CHAPTER 6

Policy Recommendations for Regional Integration in East Asia

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CHAPTER 6

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Akifumi Kuchiki

INTRODUCTION

There are three key issues of concern to the Economic Research Institute for ASEAN and East Asia (ERIA) when one talks about regional integration of East Asia: deepening integration, narrowing gaps, and sustaining growth. When it comes to narrowing gaps, focus is on the development of Cambodia, Lao, Myanmar, and Vietnam (CLMV). While there are many large industrial agglomerations or clusters in East Asia, there are none in Cambodia, Lao, and Myanmar. It may be difficult to narrow the gaps in East Asia without any industrial clusters in Cambodia, Lao, Myanmar, and Vietnam.

Kuchiki (2008) finds that the flowchart approach to industrial clusters is key to a successful industrial cluster policy in CLMV. Kuchiki and Uchikawa (2009) and ERIA, meanwhile, try to find ways for CLMV to develop industrial clusters in some cities, although no attempt has been done to attract foreign investors to its export processing zones. Missing here are policy measures that will allow certain instruments to push Asian countries to free themselves from their low equilibrium trap.

This chapter presents recommendations on how industrial clusters can establish an export processing zone in the cities of CLMV. The strategy of our flowchart approach

to an industrial cluster policy is an unbalanced growth under the conditions of an open economy and decentralized governance. This flowchart approach suggests that we should find actors who can drive the implementation of policy measures in Hanoi and Danang in Vietnam; Yangon in Myanmar; Savannakhet and Vientiane in Lao; Sihanoukville and Phnom Penn in Cambodia; Guangzhou in China; and Eastern Seaboard in Thailand.

The policy recommendations based on the flowchart approach for ERIA are as follows:

- First, export processing zones are needed to lure in anchor firms because the domestic markets of each CLMV nation are small;
- Second, with regard capacity building, physical infrastructure for foreign direct investment in the labor-intensive manufacturing industry should be strengthened;
- Third, incentives for anchor firms such as cheap land prices, the roads-and-railways construction for the firm, and the establishment of international hospitals and schools, are effective in inviting them to export processing zones; and
- Fourth, the flowchart approach makes clear who are the players in the formation of an industrial cluster at each step of the flowchart.

The following points were further picked up from interviews regarding the cities' investment environment: First, by inviting foreign direct investment into the labor-intensive manufacturing industry with a high value for backward linkages to

213

export processing zones, the score of the eastern seaboard area in Thailand is more than that of Guangzhou and, in fact, is the highest among the cities. Second, the scores of the other cities have minor differences. Third, the score of Vientiane can be higher than the scores of the other cities if it were to create physical infrastructure such as ports and a water supply system.

This analysis tells us how ERIA's policy recommendations can affect the future of East Asia's regional integration. First, the eastern seaboard region in Thailand closely competes with Guangzhou in inviting foreign investors in the labor-intensive manufacturing industry. It is unlikely that Chinese manufacturing industries will export all manufacturing products to Thailand when the manufacturing industry in Thailand does not hold. Second, the labor-intensive manufacturing industry of Guangzhou may shift from Guangzhou to other cities such as those in inland China and northern Vietnam. The Guangzhou municipality will not allow foreign investors in labor-intensive manufacturing industries to establish their plants in Guangzhou. Third, the countries of Cambodia, Laos, Myanmar, and Vietnam might catch up with the advanced ASEAN in terms of competitiveness of the labor-intensive manufacturing industry if physical infrastructure, including electricity supply and communication, is supported. After all, supporting physical infrastructure is relatively easier to achieve in the short term than do human resource development.

Section 2 re-examines development theories in the past including those by Hirschman (1958). Section 3 reclassifies industrial clusters by using Markusen (1996) and Iammarino and McCann (2006). Section 4 defines our flowchart approach to an industrial cluster policy. Section 5 explains the development of the automobile industry cluster policy in the eastern seaboard in Thailand and the electronics industry

214

cluster policy in northern Vietnam using the flowchart approach. The interview method was also used to find the bottlenecks of the industrial cluster policy. Section 6 applies the flowchart approach to cities in CLMV. Section 7 concludes the chapter.

1. RE-EXAMINATION OF DEVELOPMENT STRATEGY

Table 1 shows development theories and growth strategies. There is a critical minimum level of per-capita income that must be reached so as sustained growth can take place. To escape the low-level equilibrium trap, per-capita income must rise to the critical minimum level. Leibenstein (1957) explains that, on the big push, the dampening forces causing a country to operate below the critical minimum rate of growth include (a) population growth and the reduction in available capital per worker; (b) a rise in the incremental capital-output ratio; (c) insufficient stimulus to entrepreneurial activity; and (d) resistance to new ideas, technical progress, and non-productive conspicuous consumption.

Lewis (1954), Ranis and Fei (1961), Jorgenson (1967), and others have discussed a dual economy. The Lewis model consists of the traditional agricultural marginal products. It argues that economic growth requires structural change in the economy whereby surplus labor in traditional agricultural sector migrates to the modern industrial sector. A modern economy is needed to give employment opportunities to redundant labor in the traditional economy. Hirschman (1958) proposes fostering industries with high values of backward linkage effects at growing points or poles. In Hirschman's theory of unbalanced growth, leading sectors induce growth in other sectors. Individual firms create backward linkages through the purchase of input in the local

Table 1: Development Theories

vicious cycle of poverty: Nurkse: exists in developing countries.
 low level equilibrium trap: Nelson

(1) big push: Rosenstein: is needed to take off.

(2) critical minimum

(3) take-off: Rostow

(1) dual economy: Lewis: exists.

balanced growth unbalanced growth the manufacturing industry leads the economy. Hirschman: backward linkage

Harrod-Domar model: capital Solow: technological progress Romer: human capital

Source: Author.

market or they create forward linkages by selling output as intermediate input to other local firms. A theory regarding protection of infant industries supports Hirschman's recommendation on the import substitution policy in domestic industries. That is, the government should foster domestic industries by intervening in the dynamic market failure and protecting the industries of import substitution.

Table 2 shows the changes in external conditions. Although a closed economy, protectionism and centralization dominated the economies before the 1980s, there was a marked change in the economic conditions after the 1980s. Reaganomics, the Open-Door Policy, and the Structural Adjustment Policy by the World Bank promoted the shift from the planned economy to the market economy, and international trade and investment were liberalized.

Economies moved away from the import substitution policy that dominated the

era before the 1980s, and toward the export-led policy that the World Bank called the "export push strategy adopted in Asia" in *East Asian Miracle*, a book published in 1993. The most important change in the development strategy, however, was that Asian economies introduced foreign direct investment (FDI) to export processing zones, special economic zones, or free trade zones by liberalizing the inflow of foreign investment. Development strategy changed from the import substitution policy to the export-oriented policy in the 1980s and 1990s. Most Asian economies positively and slowly introduced foreign direct investment and established a "flying geese" pattern of development.

In 1997, this industrial policy lost momentum when the Asian economies, including South Korea and Japan, faced economic crises originating from the Asian currency crisis. Asian countries focused on export processing zones, free trade zones, or special economic zones as the growth strategy, but experienced bottlenecks. Efforts were made to solve these bottlenecks from hereon.

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Asian nations gave emphasis on institutional reforms after Mr. Wolfensohn

217

| | A. External conditions | | |
|----------------------------|-----------------------------------|---------------------|----------|
| the 1950s | the 1980s | the 1990s | 2008 |
| 1. Closed | | 1. Open | same |
| 2. Protection | | 2. Liberalization | same? |
| 3. Centralization | | 3. Decentralization | same |
| Import substitution policy | 1. Reganomics | | |
| : Industrial policy | 2. Open door policy: China | | |
| (until 1997) | 3. Structural Adjustment Program: | Market mechanism | Economic |
| (low interest policy etc.) | World Bank | Third Oil Crisis | Crisis |

Table 2: The Changes due to the External Conditions

| | <u>B. Changes due to external conditions</u> | i | 2008 |
|-------------------------|--|-------------------------------|-------|
| 1. Demand | | Enclave: EPZ-FDI led growth | |
| (1) Domestic demand | | (2) Export | |
| import substitution | | export-led growth | same |
| 2. Investment | | | |
| (1) Domestic investment | | (2) Foreign investment | |
| | | foreign direct investment | same |
| <u>3. Player</u> | | | |
| (1) Central government | | (2) Local governments | |
| industrial policy | | indstrial cluster policy | |
| | | | |
| | C. Official Development Assistance | PRSP (growth ->equity) | 2008 |
| Physical capital: | | Capacity building | |
| Social overhead capital | | (1) physical capital | same |
| | | (2) human capital | same |
| | | (3) institutions(governance) | same |
| | | (4) social capital(community) | Isame |

No more H.O. theorem depends on transport costs.

Source: Author.

became the World Bank president. Under the growth theory, the Harrod (1939)-Domar (1946) model emphasizes the importance of physical investment---that is, social overhead capital. The Solow (1956) model clearly illustrates that technological progress contributes to economic growth, and Romer (1986) explains that human capital is the origin of economic growth. We could understand why economic growth needs physical investment, technological progress, and human resource development. There are two types of investment: domestic and foreign. Domestic investment played central roles in economic growth before the 1980s, while foreign investment took the rein after the 1980s. Official development assistance focused on physical infrastructure before the 1980s. In contrast, it emphasized the importance of human capital, institutions, and social capital after the 1980s.

Hence, economics lost its weight in development strategies while sociology and politics were slowly given more attention. Papers on poverty reduction strategies began to be published since 1998 as institutional reforms became increasingly important. Official development assistance (ODA) helped introduce market economies into developing economies and instituted laws and regulations for good governance and transparency. The papers promoted capacity building as a development strategy and made it clear that institutional reforms are an integral part of economic growth. Governance became the first priority of institutional reforms in developing countries. In particular, how to control corruption was one of the most serious issues tackled in the reform process.

In summary, unbalanced growth is needed to get away from the vicious cycle of poverty. The growing industry may belong to one with high backward linkages. International trade and investment have been liberalized since the 1980s. While Hirschman (1958) recommends protection of domestic firms before the 1980s, his unbalanced growth strategy now ought to be introduced under an environment of liberalized international trade and investment. One of the strategies is to support the industrial cluster policy.

2. FLOWCHART APPROACH TO INDUSTRIAL CLUSTER POLICY

Markusen (1996) classifies industrial districts into five: Marshallian industrial district,

Italian variant, hub-spoke districts, satellite industrial platforms, and state-anchored industrial districts. The *Marshallian industrial district* is a traditional industrial agglomeration whose business structure is dominated by small locally owned firms. It has its recent *Italian variety*. *Hub-and-spoke districts* are dominated by one or several large, vertically integrated firms in one or more sectors, surrounded by smaller and less powerful suppliers. The smaller firms are quite dependent upon the anchor firm. *Satellite platforms* are a congregation of branch facilities of externally based multi-plant firms. *State-anchored districts* have their business structure dominated by one or several large government institutions such as military bases, state or national capitals, and large public universities, surrounded by suppliers and customers.

Iammarino and McCann (2006) classify industrial agglomerations into pure agglomeration, industrial complex, and social network. In the *pure agglomeration* model, inter-firm relations are inherently transient. Firms are essentially atomistic in the sense that they have no market power. The *industrial complex* is characterized primarily by long-term stable and predictable relations between firms in a cluster. *Component firms* within the spatial cluster each undertake long-term investments so as to become part of the grouping. The rationale is that proximity is required to minimize inter-firm transport transactions costs. The *social network* model argues that mutual trust relations between key decision-making agents in different organizations. These trust relations are manifested by a variety of features such as joint lobbying and informal alliances. Trust relations are assumed to reduce inter-firm transactions costs. The paper argues how an observed industrial cluster may evolve over time and uses examples to illustrate the typical evolutionary paths and transitions industrial clusters

take.

The evolutionary process of the automobile industry is from pure agglomeration to industrial complex. That of the high-fashion garment industry clusters is from old social network to new social network, or to pure network. The evolutionary transition of the Silicon Valley clusters is from old social network to new social network to pure agglomeration. On the other hand, no real evolutionary path is discernible in the case of the Scottish Electronics Industry.

Hershberg, Nabeshima and Yusuf (2007) provide an overview of papers on the university-industry linkages (UILs) and national innovation systems (NISs) in Asia. Some of the conclusions of their study are:

- Leading universities in Korea and Singapore have only recently begun giving more attention to research and its commercialization;
- (2) Economies in East Asia, especially Japan, Korea, and Taiwan, are slowly changing the way their universities and research institutes interact with firms;
- (3) Leading university and research institutions are unlikely to be satisfied with their traditional roles of educating and imparting science and technology skills; and
- (4) Contracting out research to universities, entering into alliances with research institutes, and collaborating with university researchers can confer substantial advantages.

Meanwhile, Kuchiki and Tsuji (2008) propose a flowchart approach to an industrial cluster policy. The authors think the reclassification of industrial clusters by Markusen (1996) is effective in implementing an industrial cluster policy based on the

221

Asian growth experience.

Figure 1 shows the new classification consisting of four dimensions: (1) The existence of industrial zones or industrial parks; (2) Type of ownership of anchor firm (Public, private or semi-public); (3) Type of linkage (Backward linkage, forward linkage or little linkage); and (4) Phase in the agglomeration process--i.e., First step of agglomeration, the second step of innovation, or the third step of innovation with university-industry linkages and national innovation systems.

The first dimension determines whether industrial zones or science parks exist or not. Markusen (1996) illustrates Manaus Export Processing Zone in Brazil and the

Figure 1: An Asian growth model:



Flowchart Approach to Industrial Cluster Policy

Source: A. Kuchiki.

UIL: university-industry linkage

NIS: national innovation system

Research Triangle Park in U.S.A. as satellite platforms. Satellite platforms are cases where industrial zones or science parks exist while industrial agglomerations without industrial zones are possible to exist.

The second dimension pertains to the type of ownership: public, private, or semi-public. The hub referred in the hub-spoke type in Markusen's paper is an anchor firm that may be owned by either the public sector or the private sector. In general, hub firms are considered to be multinational corporations, particularly in the automobile and electronics industries. Markusen takes Toyota, a Japanese automobile firm in Toyota City, Japan as an example. In contrast, Proton of Malaysia, Maruti Suzuki of India, and First Automobile Works Group of China are owned by the public sector. Many governments in Asia had established automobile firms and tried to form an automobile industry cluster.

The third dimension relates to the linkage of an anchor firm: Backward linkage, forward linkage, or minimal linkage. A close industrial linkage will strengthen the relationship between a hub firm or anchor firm, and spokes. The automobile assembly industry, for instance, has a high value of industrial linkage since an automobile is composed of more than 20,000 parts and components. An ink jet printer in the electronics industry is composed of 800 parts and components. The size of an industrial agglomeration---or the number of spokes---depends on the strength of the industrial linkage between a hub firm and its spoke firms.

The fourth dimension refers to the phase of the agglomeration—whether it is at the first step of agglomeration, the second step (innovation), or the third step (innovation plus university-industry linkages and national innovation systems). The dynamic evolution of industrial clusters will depend on the change in transaction costs, according

to Iammarino and McCann (2006). We apply their theory to the Asian experiences in the following: Pure agglomeration, according to the authors, corresponds to the first step of our flowchart approach. This is a case where firms agglomerate without innovation. This will evolve into the second step once innovation in the agglomeration sets in. In the third step, innovation is positively active due to university-industry linkages and national innovation systems.

Let us now analyze the Asian growth experiences since the 1980s using Kuchiki and Tsuji's flowchart approach and the four dimensions. Figure 1 shows the results. In an Asian growth model, an industrial zone is constructed during the first dimension, foreign investors are invited as anchor firms to the industrial zone during the second dimension, and related firms agglomerate at the third dimension, which then results in the first step of industrial clustering under the flowchart approach. Figure 2 is a prototype model of the third step, involving innovation with university-industry linkages and national innovation systems.

Our aim in all these is to create a flowchart that identifies conditions or factors that can make an industrial cluster a success.

2.1. Step I: Agglomeration

Figure 3 illustrates our flowchart approach. First, we ask whether industrial zones have been established. If they have not, we must decide which actors should establish such zones. Once these actors are identified, we return to the main stream of the flowchart.

Next, we move to the flowchart's second step, where capacity building takes place



Figure 2: Flowchart of Innovation by University, Industry and Cluster

after industrial zones are established. We examine whether there is adequate water supply for the industrial zones. We then proceed further to examine the zone's power supply, communication, and transportation systems.

After reviewing the physical infrastructure, we move to see whether institutions are in place. The central and local governments must institutionalize national tax systems



Figure 3: The Industrial Cluster in the ZSP

Source: Author.

and local tax systems, respectively. It is a well known fact that one-stop investment procedures are crucial in attracting foreign investors.

In the area of human resource development, an abundance of unskilled labor with a high literacy rate is a necessary condition if one were to lure foreign investors into employing inexpensive labor. At times, an industrial cluster can face a shortage of skilled labor after industrialization takes place. In this case, universities and on-the-job training centers for innovation are needed for further development.

Living conditions are crucial, too, in attracting foreign investors. The staff members from investor companies will be motivated to work hard if they can enjoy their lives. Ergo, it is important to create satisfactory conditions in such areas as housing, schooling, medical care, etc. These are the final conditions that must be satisfied so as to bring in anchor firms. An anchor firm here is defined as one belonging to the manufacturing industry and has a high value of backward linkage in its input-output relationship.

2.2. Step II: Innovation

Intellectual property rights should be enforced in Step II (innovation), as is shown in Figure 3. Figure 4 gives the positions of industry-universities linkages and national innovation systems. Figure 5 features the case of the biotechnology industry in Singapore. There are two sets of preconditions that must exist for Step II: (1) Related services: finance and insurance, logistics, marketing companies, repair shops, used car shops; and (2) Professional and other services: lawyers, restaurants, retail shops, and tourism.

As is shown in Figure 6, the factors that can lead one to proceed beyond Step II of innovation are (1) universities and research institutes; (2) capacity building in infrastructure, institutional reforms, human resources, and living conditions; and (3) anchor persons.





Source: Author.

Figure 5: The Biology Industry Cluster in Singapore: The roles of parks, anchor persons and capacity building



Source: Compiled by A. Kuchiki.

Collective action points that must be taken to move the industry cluster to Step II may include facilitating cluster skill centers; establishing collective projects; creating business associations; and taking branding 'linear instruments' and an interactive approach toward policy instruments for innovation. Such linear instruments may be in



Figure 6: Factors of Proceeding Step II of Innovations

Source: Author.

terms of direct R&D aids; transfer of research-based knowledge to firms; financial support. Interactive approaches, on the other hand, may be in terms of improving institutions and programs providing technology transfer services and implementing a policy that will stimulate networking and business clusters.

The illustration here only focused on the minimum number of required factors---i.e., universities and research institutes; capacity building; and anchor persons---to simplify the flowchart of Step II and prioritize policy measures. Most Asian countries are located right at the entrance of Step II of innovation. We cannot find many experiences in Asia on Step II. Therefore, Step II remains a hypothesis to be further examined.

Figure 7: Agglomeration of the Biotechnology Industry



Source: Author.

Note that the flowchart approach to the biotechnology industry cluster policy and the information technology industry policy of Figure 7 and Figure 8, respectively, are different from that of the manufacturing industry cluster policy of Figure 3.

3. FLOWCHART APPROACH TO EASTERN SEABOARD DEVELOPMENT PROGRAM OF THAILAND

3.1 A Prototype model of Asian growth

A prototype model of Asian growth since the 1980s consists of four characteristics. First, the industry is labor intensive. Second, foreign direct investment is used. Third,

Figure 8: Agglomeration of the Information Technology Industry



Source: Author.

the industry has high value of backward linkages in the industrial input-output relationship. Fourth, export processing zones are used for export-oriented growth. This section proposes a prototype model of the flowchart approach in the automobile industry cluster in Asia (Figure 9).

Spatial economics identifies three conditions for industrial agglomeration in the said cluster in Figure 9. The first is the reduction in transportation costs after the construction of new ports, railways, and roads. The second is the generation of monopolistic nature of Mitsubishi Motors' investment, which will create rent. The third is economies of scale by external economies, as an offshoot of the networking activities between an anchor firm and its related firms. All three conditions for industrial agglomeration are satisfied by the eastern seaboard region, with Mitsubishi Motors as

Figure 9: A Prototype Model of Asian Growth: Flowchart Approach to Eastern **Seaboard Development:**

| Mitsubishi Motors | | | | | | |
|--|------------------|--------------------|-------------------|---------------|--|--|
| | | | (Unit: 100 millio | n yen) | | |
| | Loan contracat | Loan completion | Loan executed | Total of loan | | |
| | agreement | | | executed | | |
| Leamchabang Port | 9/1984 | 6/1993 | 31.78 | | | |
| | 11/1986 | 11/1993 | 48.42 | | | |
| | 2/1990 | 9/1995 | 58.68 | 138.88 | | |
| V | | | | | | |
| Nongkho/Laemchabang Water Pipeline | 9/1984 | 4/1987 | 1.03 | | | |
| | 10/1985 | 10/1990 | 4.75 | | | |
| Nongplalai Construction | 9/1988 | 1/1995 | 32.26 | | | |
| Maptaphut/Sattahip Water Pipeline | 11/1988 | 3/1994 | 10.52 | | | |
| Nongplalai/Nongkho Water Pipeline | 2/1990 | 6/1995 | 1.56 | 50.12 | | |
| | | | | | | |
| Leamchabang Industrial Estate | 10/1985 | 10/1992 | 25.76 | | | |
| | 9/1987 | 9/1992 | 19.89 | 45.65 | | |
| \checkmark | | • | | , | | |
| Railway Projects | | | | | | |
| Siracha/Leamchabang | 9/1988 | 7/1996 | 9.2 | | | |
| Sattahip/Maptaphut | 9/1988 | 1/1997 | 28.26 | | | |
| Khlong19/Kengkoi | 2/1990 | 12/1999 | 72.98 | 110.44 | | |
| ¥ | | • | | · | | |
| Road Projects | 7 | | | | | |
| Chonburi/Pattaya | 11/1988 | 3/1994 | 40.74 | | | |
| Bangkok/Chonburi | 12/1990 | 4/1993 | 134.35 | | | |
| Outer Bangkok Ring | 12/1990 | 4/1993 | 128.28 | 303.37 | | |
| | • | • | • | 648.46 | | |
| Mitsubishi Motors (Thailand) | Established in 1 | 992 | | | | |
| | | 002 | | | | |
| Its suppliers | 7 | Main suppliers for | Mitsubishi Moto | rs | | |
| | SUMMIT SHOW | | | 0 | | |
| | | TA MANI IFACTURI | | | | |
| | | |) | | | |
| | Leamchahan | Inductrial Fete | | | | |
| Industrial agglemention | ISUMMIT AUTO | BODV INDUSTRY | | | | |
| | | | | | | |
| | SUMMIT AUTO | | TD. | | | |
| | | | | | | |
| | | ARNESS CO., LIL | | | | |
| | | | JU., LID. | | | |
| | Samutprakan | retecture | | | | |
| Nata:1 Protations model of Asian Crowth | | | | | | |
| THOLE. I. FTOLOLUDE HOUEL OF ASIAN GROWL | 1 | | | | | |

(1) Labor intensive with high value of industrial backward linkage

(2) Export led growth

(3) Foreign direct indepent

to make use of introducing foreign direct investment

in the labor intensive manufacturing industries with high value of industrial backward linkage

2. The explanation of spatial economics

(1) the projects of ports, railways and roads to reduce transport costs

 $(2) {\it monopolistic \ competition \ generates \ rent \ by \ Mitsubishi \ Motor's \ invetment}$

(3) economies of scale is generated since anchor firms lead to network companies

due to backword linkage in the industry

Mitsubishi Motor as an Anchor Firm in the cluster of Eastern Sea Board Region 420ha: the number of the newly employed is abour 30 thousands.

Source: Kuchiki, A. and T. Gokan based on Shimomura (1996).

the anchor firm.

We can further find a prototype model of our flowchart approach in the industrial cluster at Laemchabang in Thailand, still located at the eastern seaboard region. The loan contracts on the Laemchabang Port project as well as the Laemchabang Water Pipeline Project were agreed in 1984. Meanwhile the loan contract of the Laemchabang Industrial Estate was agreed in 1985, followed by contracts on railways and roads in 1988. It took 11 years from 1982 to 1999 at the total cost of around US\$680 million to complete the flowchart process in Table 1.

Mitsubishi Motors as an anchor firm announced its set-up in the Laemchabang Industrial Estate in 1992. Its related firms as well as companies under a local conglomerate---Summit Showa, Summit Kurita, and Thai Summit Harness--agglomerated around the same period. Other firms under this same local conglomerate---Summit Auto Body, Summit Auto Seats, Summit Steering Wheel, Thai Summit Harness are located in the Samutprakan Prefecture.

3.2. Eastern Seaboard Development Program of Thailand

Thailand's National Economic and Social Development Board (NESDB) in 1985 reviewed the Eastern Seaboard Development Program to develop the nation's heavy industry. The Eastern Seaboard Development Program consisted of making Laemchabang a location for export-oriented industries and Map Ta Phut as a core district of the heavy industries utilizing natural gas yielded from the Gulf of Thailand. The Laemchabang Plan included the construction of the Laemchabang Industrial Estate as well as of other related infrastructure projects (i.e., water supply system, port, railway, and roads). The estate was to include an export processing zone and a general industrial estate. Also, the East Coast Water Resources Development Project was agreed in 1982 and completed in 1984. After all, firms in the labor-intensive manufacturing industry cannot operate without water supply.

The Eastern Seaboard Development Program intended to alleviate the concentration of population and industries in the Bangkok metropolitan area (Watanabe 2004). Laemchabang Port was designed to be a new deep sea port and a substitute for Bangkok Port since Bangkok Port is a river port while cargoes from and to Bangkok need to be transhipped at either the Hong Kong Port or Singapore Port as a hub.

Japan International Cooperation Agency (or JICA, formerly the Overseas Economic Cooperation Fund) financed 27 loans for 16 projects of the program, with the total loan commitment amounting to ¥178.8 billion (US\$178 million at the exchange rate of 100 yen per dollar). Today, Thailand hosts the assembling factories of Honda, Toyota, Nissan, Mitsubishi, Isuzu, Ford, and GM, with 760,000 cars exported and domestic sales hitting over 600,000 in 2008 (Ariga and Ejima 2000; and Lecler 2002).

Specifically, the Laemchabang Region Development Plan consisted of the Laemchabang Port Development and the construction of the Laemchabang Industrial Estate. The Development Project of Laemchabang Port has three loan contracts. The first, second, and third loan commitments were ¥3.178 billion (US\$31.78 million) starting from September 1984, ¥4.843 billion from November 1986, and ¥5.868 billion from February 1990, respectively. Laemchabang Port started to operate in January 1991, and ultimately ranked the 21st in the world, higher than Japan's Yokohama Port in 2008.

Under the initial plan, the Laemchabang Industrial Estate has been designed to

serve export-oriented light industries, but many heavy industries such as the automobile and electronics companies for the domestic market have moved in. It covers 420 hectares in 1999. The total amount of disbursed loan was ¥576 million starting from 1985 and ¥1989 million starting from 1987. Laemchabang Industrial Estate covers about 520 hectares in 2009. About 90 firms have moved in, and about 300,000 people are employed at the estate. Industrial Estate is also located in Laemchabang, covers about 125 hectares, and is composed of about 70 firms and 200,000 employees. In comparison, the average area of industrial zones in Asia is 400 hectares, where firms employ from 20,000 to 50,000 people.

Figure 10 shows how the automobile industry has agglomerated along Route 331. Gateway City Industrial Estate is located in the eastern seaboard area along this route. It enjoys a 50 percent tax exemption on imported machinery equipment for seven years, and an exemption on import tariffs of raw materials for one year for exported products. Toyota is located in the estate, together with Isuzu, Obayashi and Kansai Paint. Toyota Thailand started with a capacity of 200,000 when it moved into the estate in 1996, although it was established in 1964. Along with the automobile industry, Chonburi Industrial Estate, Eastern Seaboard Industrial Estate, and Amata City Industrial Estate are located along Route 331.

Thailand is divided into three types of zones and each zone has its tax preferences, specifically the exemption from import taxes and reduced corporate tax. Exemption periods from corporate taxes are five years at Zone 1, seven years at Zone 2 and eight years at Zone 3 in 2009. Zone 2 covers Chonburi Industrial Estate, Eastern Seaboard Industrial Estate and Amata City Industrial Estate, together with Gateway City Industrial Estate. The region along Route 331 is called Detroit in the East.

Figure 10: Asian prototype model:

| Cluster | |
|------------|--|
| Road 331 (| |
| National | |
| Motor: | |
| Toyota | |
| firm: | |
| Anchor | |

| onburi Industrial Estate stern Seahoard Industrial Estate |
|--|
| ata City Industrial Estate |
| teway Industrial Estate |

| | | | (Unit: 100 million yen) | |
|---------------------|----------------|-----------------|-------------------------|---------------|
| * | Loan contracat | Loan completion | Loan executed | Total of loan |
| Railway Projects | agreement | | | executed |
| Siracha/Leamchabang | 9/1988 | 7/1996 | 9.2 | |
| Sattahip/Maptaphut | 9/1988 | 1/1997 | 28.26 | |
| Khlong19/Kengkoi | 2/1900 | 12/1999 | 72.98 | 110.44 |
| ~ | | | | |
| Road Projects | | | | |
| Chonburi/Pattaya | 9/1991 | 1/1977 | 45.13 | |
| Bangkok/Chonburi | 9/1993 | 1/2000 | 185.72 | |
| Outer Bangkok Ring | 9/1993 | 1/2000 | 119.44 | 350.29 |
| ^ | | | | 460.73 |
| | | | | |

Toyota Motor (Gateway I. E.) Established in 1996.

| Its suppliers | | Main suppliers for | Toyota |
|--------------------------|--|--------------------|---|
| | TOYOTA AUTO BODY THAILAND CO., LTD | Samutprakarn | Samrong Plant |
| | THAI AUTOWORKS CO., LTD | Samutprakarn | Teparak Plant |
| | THAI KOITO CO., LTD | Samutprakarn | Samutprakarn Plant |
| * | NHK SPRING(THAILAND) CO., LTD | Samutprakarn | Bangpoo Ind. Estate Plant |
| Industrial agglomeration | TOYOTA MOTOR THAILAND CO., LTD | Chachoengsao | Gateway City Industrial Estate Plant(Passenger Car Plan |
| | TOKAI RIKA (THAILAND) CO., LTD | Rayong | AmataCity City Industrial Estate Plant |
| | TOYODA MACHINE WORKS (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| | YOROZU (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| | DENSO(THAILAND) CO., LTD. | Chachoengsao | Wellgrow Industrial Estate Plant |
| | KOYO STEERING (THAILAND) CO., LTD | Chachoengsao | Bangna-Trad Plant |
| | KOYO MANUFACTURING (THAILAND) CO., LTD | Chachoengsao | Bangna-Trad Plant |
| | NHK SPRING(THAILAND) CO., LTD | Chachoengsao | Wellgrow Industrial Estate |
| | SIAM TOYOTA MANUFACTURING CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| | DENSO(THAILAND) CO., LTD. | Chonburi | Amata Nakorn Industrial Estate Plant |
| | TOYODA GOSEI (THAILAND) CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| | TOYODA GOSEI RUBBER(THAILAND) CO., LTD | Samut Sakorn | Samutsakom Plant |
| | SIAM TOYOTA MANUFACTURING CO., LTD | Bangkok | Lardkrabang Plant |

Source: A. Kuchiki & T. Gokan.

The Map Ta Phut area consists of an industrial estate and an industrial port intended for the heavy industry. The industrial estate covers 380 hectares while the industrial port project includes a multi-purpose berth and a cargo berth. Siam Group, a local conglomerate, is located at the Map Ta Phut Industrial Estate.

The Water Pipeline Project was implemented in 1984---around the same period that the Laemchabang and Map Ta Phut areas were being developed. Highways projects between Chonburi and Pattaya, and between Bangkok and Chonburi were agreed in 1988 and 1990, respectively, while the Outer Bangkok Ring Road project was agreed in 1990. As a whole, the water pipeline project of 1984 was the first project and the road project in 1988 was the last in the program to build the area's infrastructure capacity (Figure 1).

One of the crucial factors in industrial agglomeration is not geographical distance but the required transit time between firms within an agglomeration. The required transit time of trucks from Bangkok to Chonburi Industrial Estate in Chonburi Prefecture averages one hour and ten minutes without congestion; that from Bangkok to Rayong Industrial Estate is two hours, and that from Bangkok to Amata Nakorn Industrial Estate in Chonburi Prefecture is one hour.

3.3. Mitsubishi Motors and its suppliers in the eastern seaboard region

The company of PITS was established in 1992 to manage Laemchabang Port. Mitsui Marine and Nippon Yusen owned 44 percent while local capital accounted for 56 percent of its total capital. The port has grown into a hub port in South East Asia and is managed by the locals. It plays a crucial role in that Laemchabang Industrial Estate functions as an export processing zone. Components and their products are exported to and imported from Japan, Vietnam, China, Thailand, and Indonesia through the port.

In 1995, Company A was established in the Laemchabang Industrial Estate, about 110 kilo-meters from Bangkok, to produce air cleaners and air bags for cars. Its second plant was constructed in the Eastern Seaboard Industrial Estate 50, kilo-meters east of its main office.

Products were initially used for Mitsubishi Motors Thailand although Company A belongs to Toyota's group, or Toyota Keiretsu. Company A supplies its products to several assembly companies including Mitsubishi Motors as well as General Motors, Toyota, and Nissan. Meanwhile, Toyota's group's Showa and Tokai Rika were established in the same year Company A was set up, to provide their products to Mitsubishi Motors. Later, Tokai Rika Japan established Thai Sheet Belt in 1994 and Tokai Rika Thailand in 1997. In this example, we can find the industrial backward linkage between Mitsubishi Motors as an anchor firm and its suppliers.

Company B was established in 1993 to produce fuel pumps and carburettors used mainly for pickup trucks to Honda, Nissan, and others. It is associated with Summit Group, a local conglomerate that has a close relationship with Mitsubishi Motors at the Laemchabang Industrial Estate. While the group's companies such as Summit Showa, Summit Kurita, and Thai Summit Harness are also located in the Laemchabang Industrial Estate, others such as Summit Auto Body, Summit Auto Seats Industry, Thai Summit Harness, and Summit Steering Wheel are located in the Samutprakan Prefecture. In this example, we see the close relationship between local firms and automobile assembly companies.

Suppliers of automobiles are categorized by tiers. Tier 3 companies supply parts to Tier 2, Tier 2 firm supply parts to Tier 1, and Tier 1 ones supply parts to assemblers.

Company C is a Tier 2 firm located in the eastern seaboard region and supplies parts and components (mainly valves for engines) to the company of TBK in Amata Nakorn Industrial Estate, which then supplies its parts to Mitsubishi Motors. What is peculiar with Company C is that its management and technology have been transferred to the local people to some extent. In 2008, when TBK it increased its demand for parts, Company C had to construct a new plant in Pinto Industrial Estate, which is near the Mitsubishi Motors plant. Company C ships its products and relays at Ayutthaya to the Lamphun plant in Lamphun Prefecture in northern region.

The eastern seaboard region in Chonburi Prefecture grew significantly from 1990 to 1995, which was partly due to the industrial agglomeration in the Laemchabang area with Mitsubishi Motors as the anchor firm. As mentioned earlier, Laemchabang Port started to operate in 1991 and Mitsubishi Motors constructed its plant in 1992. Local conglomerates Summit Group and Siam Group also grew side by side their Japanese counterparts.

The establishment of industrial zones in the prefectures of Phrachinburi, Chonburi, Chachongsao, and Rayong of the eastern seaboard region peaked in 1985 to 1995. During this period, Thailand's economic growth was driven by the industrial zones: These are the Amata Nakorn Industrial Estate in Chonburi in 1989, Hemaraj Chonburi Industrial Estate in 1988 in Chonburi, Amata City Industrial Estate in Rayong in 1995, Eastern Seaboard Industrial Estate in Rayong in 1995, Hemaraj Eastern Seaboard Industrial Estate in Rayong in 1988, Map Ta Phut Industrial Estate in Rayong, Rayong Industrial Estate in 1995, 304 Industrial Park in Phrachinburi in 1994, and Kabinburi Industrial Zone in Phrachinburi in 1990. The automobile industry agglomerated in these industrial zones (other main assemblers and industrial estates are shown in Table

Table 3: Asian prototype model

Anchor firm: Toyota Motor: National Road 331 Cluster Chonburi Industrial Estate

| | | | nillion yen) | ted Total of loan | executed | 9.2 | 28.26 | 72.98 110.44 | | | 45.13 | 185.72 | 119.44 350.29 | 460.73 | |
|-----------------------------------|-----------------------------|---------------------------|--------------|-------------------|------------------|--------------------|-------------------|-----------------|---|--------------|-----------------|------------------|--------------------|---------------|---|
| | | | (Unit: 100 m | etion Loan execu | | | | | | | | | | | |
| | | | | Loan comp | | 7/1996 | 1/1997 | 12/1999 | | | 1/1977 | 1/2000 | 1/2000 | | |
| | | | I | Loan contracat | lagreement | 9/1988 | 9/1988 | 2/1900 | | | 9/1991 | 9/1993 | 9/1993 | | 7 |
| astern Seaboard Industrial Estate | mata City Industrial Estate | iateway Industrial Estate | | <i>></i> | lailway Projects | iracha∕Leamchabang | attahip/Maptaphut | hlong19/Kengkoi | Ŷ | oad Projects | honburi/Pattaya | angkok/ Chonburi | Juter Bangkok Ring | \rightarrow | |

| Main suppli | |
|-------------|--|
| | |
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| | |
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| • | | | |
|--------------------------|---|------------------------|---|
| Its suppliers | | Main suppliers for Toy | vota |
| | TOYOTA AUTO BODY THAILAND CO, LTD | Samutprakarn | Samrong Plant |
| | THAI AUTOWORKS CO., LTD | Samutprakarn | Teparak Plant |
| | THAI KOITO CO, LTD | Samutprakarn | Samutprakarn Plant |
| \rightarrow | NHK SPRING(THAILAND) CO, LTD | Samutprakarn | Bangpoo Ind. Estate Plant |
| Industrial agglomeration | TOYOTA MOTOR THAILAND CO., LTD | Chachoengsao | Gateway City Industrial Estate Plant(Passenger Car Plant) |
| | TOKAI RIKA (THAILAND) CO,, LTD | Rayong | AmataCity City Industrial Estate Plant |
| | TOYODA MACHINE WORKS (THAILAND) CO, LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| | YOROZU (THAILAND) CO, LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| | DENSO(THAILAND) CO, LTD. | Chachoengsao | Wellgrow Industrial Estate Plant |
| | KOYO STEERING (THAILAND) CO., LTD | Chachoengsao | Bangna-Trad Plant |
| | KOYO MANUFACTURING (THAILAND) CO, LTD | Chachoengsao | Bangna-Trad Plant |
| | NHK SPRING(THAILAND) CO, LTD | Chachoengsao | Wellgrow Industrial Estate |
| | SIAM TOYOTA MANUFACTURING CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| | DENSO(THAILAND) CO, LTD. | Chonburi | Amata Nakorn Industrial Estate Plant |
| | TOYODA GOSEI (THAILAND) CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| | TOYODA GOSEI RUBBER(THAILAND) CO, LTD | Samut Sakorn | Samutsakorn Plant |
| | SIAM TOYOTA MANUFACTURING CO., LTD | Bangkok | Lardkrabang Plant |

Source: A. Kuchiki & T. Gokan.

Table 4: Agglomeration of Suppliers at Main Industrial Zones

| Ayutthaya | Rojana Industrial Park Plant, Bangpa-In Industrial Estate, Hi-Tech Industrial Estate, Factory Land Wangnoi, Saha Rattana Nakorn Industrial Estate |
|-----------------|---|
| Samutprakarn | Bangplee Industrial Estate, Bangpoo Industrial Estate, Teparak Road |
| Prachin Buri | 304 Industrial Park, Bor-Thong Industrial Zone, Kabinburi Industrial Zone, Saha Group Industrial Park |
| 1. Chachoengsao | <i>Gateway City Industrial Estate,</i> Wellgrow Induatrial Estate, 304 Industrial Park 2, TFD Industrial Estate |
| 2. Rayong | Eastern Seaboard Industrial Estate Plant, Amata City Industrial Estate, Rojana Industrial Park, Asia Industrial Estate, G. K. Land Industrial Park, Hemaraj Eastern Industrial Estate, Hemaraj Eastern Seaboard Industrial Estate, <i>Map Ta Phut Industrial</i> <i>Estate</i> , Rayong Industrial Zone, Rayong Industrial Park, Siam Eastern Industrial Park, T.C.C. Industrial Park |
| 3. Chonburi | Amata Nakorn Industrial Estate, <i>Laemchabang Industrial Estate</i> , Chonburi Industrial Estate, Pinthong Industrial Estate, Saha-Group Industrial Park Sirach, Poo Para Co. |
| Bangkok | Ladkrabang Industrial Estate Bangchan Industrial Estate |

Source: Industrial Research Institute of Japan (2006), Thailand Automotive Industry Suppliers Map, Tokyo: NNA Publishing Co.. and JETRO (2009).

Table 5: Distribution of the Plants of Main Assemblers

| Honda Automobile (Thailand) | Ayutthaya | Rojana Industrial Park Plant |
|-------------------------------|--------------|---|
| Toyota Motor Thailand | Chachoengsao | Gateway City Industrial Estate Plant(Passenger Car Plant) |
| Isuzu Motors (Thailand) | Chachoengsao | Gateway City Industrial Estate Plant |
| BMW Manufacturing (Thailandz9 | Rayong | AmataCity City Industrial Estate Plant |
| General Motor (Thailand) | Rayong | Eastern Seaboard Industrial Estate Plant |
| Auto Alliance (Thailand) | Rayong | Eastern Seaboard Industrial Estate Plant |
| Toyota Motor Thailand | Samutprakarn | Samrong Plant |
| Siam Nissan Automobile | Samutprakarn | Samutprakarn Plant |
| Mitsubish Motors Thailand | Chonburi | Laemchabang Industrial Estate Plant |

Source: the same as Table 3.

3, Table 4 and Table 5, respectively).

While Honda is located in Ayutthaya, other anchor firms are located in the eastern seaboard region. Toyota moved to Gateway City Industrial Estate in 1996 and Mitsubishi Motors, to Laemchabang Industrial Estate. General Motors moved to the Eastern Seaboard Industrial Estate; and BMW, to Amata City Industrial Estate (JETRO 2006). Other main suppliers are shown in Table 6 – Table 16.

Table 6: Distribution of Main Suppliers

| THAI STANLEY ELECTRIC PUBLIC CO., LTD | Pathumthani | Banklang Plant |
|---|--------------|--|
| DENSO(THAILAND) CO., LTD. | Samutprakarn | Samutprakarn Plant: Radiator for Air-Conditioner |
| NISSAN POWERTRAIN (THAILAND) CO., LTD. | Samutprakarn | Samutprakarn Plant |
| THAI KOITO CO., LTD. | Samutprakarn | Samutprakarn Plant |
| THAI STEEL CABLE PUBLICC CO., LTD. | Samutprakarn | Bangplee Plant |
| YARNAPUND PUBLIC CO., LTD | Samutprakarn | Bangplee Plant |
| DENSO(THAILAND) CO., LTD. | Chachoengsao | Wellgrow Industrial Estate Plant: Filter for Car Air-Conditioner Capacitor or Car Air-Conditioner |
| YOROZU (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| ZEXEL VALEO COMMPRESSOR (THAILAND) LTD. | Rayong | Eastern Seaboard Industrial Estate Plant |
| SIAM TOYOTA MANUFACTURING CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| DENSO(THAILAND) CO., LTD. | Chonburi | Amata Nakorn Industrial Estate Plant:Alternator, Starter, Common Raik System |
| SIAM TOYOTA MANUFACTURING CO., LTD | Bangkok | Lardkrabang Plant |
| ISUZU ENGINE MANUFACTURING CO (THAILAND) LTD. | Bangkok | Lardkrabang Industrial Estate Plant |
| MMTH ENGINE CO., LTD | Bangkok | Lardkrabang Plant |

Source: the same as Table 3.

Table 7: Main suppliers for Toyota Motor

| TOYOTA MOTOR THAILAND CO., LTD | Samutprakarn | Samrong Plant(Commercial Car & SUV Plant) |
|--|--------------|---|
| TOYOTA AUTO BODY THAILAND CO., LTD | Samutprakarn | Samrong Plant |
| THAI AUTOWORKS CO., LTD | Samutprakarn | Teparak Plant |
| THAI KOITO CO., LTD | Samutprakarn | Samutprakarn Plant |
| NHK SPRING(THAILAND) CO., LTD | Samutprakarn | Bangpoo Ind. Estate Plant |
| TOYOTA MOTOR THAILAND CO., LTD | Chachoengsao | Gateway City Industrial Estate Plant(Passenger Car Plant) |
| TOKAI RIKA (THAILAND) CO., LTD | Rayong | AmataCity City Industrial Estate Plant |
| TOYODA MACHINE WORKS (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| YOROZU (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| DENSO(THAILAND) CO., LTD. | Chachoengsao | Wellgrow Industrial Estate Plant |
| KOYO STEERING (THAILAND) CO., LTD | Chachoengsao | Bangna-Trad Plant |
| KOYO MANUFACTURING (THAILAND) CO., LTD | Chachoengsao | Bangna-Trad Plant |
| NHK SPRING(THAILAND) CO., LTD | Chachoengsao | Wellgrow Industrial Estate |
| SIAM TOYOTA MANUFACTURING CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| DENSO(THAILAND) CO., LTD. | Chonburi | Amata Nakorn Industrial Estate Plant |
| TOYODA GOSEI (THAILAND) CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| TOYODA GOSEI RUBBER(THAILAND) CO., LTD | Samut Sakorn | Samutsakorn Plant |
| SIAM TOYOTA MANUFACTURING CO., LTD | Bangkok | Lardkrabang Plant |

Source: Industrial Research Institute of Japan, Suppliers Map of Thailand's Automobile Industry, 2006.

Table 8: Main Suppliers for Isuzu Motors

| ISUZU MOTORS CO. (THAILAND) LTD. | Chachoengsao | Gateway City Industrial Estate Plant |
|--|--------------|--|
| ISUZU MOTORS CO. (THAILAND) LTD. | Samutprakarn | Samrongtai Phrapradaeng Plant |
| YARNAPUND PUBLIC CO.,LTD. | Samutprakarn | Bangplee Plant |
| THAI RADIATOR MFG. CO., LTD. | Samutprakarn | Bangplee Plant |
| THAI SUMMIT AUTOPARTS INDUSTRY. CO., LTD. | Samutprakarn | Bangplee Plant |
| THAI SUMMIT PKK. CO., LTD. | Samutprakarn | Bangplee Plant |
| AOYAMA THAI CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| GENERAL MOTOR (THAILAND) LTD. 1) & 2) | Rayong | Eastern Seaboard Industrial Estate Plant |
| JIBUHIN(THAILAND) CO., LTD. | Chonburi | Amata Nakorn Ind. Park2 Plant |
| TBKK(THAILAND) CO., LTD. | Chonburi | Chonburi Plant |
| CHERRY SERINA CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| ISUZU ENGINE MANUFACTURING CO. (THAILAND) LTD. | Bangkok | Lardkrabang Industrial Estate Plant |
| MAHLE ENGINE COMPONENTS(THAILAND) CO., LTD. | Bangkok | Bangchan Industrial Estate Plant |
| ART-SERINA PISTON CO., LTD. | Bangkok | Miinburi/ LatKrabang Plant |

Source: the same as Table 7.

| HONDA AUTOMOBILE (THAILAND) CO., LTD. | Ayutthaya | Rojana Industrial Park Plant |
|--|--------------|--|
| KEIHIN AUTO PARTS(THAILAND) CO., LTD. | Ayutthaya | Rojana Industrial Park Plant |
| THAI STANLEY ELECTRIC PUBLIC CO., LTD. | Pathumthani | Banklang Plant |
| SIAM NGK SPARK PLUG CO., LTD | Samutprakarn | Bangplee Plant |
| TAKATA-TOA CO., LTD. | Chachoengsao | Wellgrow Industrial Estate Plant |
| GKN DRIVESHAFTS(THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| MIYUKI INDUSTRIES (THAILAND) CO., LTD. | Rayong | Siam Eastern Industrial Park |
| YAMADA SOMBOON CO., LTD. | Rayong | Eastern Industrial Estate Plant |
| SUMMIT SHOWA MANUFACTURING CO., LTD. | Chonburi | Laemchabang Industrial Estate Plant |
| HONDA LOCK THAI CO., LTD. | Chonburi | Amata Nakorn Industrial Estate Plant |
| THAI NIPPON SEIKI CO., LTD | Chonburi | Bangpakong Industrial Park 2 |
| HONDA ACCESS(THAILAND) CO., LTD. | Bangkok | |
| BANGCHAN GENERAL ASSEMBLY CO. LTD | Bangkok | |

Table 9: Main Suppliers for Honda Automobile

Source: the same as Table 7.

Table 10: Main Suppliers for Mitsubishi Motors

| MITSUBISHI MOTORS(THAILAND)CO., LTD. | Chonburi | Laemchabang Industrial Estate Plant |
|---|--------------------|---|
| SUMMIT SHOWA MANUFACTURING CO., LTD. | Chonburi | Laemchabang Industrial Estate Plant |
| SUMMIT KURATA MANUFACTURING CO., LTD. | Chonburi | Laemchabang Industrial Estate Plant |
| THAI SUMMIT HARNESS CO., LTD. | Chonburi | Laemchabang Industrial Estate Plant |
| SUMMIT AUTO BODY INDUSTRY CO., LTD. | Samutprakarn | Bangplee, Bangna-Trad Road Plant |
| SUMMIT AUTO SEATS INDUSTRY CO., LTD. | Samutprakarn | Bangplee, Rachathewa Plant |
| SUMMIT STEERING WHEEL CO., LTD. | Samutprakarn | Bangplee, Rachathewa Plant |
| THAI SUMMIT HARNESS CO., LTD. | Samutprakarn | Bangplee, Bangna-Trad Road Plant |
| THAI CHANATHORN INDUSTRY CO., LTD. | Samutprakarn | Bangplee Plant |
| MMTH ENGINE CO., LTD. | Bangkok | Lardkrabang Industrial Estate Plant |
| MITSUBISHI FUSO TRUCK(THAILAND)CO., LTD. | Bangkok | Ladkrabang Industrial Estate Plant |
| MMTH ENGINE CO., LTD. MITSUBISHI FUSO TRUCK(THAILAND)CO., LTD. | Bangkok Bangkok | Lardkrabang Industrial Estate Plant Ladkrabang Industrial Estate Plant |

Source: the same as Table 7.

Table 11: Main Suppliers for Auto Alliance

| AUTO ALLIANCE (THAILAND) CO., LTD. | Rayong | Eastern Seaboard Industrial Estate Plant |
|---|--------------|--|
| VISTEON(THAILAND) LTD. | Rayong | Eastern Seaboard Industrial Estate Plant |
| GENERAL SEATING(THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| BOSCH AUTOMOTIVE(THAILAND) CO., LTD. | Rayong | AmataCity City Industrial Estate Plant |
| TAKATA-TOA CO., LTD | Chachoengsao | Wellgrow Industrial Estate |
| WICHIEN DYNAMIC INDUSTRY CO., LTD. | Pathumthani | |
| AAPICO HITECH PUBLIC CO., LTD. | Ayutthaya | Hitech Industrial Estate |
| ASAHI SOMBOON ALUMINIUM CO., LTD. | Samutprakarn | Bangna-Trad Road Plant |
| SOMBOON MALLEABLE IRON INDUSTRIAL CO., LTD. | Samutprakarn | Bangplee Plant |
| THAI SUMMMIT PKK CO., LTD. | Samutprakarn | Bangplee Plant |
| SIAM RIKEN INDUSTRIAL CO., LTD. | Chonburi | Amata Nakorn Industrial Estate Plant |

Source: the same as Table 7.

Table 12: Main Suppliers for Siam Nissan Automobile

| SIAM NISSAN AUTOMOBILE CO., LTD. | Samutprakarn | Samutprakarn Plant |
|---------------------------------------|--------------|--|
| NISSAN POWERTRAIN(THAILAND) CO., LTD. | Samutprakarn | Bangna-Trad Road Plant |
| THAI STEEL CABLE PUBLICC CO., LTD. | Samutprakarn | Bangplee Plant |
| SIAM EBISU CO., LTD. | Bangkok | |
| NAGATA(THAILAND) CO., LTD. | Prachinburi | Bangna-Trad Road Plant |
| SIAM HITACHI AUTOMOTIVE PRODUCTS LTD. | Chonburi | |
| NTN MANUFACTURING (THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| SIAM METAL TECHNOLOGY CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |

Source: the same as Table 7.

Table 13: Main Suppliers for GM Thailand

| GENERAL MOTORS (THAILAND) LTD. | Rayong | Eastern Seaboard Industrial Estate Plant |
|--|--------------|--|
| VISTEON(THAILAND) LTD. | Rayong | Eastern Seaboard Industrial Estate Plant |
| HICOM AUTOMOBILE PLASTICS(THAILAND) CO., LTD | Rayong | Eastern Seaboard Industrial Estate Plant |
| NHK SPRING(THAILAND) CO., LTD | Chachoengsao | Wellgrow Industrial Estate |
| NHK SPRING(THAILAND) CO., LTD | Samutprakarn | Bangpoo Industrial Estate Plant |
| THAI SUMMIT AUTOPARTS INDUSTRY CO., LTD. | Samutprakarn | Bangplee Plant |
| THAI DECAL CO., LTD. | Samutprakarn | Phrapradaeng Plant |
| ROBERT BOSCH LTD. | Bangkok | |

Source: the same as Table 7.

Table 14: Main suppliers for BMW Thailand

| BMW MANUFACTURING (THAILAND)CO., LTD. | Rayong | AmataCity City Industrial Estate Plant |
|---------------------------------------|--------------|--|
| DENSO(THAILAND)CO., LTD | Chonburi | Amata Nakorn Industrial Estate Plant |
| DENSO(THAILAND)CO., LTD | Chachoengsao | Wellgrow Industrial Estate Plant |
| A.T.P. INDUSTRY CO., LTD. | Bangkok | Suanluang/Lardkrabang Plant |

Source: the same as Table 7.

Table 15: YONTRAKIT Group as Powerful Suppliers

| OEM Supplier=AUDI, VW, SKODA, KIA, PEUGEOT, CITROEN | | | | | | | | |
|---|---------|-----------------------------|--|--|--|--|--|--|
| THAI PRADITH ASSEMBLY PLANT(2504) Co., LTD (OEM) | Bangkok | Lardkrabang Plant | | | | | | |
| Y.M.C.ASSEMBLY Co., LTD (OEM) | Bangkok | Lardkrabang Plant | | | | | | |
| A.T.P. INDUSTRY CO., LTD. | Bangkok | Suanluang/Lardkrabang Plant | | | | | | |

Source: the same as Table 7.

Table 16: Supplier for DAIMLER CHRYSLER (THAILAND) LTD.

OEM Supplier: THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD.

* Parts and components are procured by DAIMLER CHRYSLER (THAILAND) LTD.

THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD. is in chatge of only assembling.

| PMK-CENTRAL GLASS CO., LTD | Samutprakarn | |
|---|--------------|---------------------------------|
| THAI SUMMIT HARNESS CO., LTD. | Chonburi | Laemchabang Industrial Estate |
| NHK SPRING(THAILAND) CO., LTD | Chachoengsao | Wellgrow Industrial Estate |
| NHK SPRING(THAILAND) CO., LTD | Samutprakarn | Bangpoo Industrial Estate Plant |
| THAI SUMMIT AUTOPARTS INDUSTRY CO., LTD. | Samutprakarn | Bangplee Plant |
| THONBURI AUTOMOTIVE ASSEMBLY PLANT CO., LTD.(OEM) | Samutprakarn | |

Source: the same as Table 7.

4. AN APPLICATION OF THE FLOWCHART APPROACH TO CLMV

For the regional integration of Asia to succeed, one condition that needs to be satisfied is to narrow the regional gaps. The incomes of Cambodia, Laos, Myanmar, and Vietnam are not as high as that of other ASEAN countries. Ideally, at least one industrial cluster has to be formed in each city of Cambodia, Laos, Myanmar, and Vietnam. The income gaps of these six cities ought to be competitive, and one way to do that is to enhance their investment climate. Our flowchart approach may be usefully in helping propose an industrial cluster policy.

Meanwhile, industrial agglomeration had substantially progressed in Hanoi and

Guangzhou. However, Guangzhou has found it increasingly difficult to further bring in companies in labor-intensive industries due to the rise in the wages of unskilled labor. It thus has to upgrade its level of industrialization and shift the labor-intensive industry to other cities where wages are lower (Kuchiki and Tsukada 2008).

Canon is one company located in the heart of the industrial agglomeration in Hanoi. Panasonic and Brothers, two Japanese electronic companies, are agglomerated in northern Vietnam. In the first half of 2008, the demand for and supply of unskilled labor in the mountain areas of northern Vietnam tightened. Consequently, the wages of unskilled labor rose and companies in northern Vietnam tried to employ workers from the mountain areas (Kuchiki 2007).

In general, setting up the needed physical infrastructure is easy to satisfy while implementing and enforcing institutions to drive economic growth is difficult. For instance, simplifying the customs clearance process has not been enforced efficiently in most countries. Likewise, getting neighboring countries to relax their rules at national borders (e.g., by reducing tariffs and abolishing non-tariff barriers) is a must if one were to allow unskilled labor across borders (ie., foreign workers).

This section looks at cities' investment climate and how such has been conducive to creating industrial clusters by interviewing respondents and conducting surveys. The cities are Hanoi and Danang in Vietnam, Phnom Penn and Sihanoukville in Cambodia, Yangon in Myanmar, Vientiane and Savannakhet in Lao, the eastern seaboard region in Thailand, and Guangzhou in China. Factors compared are: industrial zones, transportation, electricity, telecommunication, ports, institutions, human resources related to unskilled labor and skilled labor, and living conditions. Here, the ideal investment climate is envisioned to be one that attracts labor-intensive

246

industries to the said cities' export processing zones.

Results show Danang with the highest scores and Vientiane, the lowest among the cities in CLMV. However, Vientiane scored better than Danang in terms of how Vientiane facilitates its industrial zone and physical infrastructure. Results of the interviews are shown in Table 17 – Table 23.

When there are small differences in the scores across cities, the weight given to each factor becomes crucial. Factors such as industrial zones, unskilled labor, and ports are indispensable elements in attracting companies in labor-intensive industries to set up factories in export processing zones. For instance, a highway linked to an industrial zone and a port are needed to efficiently move export products out of the industrial zone.

The interview method was used to survey the investment climate in cities of CLMV. Weights were assigned to each of the nine factors in the analytic hierarchy process (AHP) method. These nine are classified into three main groups:

Table 17: Results of Interviews on Investment Climate: Yangon, Myanmar

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | × | × | × | 0 | × | × | 0 | × | × | 0 | 3 | × |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | × | × | × | 0 | 0 | × | × | × | × | × | 2 | × |
| 3. Does electricity infrastructure exist sufficiently? | × | × | × | × | × | × | × | × | × | × | 0 | × |
| 4. Does communication infrastructure exist sufficiently? | × | × | × | 0 | 0 | × | × | × | × | × | 2 | × |
| 5. Does port infrastructure exist sufficiently? | × | × | × | 0 | × | × | × | × | × | × | 1 | × |
| 6. Do institutions exist sufficiently? | × | × | × | × | × | × | 0 | × | × | × | 1 | × |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | 0 | 0 | 0 | 0 | × | × | 0 | 0 | 0 | × | 7 | 0 |
| 8. Does skilled labor exist sufficiently? | × | × | × | 0 | × | × | × | × | × | 0 | 2 | × |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | 0 | × | × | 0 | 0 | × | 0 | 0 | × | 6 | 0 |

Note: 1) Every factor is not sufficient except unskilled labor.

2) \times means that it is a problem and \bigcirc means that it is sufficient (the same applies hereinafter). Source: Moe Kyaw (Interviews in November 2008).

Table 18: Results of Interviews on Investment Climate: Danang, Vietnam

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|----|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| Capacity building: Physical infrastructure | | | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | × | × | × | 0 | 0 | × | × | × | 0 | 0 | × | 0 | 5 | × |
| 3. Does electricity infrastructure exist sufficiently? | × | 0 | × | 0 | 0 | × | 0 | 0 | × | 0 | × | 0 | 7 | 0 |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 |
| 5. Does port infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | × | 0 | 0 | 0 | 0 | × | × | × | 9 | 0 |
| 6. Do institutions exist sufficiently? | 0 | 0 | × | 0 | 0 | × | 0 | 0 | × | × | × | 0 | | |
| Human resources | | | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | × | × | × | × | 0 | × | × | × | × | × | × | × | 1 | × |
| 8. Does skilled labor exist sufficiently? | × | × | × | × | × | × | × | × | × | × | × | × | 0 | × |
| Living conditions | | | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | × | × | 0 | 0 | × | 0 | × | × | × | 0 | × | 5 | × |

Note: Roads and unskilled labor are insufficient.

Source: Hiem Minh (Interviews in Danang on Dec. 8-12, 2008)

Table 19: Results of Interviews on Investment Climate: Savannakhte, Laos

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | × | 0 | × | × | × | 0 | × | 0 | × | × | 3 | × |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | 0 | × | × | 3 | × |
| 3. Does electricity infrastructure exist sufficiently? | × | 0 | × | 0 | 0 | 0 | × | 0 | 0 | 0 | 7 | 0 |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | × | 0 | 0 | 0 | 0 | 0 | 9 | 0 |
| 5. Does port infrastructure exist sufficiently? | × | × | × | × | × | × | × | 0 | 0 | × | 2 | × |
| 6. Do institutions exist sufficiently? | 0 | 0 | × | × | × | 0 | × | 0 | × | × | 4 | × |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | × | × | × | × | × | × | × | × | × | × | 0 | × |
| 8. Does skilled labor exist sufficiently? | × | × | × | × | × | × | × | × | × | 0 | 1 | × |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | × | × | × | × | × | × | × | × | × | 1 | × |

Note: Every factor except electricity and telecommunication is insufficient. Source: Syviengxay Oraboune (Interviews in Savannakhet)

Table 20: Results of Interviews on Investment Climate: Vientiane, Laos

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | × | × | × | 0 | × | × | 0 | × | 0 | × | 3 | × |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | × | 0 | × | × | × | 0 | × | × | × | 0 | 3 | × |
| 3. Does electricity infrastructure exist sufficiently? | 0 | 0 | × | × | 0 | × | × | 0 | × | 0 | 5 | 0 |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | × | × | 0 | × | 0 | 0 | 0 | × | 6 | 0 |
| 5. Does port infrastructure exist sufficiently? | × | × | × | × | × | × | × | 0 | 0 | × | 2 | × |
| 6. Do institutions exist sufficiently? | × | 0 | × | × | × | 0 | 0 | × | × | 0 | 4 | × |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | × | × | × | × | × | × | × | × | × | × | 0 | × |
| 8. Does skilled labor exist sufficiently? | × | × | × | × | × | × | × | × | 0 | × | 1 | × |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | × | × | × | × | × | × | 0 | × | 0 | × | 2 | × |

Note: Every factor except electricity and telecommunication is insufficient. Source: Syviengxay Oraboune (Interviews in Savannakhet).

Table 21: Results of Interviews on Investment Climate: Phnom Penh

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | 0 | 0 | 0 | 0 | × | × | 0 | 0 | 0 | 0 | 8 | 0 |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | 0 | × | 3 | × |
| 3. Does electricity infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | 0 | × | 3 | × |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | × | × | × | 0 | 0 | 0 | 7 | 0 |
| 5. Does port infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | × | × | 2 | × |
| 6. Do institutions exist sufficiently? | 0 | × | 0 | × | × | × | 0 | 0 | 0 | × | 5 | 0 |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | 0 | 0 | × | × | × | × | 0 | 0 | × | 0 | 4 | 0 |
| 8. Does skilled labor exist sufficiently? | 0 | × | × | × | × | × | 0 | × | × | × | 2 | × |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | × | × | × | × | × | × | × | × | × | 1 | × |

Note: Roads, electricity and water are insufficient.

Source: Sau Sisovanna (Interviews in Phnom Penh, 8-12/12/2008).

Table 22: Results of Interviews on Investment Climate: Sihanoukville

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | 0 | 0 | 0 | 0 | × | × | 0 | 0 | 0 | 0 | 8 | 0 |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | 0 | × | 3 | × |
| 3. Does electricity infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | 0 | × | 3 | × |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | × | × | × | 0 | 0 | 0 | 7 | 0 |
| 5. Does port infrastructure exist sufficiently? | 0 | × | 0 | × | × | × | × | × | × | × | 2 | × |
| 6. Do institutions exist sufficiently? | 0 | × | 0 | × | × | × | 0 | 0 | 0 | × | 5 | 0 |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | 0 | 0 | × | × | × | × | 0 | 0 | × | 0 | 4 | 0 |
| 8. Does skilled labor exist sufficiently? | 0 | × | × | × | × | × | 0 | × | × | × | 2 | × |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | × | × | × | × | × | × | × | × | × | 1 | × |

Note: Roads, electricity and water are insufficient.

Source: Sau Sisovanna (Interviews in Phnom Penh, 8-12/12/2008).

Table 23: Results of Interviews on Investment Climate: Eastern Seaboard area

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Results | Issues |
|--|---|---|---|---|---|---|---|---|---|----|---------|--------|
| 1. Do industrial zones exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Capacity building: Physical infrastructure | | | | | | | | | | | | |
| 2. Does transport infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| 3. Does electricity infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| 4. Does communication infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | × | 0 | 0 | 0 | 9 | 0 |
| 5. Does port infrastructure exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| 6. Do institutions exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | × | 0 | 9 | 0 |
| Human resources | | | | | | | | | | | | |
| 7. Does unskilled labor exist sufficiently? | 0 | × | 0 | 0 | 0 | 0 | 0 | 0 | 0 | × | 8 | 0 |
| 8. Does skilled labor exist sufficiently? | 0 | 0 | × | 0 | × | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| Living conditions | | | | | | | | | | | | |
| 9. Do hospitals exist sufficiently? | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |

Note: Every factor is sufficient.

Source: A. Kuchiki & T. Gokan (Interviews in Thailand, 4-12/8/2009)

The first group represents infrastructure for the labor-intensive manufacturing industry at an export processing zone; the second group represents infrastructure indispensable to the manufacturing industry; and the third group is the factor on human resources. Suppose that the weight of the first of the three groups is 1.0. Weights of the second and third groups are 0.5 and 2.0, respectively. Note too that the weight of the second group is not the same as that of the first group (Details of the weight under the AHP method are show in Table 24).

To illustrate, let us take the case of Vientiane and how its scores are derived. By multiplying the weight of industrial zones (0.125) by the number of persons (3) who answered Yes to this factor, we get the product 0.375. Similarly, if the weight assigned to roads is 0.125 and the number of persons who answered Yes is three, we get 0.375 as score. If we replicate this process on the rest of the nine factors and add each of their points, we get a total of 2.95.

Table 25 shows the results of the AHP method. Of all the cities, Guangzhou, China garnered the second highest score at 5.75. Phnom Penn, Cambodia, came third at 4.8.



Table 24: Weight of nine factors by AHP method

Source: A. Kuchiki.

The fourth and fifth are Danang in Vietnam and Sihanoukville in Cambodia at 4.38 and 3.81, respectively. It makes sense that multinational firms in the labor-intensive manufacturing industry be directed to invest in Danang's export processing zones since it has been one of the best cities in August 2008. After all, Vietnam started to facilitate the investment environment earlier than did Cambodia, Laos, and Myanmar. Of these three nations, Cambodia's investment environment is generally better than that of Laos and Myanmar. The final scores of Savannakhet and Vientiane are low at 2.44 and 2.19, respectively. That of Yangon is at 3.75.

Second, let us consider the case where we have the same weight given to all nine factors at 11.1 percent (Table 26). Guangzhou and Yangon garnered the highest and lowest at 5.88 and 2.76, respectively.

Third, we find that Vientiane's got the highest among the eight cities in the case of the labor-intensive industry at export processing zones (Table 27). All 10 respondents for Vientiane answered Yes on the questions pertaining to physical infrastructure (roads, electricity, and communication). Its 4.5 score is higher than that of Danang. In short, Vientiane is competitive enough be compared with other cities in luring in foreign investors via establishment of industrial zones and facilitation of physical infrastructure. Results show that all cities would be competitive enough to invite investors in the labor-intensive industry sector to set up shop in the export processing zones if only these cities start to establish industrial zones and facilitate the building of infrastructure.

Next, we apply the interview method to survey the investment environment in the CLMV cities in Kuchiki and Uchikawa's study (2009). Table 7 shows that the total scores of the cities are almost the same except that of Yangon when one assigns the

| Cities | Danang Phn | om Penh Sihano | uk Ville Sava | annakhet | ſangon | Vientiane | Guangzhou | Hanoi | Bangkok | Weight |
|---|------------|------------------|---------------|----------|--------|-----------|-----------|-------|---------|--------|
| Full scores = 10. | 4.38 | 4.75 | 3.81 | 2.44 | 3.75 | 2.19 | 5.75 | 4.06 | 9.13 | AHP |
| 1. Do industrial zones exist sufficiently? | 10 | 5 | 8 | с | e | 3 | £ | 10 | 10 | 0.125 |
| 2. Does transport infrastructure exist sufficier | 4.2 | 2 | ო | 3 | 2 | S | 10 | 0 | 10 | 0.0625 |
| 3. Does electricity infrastructure exist sufficie | 5.8 | . | ო | 7 | 0 | 5 | 2 | S | 10 | 0.0625 |
| 4. Does communication infrastructure exist su | 10 | 5 | 7 | 6 | 2 | 9 | 10 | 8 | 0 | 0.0625 |
| 5. Does port infrastructure exist sufficiently? | 7.5 | 4 | 2 | 2 | - | 2 | 10 | 2 | 10 | 0.125 |
| 6. Do institutions exist sufficiently? | 5.8 | 4 | 5 | 4 | - | 4 | 0 | 0 | 0 | 0.0625 |
| 7. Does unskilled labor exist sufficiently? | 0.8 | 10 | 4 | 0 | 7 | 0 | 4 | 0 | ω | 0.25 |
| 8. Does skilled labor exist sufficiently? | 0 | 2 | 2 | - | 2 | - | 8 | 8 | ω | 0.125 |
| 9. Do hospitals exist sufficiently? | 4.6 | 2 | , | 1.5 | 7 | 2 | 9 | 8 | 10 | 0.125 |

Table 25: Comparison of Cities in Investment Environment Survey by Interview for Industrial Clustering (different weights)

Source: A. Kuchiki.

Table 26: Comparison of Cities in Investment Environment Survey by Interview for Industrial Clustering (the same weight)

| Cities | Danang | Phnom Penh Sihanouk Vill | e Savannakhet | Yangon | Vientiane | Guangzhou | Hanoi | Bangkok | |
|--|--------|--------------------------|---------------|--------|-----------|-----------|-------|---------|--------|
| Full scores = 10. | 5.41 | 3.88 3.8 | 3.39 | 2.76 | 2.89 | 5.88 | 4.33 | 9.324 | Weight |
| 1. Do industrial zones exist sufficiently? | 10 | 5 | 8 3 | 3 | 3 | 3 | 10 | 10 | 11.1 |
| 2. Does transport infrastructure exist sufficiently? | 4.2 | 2 | 3 3 | 2 | e | 10 | 0 | 10 | 11.1 |
| 3. Does electricity infrastructure exist sufficiently? | 5.8 | ÷ | 3 7 | 0 | 5 | 2 | ო | 10 | 11.1 |
| 4. Does communication infrastructure exist sufficiently? | 10 | 5 | 7 9 | 2 | 9 | 10 | 8 | 6 | 11.1 |
| 5. Does port infrastructure exist sufficiently? | 7.5 | 4 | 2 2 | - | 2 | 10 | 2 | 10 | 11.1 |
| 6. Do institutions exist sufficiently? | 5.8 | 4 | 5 4 | - | 4 | 0 | 0 | 6 | 11.1 |
| 7. Does unskilled labor exist sufficiently? | 0.8 | 10 | 4 0 | 7 | 0 | 4 | 0 | 8 | 11.1 |
| 8. Does skilled labor exist sufficiently? | 0 | 2 | 2 1 | 2 | - | 8 | 8 | 8 | 11.1 |
| 9. Do hospitals exist sufficiently? | 4.6 | 2 | 1 1.5 | 7 | 2 | 9 | 8 | 10 | 11.1 |

Source: A. Kuchiki.

| Weight | Danang | | Vientian | | Savannakhet | | Yangon | | Sihanouk Ville | | Phnom Penh | | Hanoi | | Guangzhou |
|--------|--------|----|----------|-----|-------------|---|--------|---|----------------|----|------------|----|--------|----|-----------|
| 0.125 | 1.250 | 10 | 1.25 | 3 | 0.375 | 3 | 0.375 | 8 | 1 | 5 | 0.625 | 10 | 1.25 | 3 | 0.375 |
| 0.125 | 0.521 | 10 | 1.25 | 3 | 0.375 | 2 | 0.25 | 3 | 0.375 | 2 | 0.25 | 0 | 0 | 10 | 1.25 |
| 0.0625 | 0.365 | 10 | 0.625 | 7 | 0.4375 | 0 | 0 | 3 | 0.1875 | 1 | 0.0625 | 3 | 0.1875 | 2 | 0.125 |
| 0.0625 | 0.625 | 10 | 0.625 | 9 | 0.5625 | 2 | 0.125 | 7 | 0.4375 | 5 | 0.3125 | 8 | 0.5 | 10 | 0.625 |
| 0.0625 | 0.469 | 2 | 0.125 | 2 | 0.125 | 1 | 0.0625 | 2 | 0.125 | 4 | 0.25 | 2 | 0.125 | 10 | 0.625 |
| 0.0625 | 0.365 | 4 | 0.25 | 4 | 0.25 | 1 | 0.0625 | 5 | 0.3125 | 4 | 0.25 | 0 | 0 | 0 | 0 |
| 0.25 | 0.208 | 0 | 0 | 0 | 0 | 7 | 1.75 | 4 | 1 | 10 | 2.5 | 0 | 0 | 4 | 1 |
| 0.125 | 0 | 1 | 0.125 | 1 | 0.125 | 2 | 0.25 | 2 | 0.25 | 2 | 0.25 | 8 | 1 | 8 | 1 |
| 0.125 | 0.573 | 2 | 0.25 | 1.5 | 0.1875 | 7 | 0.875 | 1 | 0.125 | 2 | 0.25 | 8 | 1 | 6 | 0.75 |
| | 4.376 | | 4.5 | | 2.4375 | | 3.75 | | 3.8125 | | 4.75 | | 4.063 | | 5.75 |

Table 27: The score of Vientiane by giving 10 points to infrastructure

Source: A. Kuchiki.

same weights on all 10 questions of the questionnaire.

From this, we obtain the same conclusions. First, the scores of Phnom Penn and Vientiane in 2008 are the best and the worst, respectively. Second, each city remains capable of forming industrial clusters as long as it sets up industrial zones.

5. POLICY RECOMMENDATIONS

This chapter presents some policy recommendations on East Asia's regional integration to ERIA, which has a key role in delivering these proposed policies to the East Asian Summit.

From this paper, we can point out three crucial points:

First, the eastern seaboard region in Thailand competes with Guangzhou in terms of attracting foreign investments in the labor-intensive manufacturing industry. It is, however, unlikely that the Chinese manufacturing industries will export all of the manufacturing products to Thailand when the manufacturing industry holds. Second, the labor-intensive manufacturing industry of Guangzhou may shift from Guangzhou to other cities such those in inland China and northern Vietnam. This is because the Guangzhou municipality will not allow foreign investors in the labor-intensive manufacturing industries to establish their plants in Guangzhou. Third, CLMV may be able to catch up and compete with the advanced ASEAN in the labor- intensive manufacturing industry if they provide sufficient support to physical infrastructure, including electricity supply and communication. Facilitating the building of physical infrastructure is easier in the short term than having to develop human resources.

Figures 11 and 12 show the policy recommendations for Hanoi and Guangzhou as reference or benchmark cities, respectively. At present, Yangon, Danang, Phnom Penh, Sihanoukville, Vientiane, and Savannakhet are facing certain bottlenecks, as shown by the list of policy recommendations in Figures 13-18.

5.1. Yangon

When it comes to roads, we recommend the construction of (1) Highway 1 to link Mue and Myawaddy; (2) A new expressway to link Yangon and Mandalay; and (3) A road to link Yangon and Thilawa Port. There is also a need to increase the power supply and install new transmission lines and transformers, and to upgrade the Yangon ports. In terms of institutional reforms, trade procedures ought to be relaxed, while faster manual and online licensing processes need to be introduced. Finally, the city should look into employing unskilled labor from rural areas.

5.2. Danang

This paper recommends that Danang's power supply be increased, particularly during summer. Likewise, its roads connecting the city with neighboring provinces









Source: Author.

| Flowchart | Prescription | | |
|-----------------------------|--|-------|--|
| Roads → | $(\overline{1})$. Highway 1 to Mue and Myawaddy | | Public Works of Ministry of Construction, |
| ↓ Yes No | $(\mathbb{Z}).$ New express way to link Yangon and Mandalay | ↑ | Private companies |
| | $(\overline{\mathfrak{D}})$. Road to link Yangon and Thilawa Port | | |
| ✓Return | | , | |
| Electricity → | Increase of power supply, | 1 | Ministry of Electric Power, |
| ↓Yes No | install new transmission lines and transformer | | Private companies |
| | | | |
| Ports → | Upgrade | 1 | Myanmar Port Authority |
| ↓Yes No | | | |
| | | , | |
| Institutions | Relaxation of trade procedure, quick process in | | 1. The simplification of procedures and |
| ↓Yes No | Nay Pyi Taw, online licensing | 1 | departmental documentation by Ministry of Commerce |
| | | | 2. The simplication of cargo handling |
| | | | in container trucks and customs clearance |
| Betiten | | | |
| | - | | |
| Unskilled → | Employment of labor from rural area | | |
| ↓Yes No | | | |
| ✓Return | | | |
| Entertainm → | Facilitation of entertainments | 1 | Private companies |
| ↓ Yes No | | | |
| ✓Return | | , | |
| Thefts → | Extensive secrurity measures | 1 | Myanmar Police Force and factory security |
| Source: Moe Kyaw. | | | |

Figure 13: Policy Recommendations for Yangon, Myanmar

Figure 14: Policy Recommendations for Danang, Vietnam

| Flowchart | | Prescription |
|----------------|---------------|--|
| Roads | \rightarrow | ①. Highway Danang Hue-Quang Tri |
| ↓Yes | No | ②. Highway to link Danang and Dung Quat Oil Refinary |
| | | ③. Road to link Yangon and Thilawa Port |
| | ∠Return | |
| Electricity | \rightarrow | Increase of power supply, |
| ↓Yes | No | |
| | ∠Return | |
| Ports | \rightarrow | Upgrade of Tien Xa Port |
| ↓ Yes | No | Building warehouse near ports |
| | | Buiding rain line around ports |
| | | Building Lien Chieu Port |
| | ∠Return | |
| Other | \rightarrow | Upgrade of airport |
| Infrastructure | No | |
| ↓ Yes | ∠Return | |
| Institutions | \rightarrow | Enforcement of regulations, improvement of |
| ↓Yes | No | consistency of circulars, simplification of |
| | | customs clearance |
| | ∠Return | |
| Unskilled | \rightarrow | Training labor in rural area |
| ↓Yes | No | Training labor in other neighboring provinces |
| | ∠Return | |
| Skilled labor | \rightarrow | Trainig cource, OJT |
| ↓Yes | No | |
| | ∠Return | |
| Professionals | \rightarrow | Labor in other provinces or foreigners |
| labor | No | |
| <u>↓</u> Yes | ∠Return | |
| School | \rightarrow | Establishig international high schools |
| ↓Yes | No | |
| | ∠Return | |
| Hospitals | \rightarrow | Improve services |
| ↓Yes | No | |
| | ∠Return | |
| Entertainments | \rightarrow | Facilitation of entertainments |
| ↓ Yes | No | |
| | ∠Return | |
| Thefts | \rightarrow | Extensive secrurity measures |
| | | |

Source: Hien Minh.

need to be improved. So do the efficiency of the Danang Port. When it comes to regulations, transparency and inconsistency are key areas that need to be enhanced. In the area of human resources, we recommend that measures be taken to improve the quality of education and training.

5.3. Phnom Penh and Sihanoukville

For Phnom Penh and Sihanoukville's special economic zones (SEZs), we recommend that policymakers look at providing more attractive non-fiscal incentives. Among these offerings may be improved transparency on fees and charges, unified employment contracts, lower costs for vocational training, exemptions from advanced profit tax, and semi-annual payment of the said tax. There is also a need to set more favorable conditions to zone investors; that is, allow them to freely import production inputs, apply a "single window" system for exports-imports control, implement the post-clearance audit method to all imports, exempt on-site inspection before packing, and restrict labor strikes inside the zones.

Policymakers should also look at cleaning up the water sources to ensure food safety and better livelihood in accordance with the Cambodian Millennium Development Goals (CMDGs), and to promote a clean environment. We also see a need for these cities to increase their electricity supply capacity and reduce tariff to an appropriate level while strengthening their institutional mechanism and management capacity. In the telecommunications infrastructure, policymakers should look into how to develop the post and telecommunication system and get the information and communication technology to a stage where quality of service conforms to international



Figure 15: Policy Recommendations for Phnom Penh, Cambodia

Source: Sisovanna Sau.





Source: Sisovanna Sau.

standards, low price prevails and nationwide coverage becomes possible.

In the transport infrastructure, we recommend that high priority be given to maintenance of national roads, the reconstruction of provincial and rural roads, expansion of ports, and rehabilitation of railways. This is so as to make the connection to the rail network of the neighboring countries within the Greater Mekong Subregion (GMS) framework possible. There is likewise a need to privatize the operations of the Cambodian railway and encourage private sector participation in the rehabilitation of infrastructure and transportation services.

In governance, policymakers should look at how to make the implementation of policy, and delivery and management of public goods efficient. There is also the need to improve the quality of education services, where more attention ought to be directed to information as well as technical and vocational training and higher education, given that this will pave the way for enhancing the quality of knowledge of the cities' technicians and engineers.

5.4. Vientiane

Vientiane's industrial zones would still benefit from further investment in infrastructure as well as laws and regulations on industrial zones. Its utilities would also benefit from expansion of the water supply system and increase in power supply as well as control in electric prices. We recommend, too, that policymakers work to develop Vientiane's channel options and dry ports for exporters as well as road networks that connect to those of neighboring countries. In terms of social infrastructure, it is the school infrastructure, quality of education, hospital infrastructure, and quality of health care services that need policymakers' attention.



Figure17: Policy Recommendations for Vientiane, Laos

Source: Syviengxay Oraboune.

5.5. Savannakhet

Savannakhet's industrial zones are still in need of investments in infrastructure as well as laws and regulations to govern industrial zones. Its water supply system needs to be expanded and its electrical power supply has to be increased, while electricity prices are reigned in. Policymakers would also need to develop transport channel options for exports. In the social infrastructure, school infrastructure, quality of education, hospital infrastructures, and quality of healthcare services need attention. Meanwhile, we recommend that the quality of vocational training curriculum for skilled labor be



Figure 18: Policy Recommendations for Savannakhet, Laos

Source: Syviengxay Oraboune.

improved. For unskilled labor, it is not just the quality of vocational training curriculum that has to be looked into; labor regulations ought to be given attention as well.

On December 25, 2009, Shigemi Sato, executive managing director of Yokohama Port Public Corporation in Japan in 2009 and adviser at the Office of Eastern Seaboard (OESD), which is in charge of the Eastern Seaboard Project in the 1980s, was interviewed by this paper's author. Sato identified four factors that were key to the success of the industrial cluster policy of the Eastern Seaboard Region Project. First, the project was able to construct water supply, industrial zones, ports, highways, and railways, as per its plan. Second, leadership had the political will to implement the project. Third, a port played a central role in the establishment of export processing zones. Fourth, the project was comprehensive, with all of Thailand's ministers---including the minister of environment---participating in the project.

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