonthaburi	2	1%	Ayudaya	12	2%
Chachoengsao	12	2%	Chachoengsao	1	1%	Chachoengsao	7	1%
Nakhon Ratchasima	8	1%	Rayong	1	1%	Nonthaburi	7	1%
Prachin Buri	7	1%	Prachuap Khiri Khan	1	1%	Prachin Buri	5	1%
Others	12	2%	Others	2	1%	Others	14	2%
Total	556	100%	Total	144	100%	Total	658	100%

Source: Compiled from the BOI Promoted Company Database by the author

(3) Bangkok's R&D and R&D Related Services

Furthermore, Bangkok provides many research & development (R&D) and R&D related services, such as laboratories, calibration and testing centers, which have agglomerated in Bangkok.

Table 1-4: The Number of BOI Promoted Companies with a R&D, Laboratory, Calibration and Testing, and Software Service, as at December 27, 2017

R & D			Laboratory, Calibration, and Test			Software		
Province	No. of company	% share	Province	No. of company	% share	Province	No. of company	% share
Bangkok	76	52%	Bangkok	41	43%	Bangkok	631	77%
Samut Prakan	12	8%	Pathum Thani	10	11%	Chiang Mai	44	5%
Pathum Thani	11	7%	Ayudaya	8	8%	Nonthaburi	44	5%
Rayong	11	7%	Chon Buri	7	7%	Pathum Thani	21	3%
Chon Buri	10	7%	Rayong	7	7%	Chon Buri	16	2%
Ayudaya	3	2%	Nonthaburi	5	5%	Khon Kaen	13	2%
Nakhon Pathom	3	2%	Samut Prakan	5	5%	Phuket	10	1%
Samut Sakhon	3	2%	Chachoengsao	4	4%	Samut Prakan	10	1%
Others	18	12%	Others	8	8%	Others	26	3%
Total	147	100%	Total	95	100%	Total	815	100%

Source: Compiled from the BOI Promoted Company Database by the author

Table 1-4, summarizes the number of BOI promoted companies whose activities cover R&D, and laboratory, calibration and testing services. Surprisingly, 76 R&D companies are located in Bangkok. This number accounts for 52 percent of the total of 147 R&D companies in Thailand. There are 95 laboratories and calibration and testing companies. Among which 41 companies, 43 percent, are located in Bangkok.

Software activities are also located in Bangkok. There are 815 software companies promoted by the BOI in Thailand, of which 631 companies, 77 percent, are located in Bangkok.

4.2 What services sectors will remain in Bangkok and grow in the EEC?

When the Bangkok-Rayong HSR service starts operating, what services may grow or disappear from Bangkok, and what services may grow in the EEC?

The International procurement office and Headquarters office functions may grow in Bangkok's central business district (CBD), and Bangkok will enhance the CBD function for Southeast Asia.

The tourism sector will develop further within the EEC's area. At the same time, the tourism sector in Bangkok will develop further thanks to expansion of Suvarnabhumi airport due to be completed by 2024.

However, services sectors that require a large office space, in particular, the BOI supported R&D and R&D support sectors will disperse to the EEC. The BOI has approved a list of target activities to be located in the Eastern Economic Corridor's Innovation (EECi) and the Digital Park Thailand (EECd).⁶ The EECi investment is divided into two groups: R&D and R&D support activities, and manufacturing or services sectors related to the six target industries; (1) Agriculture and biotechnology;

⁶ BOI Press Release No. 153/2017 (O.82) 18 December, 2017, “The BOI offers more attractive incentives for SMEs, and identifies the list of the target industries in the EECi and EECd.”

(2) High-performance batteries and next-generation vehicles; (3) Aviation; (4) Bioenergy and biochemical; (5) Automation machines, robotics and smart electronics; and (6) Medical instruments. The EECd investment is divided into two groups: R&D and R&D support activities, and digital business, including high value-added software, cloud services, data centers, and digital services. These activities will be eligible for special tax incentives under the EEC scheme; two more years of corporate income tax exemption on top of the normal incentives, and a 50 percent reduction for another five years. However, qualifying projects shall cooperate with human resource development as specified by the BOI.

With support by the BOI tax incentive investment promotion, various manufacturing services support functions will develop in the EEC, including R&D, laboratory, calibration, and testing center functions.

Table 1-4 summarizes the number of BOI promoted companies for R&D, laboratory, and calibration and testing centers by province. Currently, the BOI promotes 147 companies for R&D activities, of which, 76 companies, 52 percent of the R&D promoted companies, are located in Bangkok. Similarly, there are 95 companies that have obtained BOI promotion providing laboratory, and calibration and testing facilities, of which, 41 companies, representing 43 percent of all the promoted companies, are located in Bangkok. When the Bangkok-Rayong HSR service starts operating, many R&D, laboratory, and calibration and testing center facilities will move to the EEC.

4.3 What is missing in the EEC?

The EEC area has so much potential that high value-added and knowledge-based services will agglomerate. But, whether the EEC can achieve Industry 4.0, or whether the EEC can attract suitable human resources related to R&D and R&D support activities depends on how by much the EEC area can improve its living amenities so that researchers and their families want to live there.

The Bangkok-Rayong HSR service will only provide the necessary conditions for the EEC HSR stations' cities to be the new innovation city belt that will attract researchers and experts, but it is not the sufficient condition for that to occur.

However, if the Bangkok to Rayong HSR service operates at a frequency of every 30 minutes, it could attract a number of services sectors to the EEC, which may generate the virtuous circle that improves the living amenities in the EEC.

However, currently, many Japanese businessmen working in the EEC area leave their families in Bangkok, travel to the EEC area on a Monday morning and return to Bangkok on a evening, because the amenities in the EEC area are not as high as in Bangkok where foreign families can easily access shopping, restaurants, schools, preparatory schools, hospitals, and so on.

In globalization, where national borders are reduced, each city is in competition with the other, which means that Bangkok and the EEC cities are competitors, although also complementary.

Therefore, it is necessary for the major EEC cities to develop suitable inner-city transportation networks so that foreign families can live conveniently in a city just as they do in Bangkok. If Si Racha, Pattaya, Rayong, and Chachoengsao develop smart

city style inner-city transportation networks, they will attract researchers and experts.

4.4 The BTS service has changed the landscape of Bangkok

This modern railway transportation network has changed the landscape in Bangkok. More than two decades ago, when the Sukhumvit BTS line first started operating, there were few passengers. At that time, most workers, students, and business persons commuted by bus or car. However, now the landscape of Bangkok has changed so much, with a large number of condominiums and office buildings being constructed along the BTS lines, and many office workers, students, and foreign persons now commute by the growing number of BTS service routes. This landscape change is evidence that when cities provide efficient transportation networks, workers want to live there, and firms want to locate their offices accordingly, and this changes the landscape of the cities.

4.5 The Khon Kaen Tram Model

The Khon Kaen tram project is a good model regarding transportation development in a small and medium size city.

In Khon Kaen, 20 local tycoons invested 10 million baht each to establish the Khon Kaen Think Thank (KKTT), which plans to construct and operate the 26km tram project (Tangkitvanich 2017). The KKTT collaborated with Khon Kaen University, the biggest potential user of the tram service, and has estimated that forty thousand people would use this service to travel to work and study per day. Eighteen tram stations will be constructed along the route, and 115 tram cars, assembled in Thailand, will service the line. The KKTT cooperated with six municipalities along the tram service route in order to establish the Khon Kaen Transit System (KKTS) company. The KKTT will raise funds from the general public through Internet crowd funding, and finally list on the Stock Exchange of Thailand.

An efficient light railway system is crucial for development of the city, but the problem is the very high construction and operating costs. In this regard, the cost of the tram cars is less than that of any other light railway system.

Providing inner- and inter-city tram services is a solution to attract human resources, in particular experts from overseas. If the areas for business, R&D sites, universities, and the commercial and residential areas in Si Racha and Pattaya are efficiently networked with tram services, as well as well adopting smart technology, Si Racha and Pattaya will become new innovation centers that can attract high quality human resources and their families as residents.

4.6 Extension of light train network to the inland EEC cities

Similarly, and importantly, the HSR station cities will benefit, but conversely the other inland EEC cities will lose, as the labor force will move from the region's inland cities to the HSR station cities.

In order to avoid this, the light rail network should extend to the inland cities, so that workers living in the inland cities can commute to work in the HSR station cities. Then, workers living at home can do agricultural works on holidays, which will not decrease agricultural production.

In Japan, many firms and governmental organizations cover the commuting cost

between home and office of the worker, either by providing one (or three-, or six-) month travel card, or by providing a commuting travel allowance, which is not assessed income by the Tax Office. This commuting allowance system has contributed to development of the inland cities in Japan.

Summary

1. The Bangkok-Rayong HSR service will run at a maximum speed of 250kms/h and links the three airports of Don Mueang, Suvarnabhumi, and U-Tapao in less than one hour if a non-stop service is provided between the stations, which will shorten the travel time distance between Bangkok and the EEC.
2. Currently, various services sectors, such as international procurement, regional headquarters, and trade and investment support services, software, R&D, laboratory, and calibration and testing facilities have agglomerated in Bangkok. The Bangkok-Rayong HSR service will disperse some of these services, in particular R&D, laboratory, and calibration and testing facilities that require more space.
3. Currently, many foreigners and Japanese work during the week in the EEC, but leave their family in Bangkok, due to the low living amenity level in the EE region. Therefore, successful development of the EEC depends on how the Bangkok-Rayong HSR station cities will be able to raise their living amenities' standard to equal that enjoyed by residents living in Bangkok.
4. However, development of the EEC will be limited to the area around the Bangkok-Rayong Line station cities. Other inland EEC cities will not benefit, as the labor force will move to the Bangkok-Rayong HSR station cities.
5. In order to avoid such unbalanced development, and attract high level human resources, an inner-city train/tram service extending to these inland EEC cities is necessary.
6. Improved living amenities are one of three fundamental conditions required for successful development of the EEC

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