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Chapter 5

Production Fragmentation and Networks in East Asia Characterized by Vertical Specialization

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Abstract

We do not know well about the overall picture and features of production fragmentation and networks in East Asia. What perspective can we have on production fragmentation in East Asia? This short paper tries to provide some answers to those research questions. The paper addresses that low labor costs in East Asia enables not only low production costs but also low service link costs, and that sophisticated logistic operation and twenty-four hours production operation make “just in time” production possible.

Key words: Fragmentation, Vertical specialization, Production Networks, Service Link Costs, Network Set-Up Costs, “Just in Time” Production

1. Introduction

One of the prominent features of the East Asian economy is the prevalence of production fragmentation, in which production is sliced into several sequential production processes and separated production processes are located within a country and across countries. In East Asia, business environments have been improved through the accumulation of ad-hoc policy responses. The remarkable economic growth in East Asia lends a strong support for this approach. At the background of the remarkable economic growth, production fragmentation has developed so much in East Asia.

It was claimed by Ando and Kimura (2003) that production networks have developed most in the world. Now, even policy makers know that production fragmentation and networks have developed in East Asia. Ong Keng Yong, Secretary-General of ASEAN addressed in November 2007 in the opening remarks that production and services were no longer integrated in one factory or location but were outsourced and increasingly manufacturing was now undertaken through production networks.

We do not know well, however, about the overall picture and features of production fragmentation and networks in East Asia: How much intensively production fragmentation has taken place in East Asia? What features of production fragmentation in East Asia has? What have caused to develop production fragmentation? What perspective we can have on production fragmentation in East Asia. This short paper tries to provide some answers to those research questions.

The following section reviews some theoretical studies on production fragmentation, networks and vertical specialization, and discusses the mechanism of production fragmentation in East Asia. Section 3 sees the evidences of the development of production fragmentation in East Asia. Section 4 discusses the features of production fragmentation by showing some examples of production networks. At the background of the development of production fragmentation, the development of logistic networks and investment policies have played significant role. Section 5 sees logistic networks supporting production fragmentation and networks. Section 6 introduces the investor friendly policies. The last section provides a perspective of production fragmentation. This paper address that one of the prominent features of the East Asia economy is the development of production fragmentation or networks which is characterized by vertical specialization. Large disparities in factor prices coupled with the reduction of service link costs and network set-up costs have been reduced have contributed to the development of production fragmentation in East Asia. The paper sees that, due to policy efforts at regional wide level, business environments of East Asia is expected to improve, and as a result, regional production fragmentation will develop further involving India and Vietnam, Laos and Cambodia.

2. Development and mechanism of production fragmentation and networks in East Asia

2.1. Development of theory on production network and vertical specialization

There are several theoretical studies on fragmentation/vertical specialization which explain the recent development of international trade. Jones and Kierzkowski (1990) discuss how increasing returns and the advantages of specialization of factors within the firm encourage a switch to a production process with fragmented production blocks connected by service links. Deardroff (2000) claimed that the incentive of fragmentation can be larger across countries within countries due to differences in factor prices and technology that are available, and that the service costs of international fragmentation are larger if regulations and restrictions impede the international provision of services. Key words of the studies are production blocks and service links that have the function of connecting production blocks in separate location. The above two pioneer studies on production fragmentation contain important policy implications in the context of economic development. Service link costs and network set-up costs are reduced, production will be fragmented further, and as a result, large disparities in factor prices can be transformed into the dynamism of economy. Yi (2003) verifies that if tariffs are sufficiently high so that there is no vertical specialization, and if tariffs continue to fall, vertical specialization becomes more of a possibility. This means that reduction of service link costs is essential to further production fragmentation. The border effect is very large in vertical specialization. The reason is that the tariffs impose a tax on the first stage of production twice for one fragmentation—once when the first stage enters the foreign country and once when the second-stage good is imported back into the home country.

2.2. Four times of border controls for one production fragmentation

One fragmentation, however, require four times of border controls (see Figure 1). The first border control is when an intermediate good is exported from the country A, and the second one is when the good is imported into the country B. The third time is when the processed good is exported from the country B, and the four time is imported into the country A. At each border, custom procedure is required. When we pay attention to times of custom procedure, service link costs is crucial for the development of vertical fragmentation. Documentation and administrative costs for custom procedures requires much of human resources. East Asia is advantage in production fragmentation because of not only because but also low service link costs. Therefore, if time required for custom procedure is reduced, production fragmentation will extend to lower wage country.

2.3. Agglomeration and fragmentation mechanism in East Asia

What mechanism does take place in the evolution process from one country production fragmentation to other country one? In other words, what are relation between industrial clusters or agglomeration in a country and fragmentation in other country? One production fragmentation in a country grows to be a sizable industrial cluster if proper policy sets are continuously maintained. But, finally, wage rates and land prices increases. When such congestion takes place, at first, firms seek a new frontier within a country. When congestion becomes large in the new frontier, firm will seek other country in which service link costs and net-work set up costs are reduced by proper policy arrangements. Fragmentation is followed by agglomeration, causing a new fragmentation.

According as agglomeration develops, materials and parts are gradually procured within a country rather than from advanced country. In fact, Japanese affiliates operating in overseas tend to procure from Japan first, and gradually from within a country. This view is not contradicted with Hillberry and Hummels (2005) which obtained the results that, in the United States, number of shipments declines very rapidly with distance, dropping off almost an entire order of magnitude between one and two hundred miles.

At the same time, the repeat of such agglomeration and fragmentation cycles transform production fragmentation from one production fragmentation to regional production networks in which many parts and components are procured across countries within a region.

3. Development of production fragmentation in East Asia

Since the early 1990s, international production networks have developed in ASEAN and East Asia. Production-process-wise division of labor has been pursued, resulting in massive vertical intra-industry trade in parts and components within the region. The international trade statistics clearly presents the recent advancement of de facto economic integration in East Asia.

Figure 2 shows the share of intra-regional trade (exports and imports) within several economic areas. The intra-regional trade share of the enlarged East Asia (the so-called as ASEAN+3+3, or ASEAN+6, comprising of ASEAN, China, Japan, Korea, Australia, New Zealand, and India) steadily rose from 33.3% in 1980 to 43.1% in 2006. Surprisingly, this figure in 2006 is higher than that of NAFTA (42.1%) though lower than that of the EU (58.2%). East Asia has no doubt achieved a high level of de facto economic integration in terms of international trade transactions within the region. The integration process has not been seriously interrupted even by the Asian currency crisis in the late 1990s.

However, economic integration in East Asia does not seem to develop in an even

manner. The share of intra-regional trade of the ASEAN 10 and China–Japan–Korea in 2006 remains at only 25.8% and 23.2% respectively, against that of the enlarged East Asia (43.1%), which suggests that economic activities require a large space in which to expand, i.e., the whole East Asia, as the spatial economists argue (Fujita, 2004). Moreover, Figure 3 shows trade shares of East Asia by partner countries/regions where we can see that China and the ASEAN 10 increased their shares in East Asian trade, in contrast to the gradual decline of Japan. This suggests that countries at relatively low income levels have played a significant role in the expansion of the intra-regional trade in East Asia.

It should be addressed that trade pattern inside the enlarged East Asia has changed, from the traditional pattern in which final products had been traded based on traditional comparative advantage, to the pattern that has traded massive amount of parts and components. To put it differently, intermediate goods in the same industry have actively been traded among the Asian countries, expanding intra-industry and intra-regional trade.

This fact can be confirmed by the observations that the import shares of parts and components within East Asia, including Hong Kong and Taiwan, increased from 6.6% in 1980 to 29.5% in 2004, while those of processed goods decreased from 38.2% to 27.9% in the years (Figure 4). Surprisingly, the imports value of parts and components of East Asia are larger than those of NAFTA and EU. East Asia is the largest import region for parts and components, indicating that East Asia has developed machinery industry most in the world (Figure 5).

With regard to intra-regional trade of parts and component, three things should be addressed here. One thing is that East Asia, in particular, ASEAN10 and China, mutually trade parts and components each other for a final product within the region. Second thing is that Japan exports much of parts and components to ASEAN and China while imports final goods from those. The last thing is that East Asia's production networks have linked deeply with NAFTA and EU (Figure 6). NAFTA and EU export much of parts and components to ASEAN10 and China, meanwhile China and ASEAN10 export parts and components as well as consumer goods to those advanced regions.

Ecochard et al. (2006) finds that one-way trade (exports and imports are widely unbalanced) still dominates in East Asia but vertical differentiated intra-industry trade (both exports and imports are active though unit prices of exports and imports differ widely) is rapidly increasing. This observation suggests that different manufacturing processes are operating in different countries and active backand- forth transactions of parts and components are developing in East Asia. Meanwhile, the EU has a large share of horizontal differentiated intra-industry trade (both exports and imports are active, and unit prices of exports and imports are similar).

4. Features of production fragmentation and networks in East Asia

What features production fragmentation or networks has in East Asia? What we observe in East Asia is an explosive increase in trade in intermediate goods, particularly in machinery industries, based on production-process-wise international division of labor among countries at different income levels and development stages. Trade patterns, in today's global competition where economies of scale are important, are quite different from the traditional ones based on static comparative advantage. The whole production processes involve sequential production blocks that locate across countries. Different stages of production are shared by different suppliers located in different countries. Products traded between firms in different countries are components instead of final products.

Figure 7 is an example of production-process-wise division of labor in hard disc drive manufacturing in East Asia. A hard disc drive assembling factory operating in Thailand procures parts and components from within the country and from the foreign countries, in particular from Asia. The same parts and components are procured from more than two suppliers located in different countries for hard disc drive assembly. Those parts and components require high technology and light weights. Those suppliers are located in different countries transport parts and components to several assemblers such as Seagate, Western digital, Maxtor, Hitachi, Fujitsu, Toshiba, and Samsun, located in different countries. Those parts and components are produced in the locations procuring materials from overseas. For example, medias which are produced by suppliers located in several countries procures from its major materials of substrates from Japan and Malaysia. Substrates procure major materials of blank from two suppliers located in Japan (see Figure 8). Therefore, hard disc drive production has sequent production processes located in various countries in the region.

The well-developed production network like a hard disc drive is seen in electronics industry. The structure of production fragmentation in East Asia varies according to industries. Automobile industry procures most of parts and components from domestic suppliers except key parts which are not available in the assembling places.

The simple one production fragmentation has developed in garment industry. Garment imports textile from Thailand since upstream textile industry has developed in Thailand and Indonesia in the Southeast Asia (see Figure 9). Such simple one production fragmentation can be seen in intra-firm trade between Singapore and Thailand in machine tool industry in which casting components are exported from Thailand to Singapore, between Thailand and Laos in condenser in which labor intensive process is operated in Lao PDR after capital intensive one in Thailand.

5. Logistic networks behind development of production fragmentation and

networks

It is logistic service that has supported production fragmentation and networks in East Asia.

Most of factories operating in East Asia by multinational enterprises (MNEs) employ two shift twenty-four hour production operation system in which workers work twelve hours a day (eight hours plus four hour overtime). This system not only meets the “just in time” production system but also recovers equipment costs under short product cycles. In the “just in time” production system, parts and components are to be shipped to clients on time. To do so, assembler factories ask logistic company to develop sophisticate online procurement system that connects fragmented suppliers with the assembler. Roughly there are two deliver systems.

One logistic system is the “hub” warehouse system in which the outsourced logistic company constructs a huge “hub warehouse” close to an assembler, and manages the “hub warehouse” (see Figure 10). Each supplier is asked to transport parts to the “hub” warehouse by its cost. In this system, domestic suppliers are asked to ship one time a day while oversea suppliers can ship parts and components two or three times a week. And the outsourced logistic company carries those transported parts every two or three hours to the contract assembler on time. Also assemblers do not need to have own warehouses in the factories. The key lies in the inventory management online system which connects a large number of suppliers, a “hub” warehouse and an assembler. The online software system is developed by logistic company. Assemblers do not need to develop the online procurement management system. In stead, assemblers pay the costs of software license, operating “hub warehouse” and transportation from the “hub” to the assembler are borne by assembler. The total costs be born by each assembler is huge but smaller than own development of software development, and the construction and management of well-designed warehouse. The “hub” warehouse system is employed by world class electronics related assemblers such as hard disc drive assemblers and PC assemblers. The logistic companies are global companies who have clients in the world.

Another is the “milk-run” delivery system that a truck arranged by logistic company drops at each supplier to pick up parts at two or three hour interval and transports them to an assembler. In the milk-run system, most of suppliers are located within distances of two or three hours by truck. But, several major parts and components are imported by the assembler. The transportation costs of goods are borne by the assembler. The “milk-run” system including inventory data are managed by logistic company. The “milk-run” logistic system is employed by automobile, motor cycle industry.

Both logistic service costs are not small. But, because of low wage rates, transportation service costs in ASEAN and China are lower than those in advanced countries. The lower service link costs have encouraged the development of production

fragmentation and network in East Asia.

6. Factors of production fragmentation and networks in East Asia

6.1. Twenty-four hours production and service operation with very low costs

The “just in time” production operation is possible for joint cooperation, assemblers, suppliers, and forwarders/logistic companies, forming East Asia’s production networks. More importantly, twenty-four hours production and service operation with very low costs in East Asia with very low costs is possible in East Asia. In global competition, product life, in particular, of electronics is very short. New projects are launched in very short period every year, and production facilities are rearranged every time. To compensate the renewal set-up costs, twenty-four hour production operation with large number of workers is essential. In the twenty-four hours operation, products are shipped very frequently, e.g., every two-four hours for domestic customers, and two or three times a week for foreign ones. Indirect staffs in charge of delivery have to secure spaces of air, ship, and truck cargoes, take export and import procedure, and deliver parts, “just in time”, from factory to factory from country to country. On the purchasing side, local staffs in charge of purchasing examine quality of parts and materials, inquire about prices and delivery schedule, and order to suppliers. Purchasers have almost perfect information of prices of parts since they exchange information each other on when, who, and what prices parts are traded. Once reaching on sales-purchase agreement, purchasers ask to arrange logistic companies to receive goods. Twenty-four hour operation requires a large number of workers and indirect staffs in charge of purchasing and delivery. Such operation is possible only in East Asia.

Figure 11 depicts GDP per capita by country (in terms of US dollars) in the enlarged East Asia. In 2006, GDP per capita in Australia, Japan, Singapore, Brunei, and New Zealand were more than 100 times higher than that in Myanmar, and more than 10 times higher than that in China. In contrast, among EU-27 countries in 2006, GDP per capita in Luxembourg (the highest) was about 20 times of that in Bulgaria, and 5 times of that in Portugal. Obviously, the income disparity in East Asia is far greater than that in Europe.

Such big disparities in GDP per capita reflect productivity differences among countries, which in turn reflect partly differences in the level of human capital development, and partly differences in the degree of agglomeration. The evolution of production fragmentation and networks in East Asia lies in large disparities in factor prices. For example, a hard disc drive industry in East Asia started in Singapore in 1982 by Seagate, and move some engineering process to Thailand in 1984. In recent years, one condenser manufacturing process of low-tech product move from Thailand to Laos where labor costs are one fourth of Thailand. Large disparities in factor prices have allocated production process according to location advantage, enabling

production-process-wise international division of labor in the region.

6.2. Policy efforts improving business environments

In addition to the viable logistic activities by private sector, what business environments have been improved through the accumulation of ad-hoc policy responses has contributed to the development of production fragmentation through inflows of foreign direct investment (FDI). In East Asia investor friendly investment policies have encouraged investment and developed production fragmentation and networks.

Most of the East Asian countries, in particular, ASEAN and China, have provided investment incentive policies which have provided tax holidays on corporate income as well as import duty exemption on intermediate materials, for export purpose, and on machinery. For example, as summarized in Table 1, Thailand has improved its business environments gradually responding to voices and claims by private sectors. Under the BOI scheme, the BOI status company can set up business without paying import tax on machinery and operate production without any tax for export purpose.

In addition, since 1 January 2000, with a few limited exceptions, the Information Technology Agreement (ITA) provides for participants to completely eliminate duties on IT products covered by the Agreement, representing about 97% of world trade in information technology products.

These investor friendly investment policies have contributed to reduce service link costs as well as network setup costs, contributing the development of production fragmentation and networks.

7. Perspective of production fragmentation in East Asia

What perspective can we have on production fragmentation and networks in East Asia? Several factors will affect the further development of production fragmentation. Service link costs that connect separated blocks across countries and network-set up costs will be reduced by free trade arrangements.

First, ASEAN will realize the ASEAN Economic Community, by 2015, including the establishment of the ASEAN single market and production base comprising of (i) free flow of goods; (ii) free flow of services; (iii) free flow of investment; (iv) freer flow of capital; and (v) free flow of skilled labor. In addition, the single market and production base also include the priority integration sectors, which realize the single market and production base in 12 sectors. AFTA is the plurilateral FTA covering ten ASEAN countries is going to be realized. ASEAN 6 (Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand) has reduced tariffs to be 0% for 75.7 % of tariff lines, and is going to reduce 0% for 99.4% tariff lines by 2010. New member CLMV (Cambodia, Laos, Myanmar, and Vietnam) has reduced tariffs to be 0% for 16.5% of

tariff lines, and will reduce to be 0% for 98.2% of tariff lines by 2015.¹

At the same time, ASEAN plans to implement the ASEAN Single Window System. The ASEAN Single Window System is a clearance system that enables a single submission of information and data, single and simultaneous processing of the data, and a single point of decision-making, among ASEAN member, through close collaboration among the lines ministries involved in the customs clearance process. The system will be implemented in Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand by 2008, and in Cambodia, Lao PDR, Myanmar and Viet Nam by 2012. Japan is considering to link its custom clearance system with the ASEAN Single Window System.

Second, FTA has proliferated in East Asia, centering on ASEAN. The first FTA involving ASEAN is the ASEAN-China FTA was enforced in July 2005, and will be gradually reduced to 0% not later than January 2010 for ASEAN 6 and China, and not later than January 2015 for new members although ASEAN 6 and China can place 400 tariff lines at the HS 6-digit level and 10% of the total import in the sensitive track, and Cambodia, Laos and Myanmar can place 500 tariff lines at the HS 6-digit level. Vietnam can also place 500 tariff lines with some ceiling import value. In a similar fashion, ASEAN-Korea FTA was enforced in June 2007. Now,

Third, more importantly, Japan has enforced the bilateral economic partnership agreement (EPA) with Singapore (2002), Malaysia (2006), and Thailand (2007), basically concluded with the Philippines and Indonesia, and negotiating with Vietnam. Japan has negotiated a plurilateral EPA with a whole ASEAN. Through those bilateral and plurilateral EPAS, Japan intends to improve business environments, of ASEAN, namely reducing service link and network-set up costs.

Fourth, Cambodia, Laos, and Vietnam are eager to be integrated into global economy than before. Vietnam becomes a member of the WTO in 2007. As mentioned already, the so-called CLMV countries will liberalize substantially all goods by 2015 in the AFTA scheme, and start to implement National Single Window by 2012 to link other ASEAN countries. The Asian Development Bank has been launching the so-called Greater Mekong Sub-region project. Its main pillar is the cross border transportation. In the cross border transportation program, the single stop custom clearance system has been launching. The East-West Economic Corridor, which has almost completed by the opening of the second friendship Mekong bridge in December 2006, has triggered the momentum of the CLMV development.

Fifth, India is going to be integrated into East Asia. Japanese multinational enterprises, which have played significant role for the development of production fragmentation and networks, are looking at India than before. India and Japan started to negotiate EPA in January 2007, and the two countries have continued intensive talks.

Lastly, regional cooperation has been launched. The process of ASEAN +3 and ASEAN +6 have been launched since 1997 and 2005 respectively.

Considering these factors, production fragmentation and networks in East Asia will develop further involving India, Vietnam, Laos and Cambodia.

8. Summary and conclusion

This short paper studies the features of production fragmentation and networks in East Asia which has been characterized vertical specialization. This paper addresses the importance of service link costs which connect separated production blocks and network-set-up costs which extend production fragmentation. East Asia is advantage in production fragmentation because twenty four hour production operations with a large plenty of human resources are possible with low costs. Multination enterprises manufacturers well explore the advantage of East Asia and separate production process into sequent production stages. On the other hand, logistic companies have been very active in East Asia, developing logistic networks in the region. The paper introduces two types of efficient logistic systems of “hub warehouse” and “milk-run” systems. Also the paper addresses the investor friendly investment policies which contain tax exemption of inputs and machinery as well as of income tax. We see further development of production fragmentation and network. there still remain great disparities in factor prices. In addition, service link costs and network set-up costs are likely to decline due to the prevalence of FTAs and regional cooperation. Business environments in Vietnam, Laos, Cambodia, and India will improve since the countries wish to be integrated into global economies.

Note

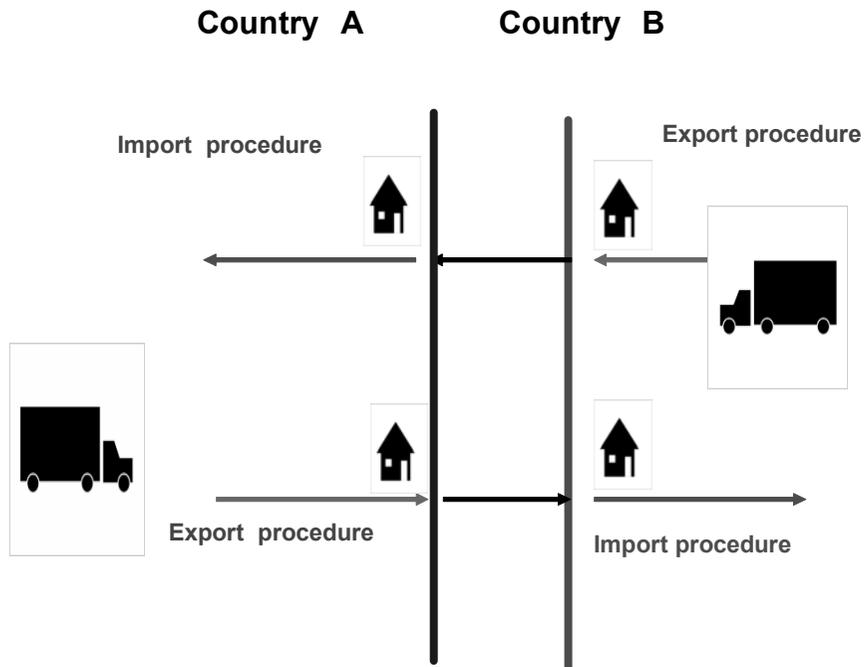
1. However, the utilization rates of FTA preferential tariff rates are not high. Malaysia and Thailand have released the utilization rates of ASEAN Free Trade Area (AFTA). The utilization rate in 2006 was 20.2% for Thailand, and just only 9.2% for Malaysia. There are several reasons for the low utilization rates. As mentioned before, the ASEAN governments have arranged the import tariff exemption on intermediate goods for export purposes, and firms are familiar with the utilization of existing tariff exemption system. Also, under the information technology agreement (ITA), the information and communication technology inputs can be exempted from import duty. Furthermore, it is cumbersome to prepare the documents that satisfy the regional local content of 40% on the export side. In particular, SMEs are unable to utilize AFTA.

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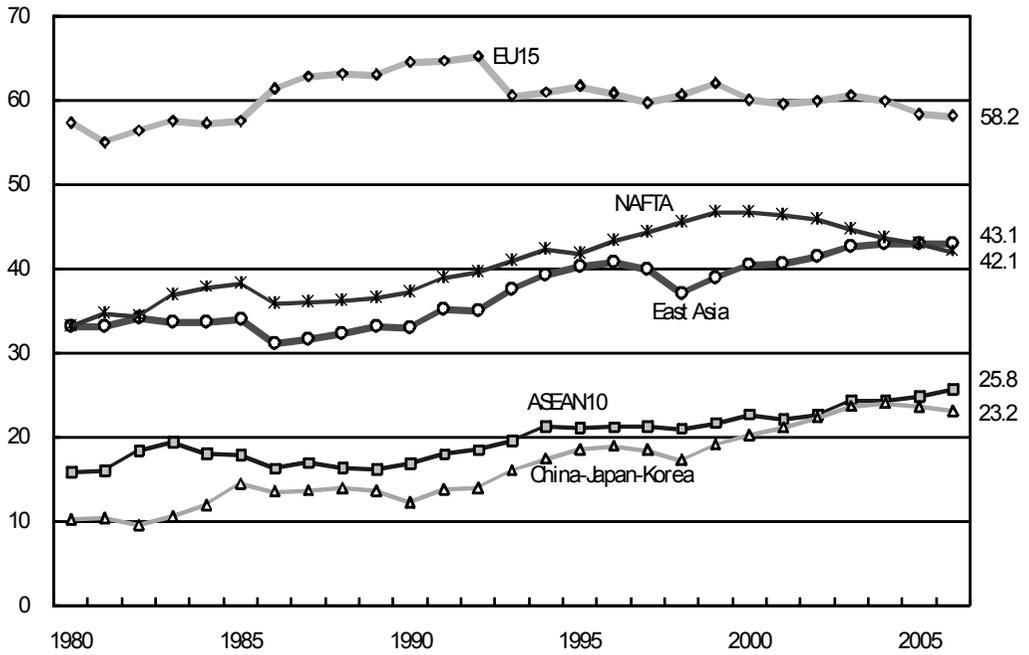
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Figure 1. Four times of custom clearances for one production fragmentation



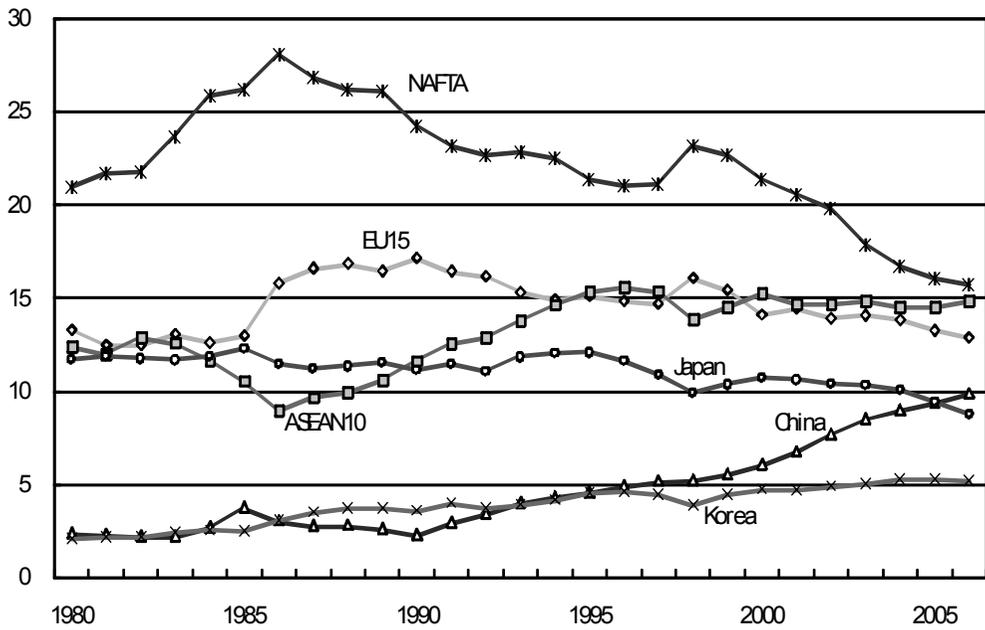
Source: by author.

Figure 2. Intra-regional trade (export and import) ratio by region (%)



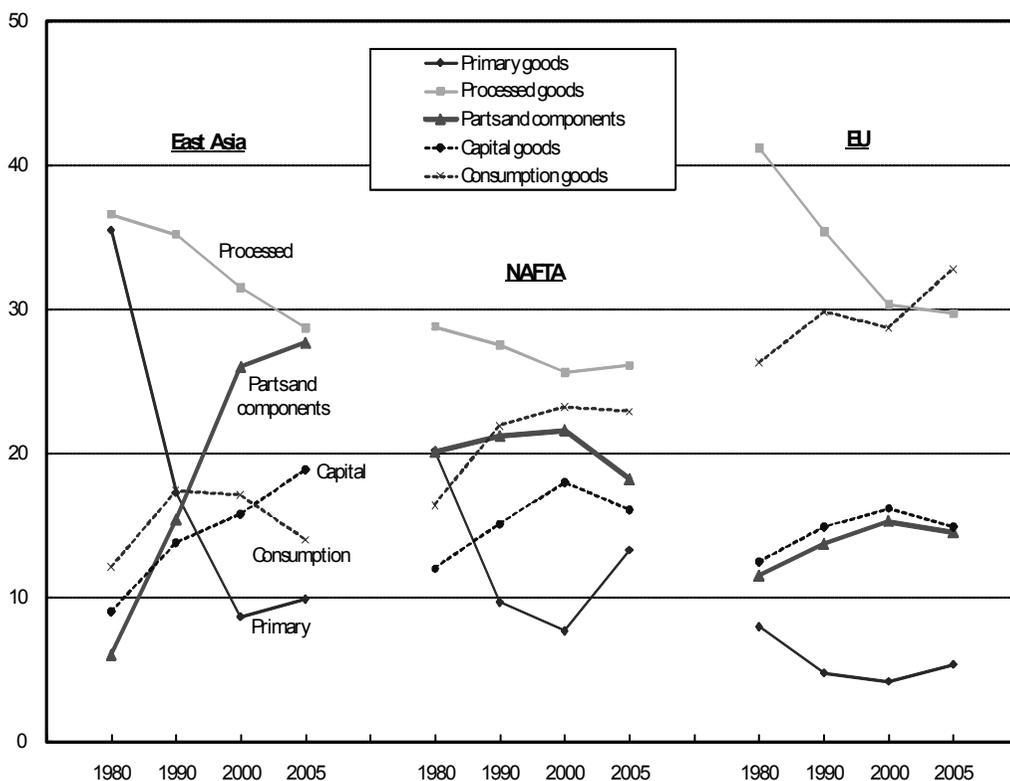
Source: IMF, *Direction of Trade Statistics*, CD-ROM, May 2007.

Figure 3. Trade share of the enlarged East Asia with partner country (%)



Source: IMF, *Direction of Trade Statistics*, CD-ROM, May 2007.

Figure 4. Trade pattern inside East Asia (%)



Notes:

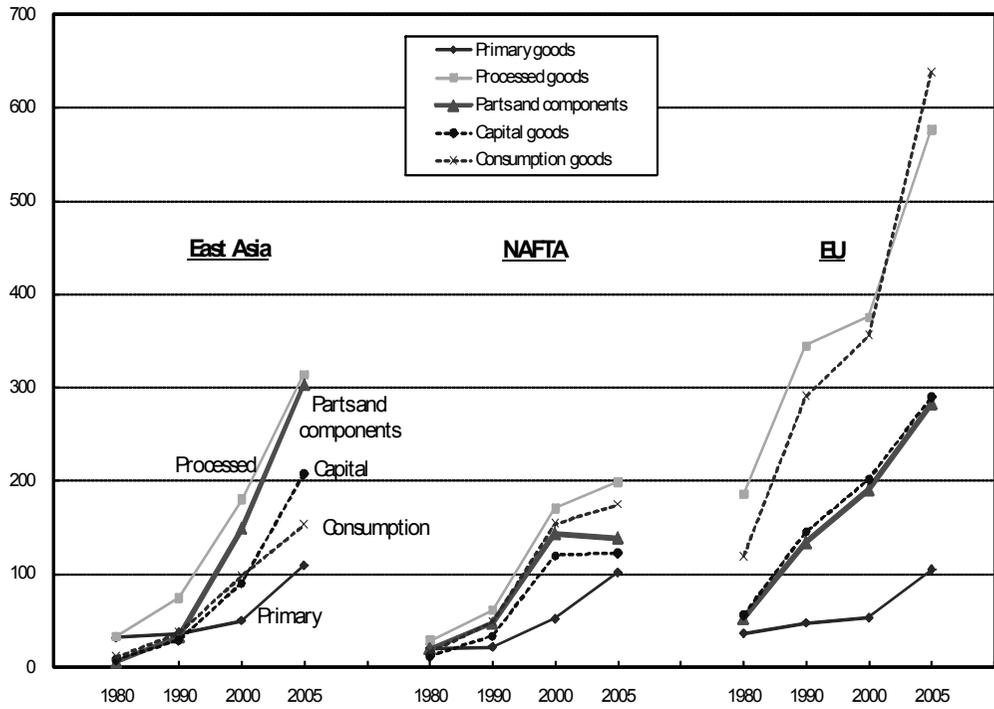
1. East Asia includes ASEAN10 (Brunei Darussalam, Indonesia, Cambodia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam), Australia, India, China, Japan, Korea and New Zealand. NAFTA includes Canada, Mexico and United States. EU is 15 country basis. Although the official members of each region may change among period, the calculation is conducted on the same country basis.
2. Because of data availability, the data on China (1980) and Brunei Darussalam (2000 and 2005) are not included. The data on Laos and Myanmar are substituted by their trade partners'. The data on Cambodia and Vietnam for the years not covered by COMTRADE database are also substituted by their partners. It implies the data may be missing for trade between those countries, because their partners' data may not be available, neither.
3. This graph is based on BEC-basis data, which are recalculated from SITC-basis for long term perspective (1980-2005). The trade goods by production stage includes following items; Primary goods: items under BEC code 111, 21 31, Processed goods: BEC code 121, 22, 32, Parts and components: BEC code 42, 53, Capital goods: BEC

code 41, 521, Consumption goods: BEC code 112, 122, 51, 522, 61, 62, 63.

4. The values of trade goods are measured by import value on US dollar basis.

Source: Compiled by IDE-JETRO based on the UN Comtrade database.

Figure 5. Trade pattern inside East Asia (billion US\$)



Notes and Source: Same as Figure 4.

Figure 6. Trade map centering on the enlarged East Asia

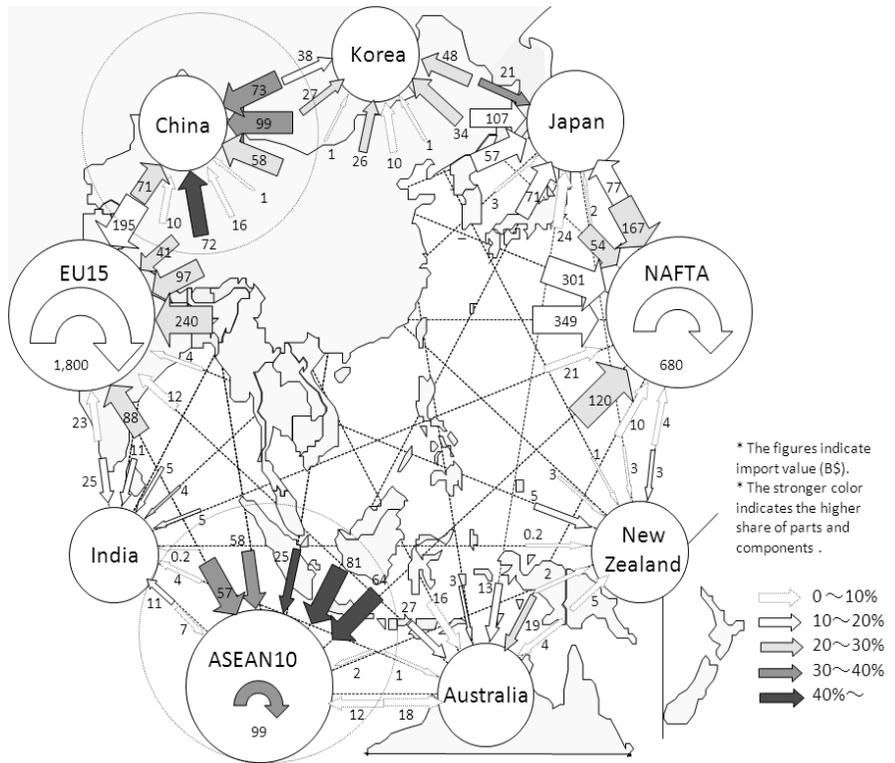
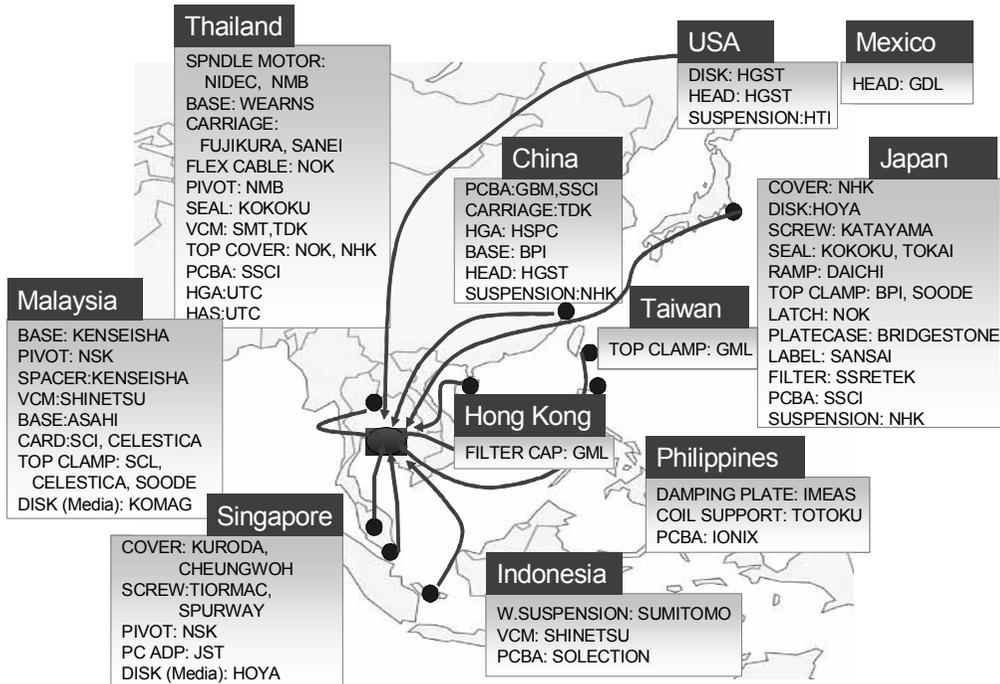
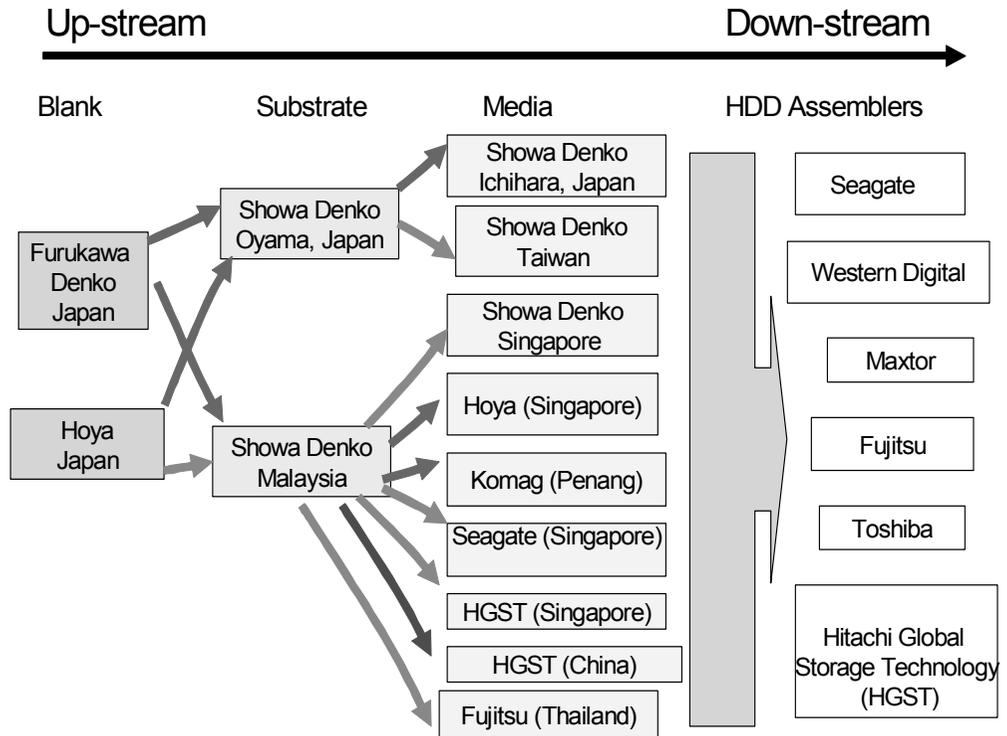


Figure 7. International procurement: An example of a hard disc drive assembler in Thailand



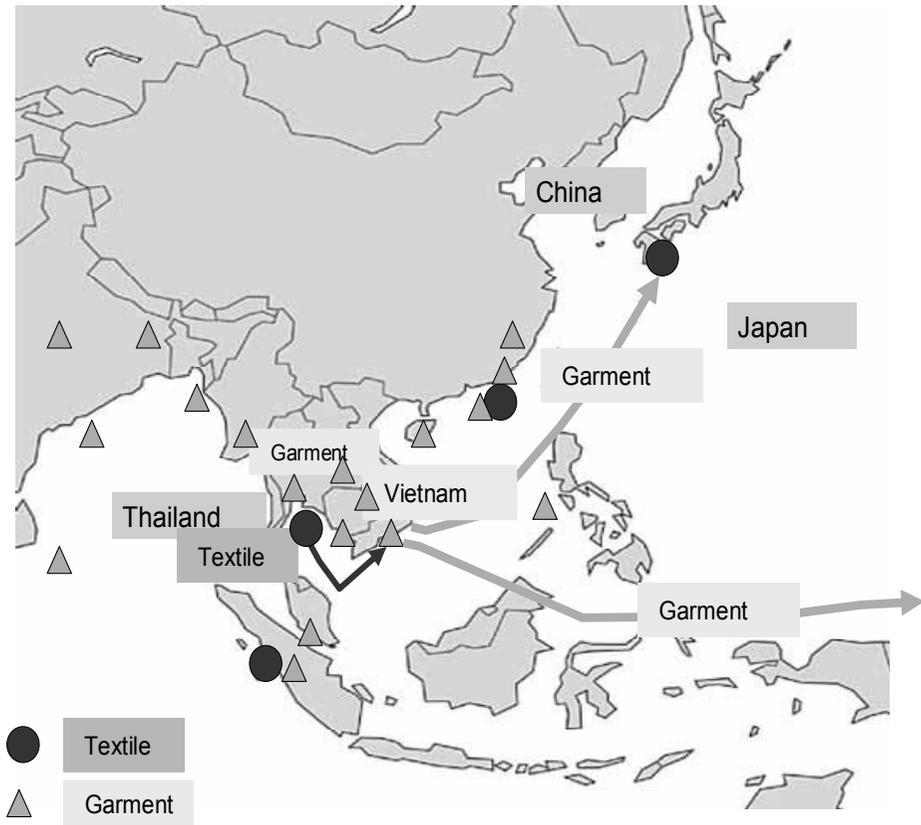
Source: Hiratsuka (2006).

Figure 8. Supply chain of media (component of hard disc drive)



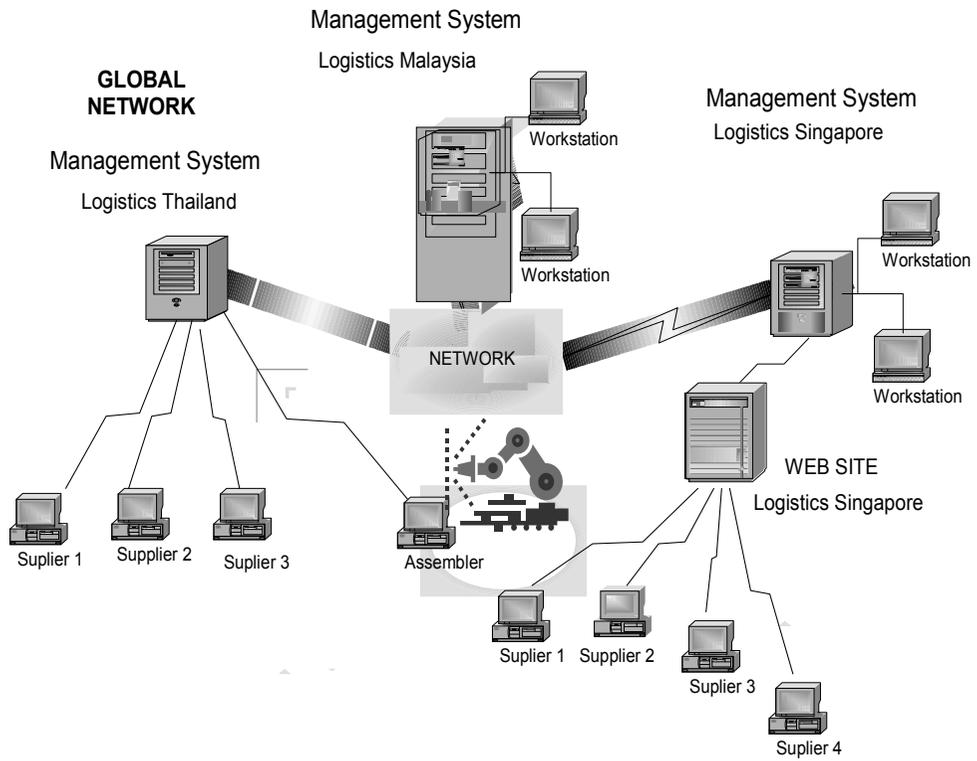
Source: by author.

Figure 9. Simple supply chain of textile and garment



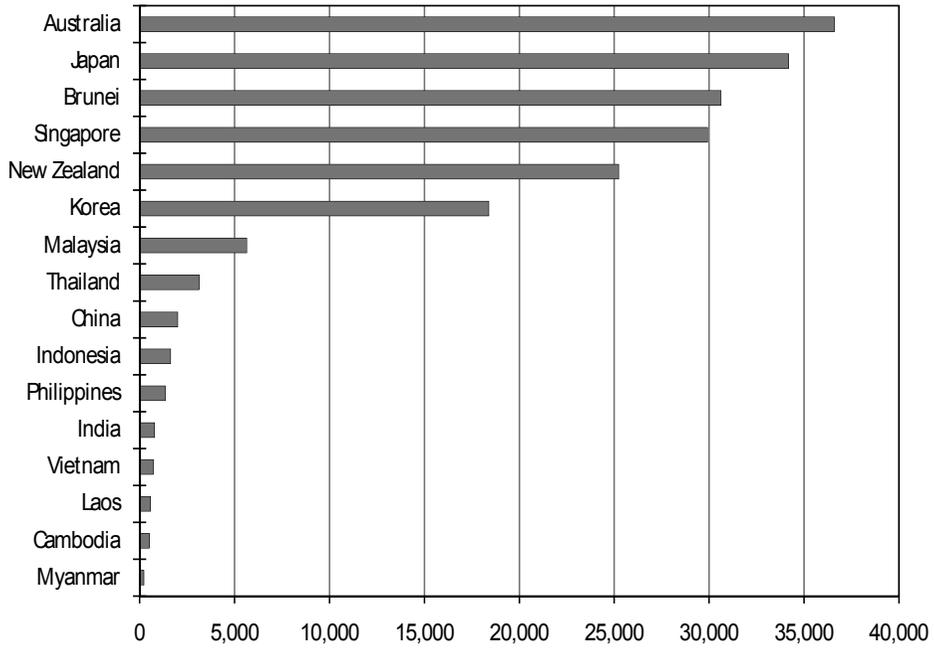
Source: by author.

Figure 10. Hub warehouse logistic operation



Source: by author.

Figure 11. GDP per capita in East Asia (US\$)



Source: IMF, *World Economic Outlook Database*, April 2007.

Table 1. Investment Promotion Incentives by Thailand

	Import Duty Exemption on Intermediate Goods	Import Duty Exemption on Machinery	Tax Exemption of Corporate Income
Since 1987	for export more than 80%	None for Zone 1, 50% for Zone2, and 100% for Zone 3	None for Zone 1 , 0-3 years for Zone2, and 4-8 years for Zone 3
Since 1989		None for Zone 1, 50% for Zone2, and 100% for Zone 3 Zone 2: import duty exemption for 1 year for more than 30% export Zone 3: import duty exemption for 5 years formore than 30% export	None for Zone 1 , 3 years for Zone2, and 5-8 years for Zone 3
Since 1990			None for Zone 1 , 3 years for Zone2, and 6-8 years for Zone 1 None (3 years for export more than 80% plus located in industrial estate)
Since 1993			Zone 2: 3 years tax exemption in principle but max 7 years for located in industrial estate Zone 3: 8 years tax exemption plus 50% reduction for 5 years, and tax deduction for 25% of investment expenditure

Notes: In 1987, the definition of zones was Zone 1 (Bangkok and one province), Zone 2 (4 provinces), and Zone 3 (67 provinces). The definition was changed in 1989, Zone 1 is Bangkok and five Bangkok surrounding provinces. Zone 2 is 10 provinces and Zone 3 is 57 provinces.

Source: Compiled by author based on materials of the Board of Investment, Thailand.

Table 2. ASEAN Free Trade Area (AFTA) tariff reduction scheme

	Tariff lines	Inclusion Lists		Liberalization level in 2007			
			% of total tariff lines	tariff less than 5%	% of total tariff lines	tariff to be 0%	% of total tariff lines
Thailand	8,301	8,301	100.0	8,288	99.8	4,513	54.4
Malaysia	12,593	12,504	99.3	12,439	98.8	9,785	77.7
Indonesia	8,732	8,619	98.7	8,619	98.7	5,730	65.6
Philippines	11,490	11,444	99.6	11,369	98.9	8,149	70.9
Singapore	10,705	10,705	100.0	10,705	100.0	10,705	100.0
Brunei	10,702	10,598	99.0	9,924	92.7	8,444	78.9
ASEAN6	62,523	62,171	99.4	61,344	98.1	47,326	75.7
Vietnam	10,689	10,523	98.4	10,285	96.2	5,478	51.2
Laos	10,690	10,389	97.2	9,960	93.2	629	5.9
Cambodia	10,689	10,454	97.8	5,301	49.6	603	5.6
Myanmar	10,689	10,611	99.3	9,325	87.2	365	3.4
New members	42,757	41,977	98.2	34,871	81.6	7,075	16.5
Grand total	105,280	104,148	98.9	96,215	91.4	54,401	51.7

Source: ASEAN Secretary