

The Evolution of East Asian Production Networks: Existing Trends and Policy Adjustments on Investment Incentives across Selected Southeast Asian Countries

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I. INTRODUCTION

In the last five decades or so, East Asia experienced remarkable economic growth that was unparalleled in the rest of the world. This “East Asian miracle,” which exhibited relatively high economic growth rates among East Asian economies, can be attributed to the region’s macroeconomic stability – low inflation, high investments, high savings, human capital development, and openness to trade. Moreover, the region’s impressive economic performance was also associated with the development strategies enforced by governments in the region (The World Bank 1993).

However, it is worthwhile to note that another characteristic of East Asia was the emergence of local and regional production networks during the 1990s. An international production network links together the affiliates, joint ventures, and subsidiaries of a multinational corporation (MNC) or a “global network flagship,” with its distributors, strategic partners, service providers, subcontractors, and suppliers (Ernst & Kim 2001). The advent of MNCs and international production networks in East Asia can be ascribed to the region’s liberalization efforts in the field of trade, capital flows, foreign direct investment (FDI) and privatization; the industrial development strategies formulated and implemented by East Asian economies; the increasing usage of information and communications technology (ICT) in the facilitation of trade in goods and services; the relative attractiveness of China as a primary center of production; and reforms in the region’s corporate organization (Ando & Kimura 2003; Yusuf 2003; Ernst & Kim 2001).

With the evolution of international production networks in East Asia, domestic firms were able to acquire “better knowledge, upgraded skills, advanced technology, and, at times, financing.” Conversely, MNCs that pioneered these production networks were able to reduce their costs of production, tap additional human resources, and focused on their core competencies (ADB 2002).

However, it seems that not all economies in East Asia were able to extract full economic benefits from this recent shift in the region’s industrial structure. For instance, the Philippine industrial sector has been suffering from relatively poor economic performance and certain studies attribute this dismal performance to poor industrial policies, inadequate infrastructure, etc. Hence, it is essential that given the recent changes in the East Asia’s industrial structures, the Philippines should learn from the “success stories” of its counterparts in the region for it to fully benefit from this new phenomenon in industrial organization.

The expansion of the production activities of MNCs originating from Japan, the United States and several Western European countries to the economies of East Asia over the past two decades has been primarily responsible for the creation of international production networks which continue to influence the extent of industrial development in the region. These international production networks have made substantial contributions to East Asian economies by initially bringing FDI to the host countries. Subsequently, these networks create new jobs,

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increase production, establish linkages by integrating local firms into their supply network and promote the use of new technology.

A country's participation in an international production network provides a ready, captive and in most cases a steady demand for its output considering that the intermediate components it produces forms an integral part of the MNC's final product being manufactured in an economy within the network. If there is a strong demand for the final product within and outside of the region where the production network is based, the countries' participation in the network as significant contributors to the value added being generated at each stage of production is strengthened.

It is necessary to understand how these international production networks evolved, how they continue to change, the factors influencing their decision to locate, and the basis for selecting countries which can serve as operational headquarters or as platforms for higher value added activities. This will enable countries that are attempting to attract FDI of this nature know how their presence in the network could be maintained in the long term. These host countries can then adopt the appropriate industrial policy adjustments that would maximize the benefits from active participation in the network and further strengthen and continually upgrade its position in the entire value chain of production activities set up by the MNC.

International production and distribution networks generally consist of vertical production chains extended across countries in the region as well as distribution networks throughout the world. The major players in this regard are firms belonging to the machinery industries including general machinery, electrical machinery, transport equipment and precision machinery, as well as electronics, computers, semi-conductors textiles, garments and many other products (Ando & Kimura 2003).

International, regional or global production networks are international systems that are set up to optimize production, marketing and innovation by locating products and processes or functions in different countries to benefit from cost, technological, marketing, logistic and other differences which create advantages for MNCs competing in international markets (Lall, Albaladejo & Zhang 2004). A conventional global production network combines a large multi-divisional MNC (a.k.a., flagship), its subsidiaries, affiliates and joint ventures, its suppliers and subcontractors, its distribution channels and value added resellers, as well as its research and development alliances and a variety of cooperative agreements, such as standards consortia (Ernst 1997 and Sloan 2000).

Trade theorists call the process 'fragmentation', while others call it 'segmentation', 'production sharing', 'integrated production', 'outward processing', or 'vertical specialization' (Arndt & Kierzkowski 2001; Borrus et al 2000). The firm (a.k.a., flagship) breaks down the value chain into a variety of discrete functions and locates them wherever they can be carried out most effectively, where they improve the firm's access to resources and capabilities, and where they are needed to facilitate the penetration of important growth markets (Ernst 1997; Sloan 2000). Intra-regional trade in East Asia is increasingly characterized by 'production sharing', defined as the decoupling of previously integrated goods into constituent parts, components and accessories which in turn are distributed across countries on the basis of comparative advantage (Ng & Yeats 1999). The main purpose is to gain quick access to lower-cost foreign capabilities that are complementary to the flagship's own competencies. Outsourcing allows firms to focus on core business and improve efficiency (Ernst 1997; Sloan 2000).

While retaining their core competencies, MNCs are setting up international production systems on the basis of corporate strategies that seek to obtain the optimal configuration of their manufacturing processes by spreading production to locations that offer significant advantages in production costs and access to third markets (UNCTAD 2002). Fragmentation plays a growing role in industrial activity in some developing countries, particularly in technology advanced activities and for economies participating in an international production network, the effects on production, employment, exports and technological upgrading have been fairly dramatic (UNIDO 2002).

Arndt (2003) explains that the fragmentation of the production process through cross-border production sharing, or cross-border production fragmentation and intra-product specialization, has received a major boost from recent innovations in communications and transportation technologies and from market-opening challenges in trade and regulatory policies. As a result, the cost of coordinating economic activities across national frontiers has declined precipitously in recent years and manufacturers have responded by breaking up the production process and moving its constituent activities abroad, producing components and locating assembly in accordance with the dictates of comparative advantage.

Many companies utilize cross-border sourcing of components in order to increase competitiveness in markets for the final product. If a component can be obtained at lower cost from a foreign source, then the cost-savings can either be passed on to lower end-product prices, hence garnering larger market shares, or be collected in higher profits at given prices. However, a country does not have to be the producer of an end product in order to reap the benefits from cross-border production sharing. Indeed, one of the attractive features of production sharing is that it facilitates a finer division of labor and thereby enables more countries to benefit from participation in global production networks. This can be especially valuable for economies trying to move up the value chain in international trade (Arndt 2003).

Rajan (2003), explains that another important feature of production sharing is that the entire set of countries that participates in the integrated production system becomes more attractive as export markets and investment destinations because the costs of manufacturing a product is reduced. This is an outcome that is mutually beneficial for all participants. Lower income developing economies are not only able to gain a comparative advantage in lower end light industries, but also in the lower end production stage of higher-tier industries. Middle and higher income developing countries are able to graduate to higher ends of the value added chain, i.e. more advanced stages of the Original Equipment Manufacturing (OEM) and eventually into Original Design Manufacturing (ODM). Countries could also move horizontally, in effect, improving product quality and serving higher value added market segments. This may evolve into Original Brand Manufacturing (OBM) which essentially involves moving from selling under a foreign label to developing and selling under their own label, hence allowing them to capture brand name rents. Hong Kong has done this effectively in the case of apparels, with many labels being produced by Hong Kong brands. Other economies in the Asia Pacific region are developing their own "brand names" in computers and electronics.

High-wage countries tend to be at a competitive disadvantage in labor-intensive production activities. Continuing such activities increases production cost and reduces competitiveness. Modern technology enables firms to improve and maintain competitiveness by dispersing labor-intensive activities to labor-rich, low-wage locations. In the absence of cross-border fragmentation, rising wage costs would cause domestic firms to lose market share at home and abroad, as imports of competing products rise and exports of the home product fall. Cross-border sourcing enables firms to slow if not, reverse that process (Arndt 2003).

II. RECENT TRENDS IN INVESTMENT AND TRADE IN EAST ASIA

A. Foreign Direct Investment

The last two decades witnessed a dramatic surge in FDI to East Asia. UNCTAD (2004) reports that East Asia had been consistently one of the largest host regions of FDI inward stock over 1980-2003. In 1980, East Asia's share of global FDI inward stock was around 30%, the second largest in the world. By 2003, its share dropped to 15.1% making it the third-largest FDI host in the world (see Table 1). Within East Asia, China was the largest host of FDI stock, comprising 40.3% of total FDI stock in the region in 2003, a significant change from its 0.5% regional share in 1980. Note that the Philippines's share in East Asia's FDI inward stock was around 1% in 2003, one of the lowest in the region (see Table 2).

Table 1: Regional Share of World's FDI Inward Stock, 1980-2003
(in percent)

Region	1980	1985	1990	1995	2000	2003
Africa	4.6	3.5	2.6	2.6	2.3	2.0
Central and Eastern Europe	—	0.0	0.1	1.3	2.3	3.2
East Asia ^a	29.7	24.9	16.4	18.0	18.3	15.1
European Union	31.2	27.5	38.4	38.0	37.1	40.5
Japan	0.5	0.5	0.5	1.2	0.8	1.1
Latin America and the Caribbean	7.3	8.2	6.0	6.7	8.4	7.9
Middle East	1.1	3.8	2.1	1.7	1.2	0.9
North America	19.8	25.6	26.0	22.0	23.4	22.2

^a East Asia consists of Brunei, Cambodia, China, Hong Kong (China), Indonesia, Lao PDR, Malaysia, Mongolia, the Philippines, Singapore, South Korea, Taiwan (China), Thailand, and Vietnam.
Source: UNCTAD (2004).

Table 2: Country Share of FDI Inward Stock in East Asia, 1980-2003
(in percent)

Region	1980	1985	1990	1995	2000	2003
Brunei	0.0	0.0	0.0	0.1	0.3	0.6
Cambodia	0.0	0.0	0.0	0.1	0.1	0.2
China	0.5	2.5	6.5	25.0	31.0	40.0
Hong Kong	87.0	76.0	63.0	42.0	41.0	30.0
Indonesia	5.0	10.0	12.0	9.4	5.4	4.6
Lao PDR	0.0	0.0	0.0	0.0	0.0	0.0
Malaysia	2.5	3.0	3.2	5.3	4.7	4.7
Mongolia	0.0	0.0	0.0	0.0	0.0	0.0
Philippines	0.6	1.1	1.0	1.1	1.2	0.9
Singapore	3.0	5.4	9.5	12.0	10.0	12.0
South Korea	0.6	0.9	1.6	1.8	3.3	3.8
Taiwan	1.2	1.2	3.0	2.9	2.5	2.7

Source: UNCTAD (2004).

In terms of FDI inflows, over 1991-2003, East Asia had been one of the largest FDI flow recipient in the world. In 2003, East Asia received around 17% of global FDI flows ranking second to the European Union (EU) as shown in Table 3. China was the largest recipient of FDI

flows in the region; in 2003, around 60% of FDI flowing to the region came into China as provided in Table 4.

Table 3: Regional Share of World FDI Inflows, 1991-2003

(in percent)								
Region	1991-96	1997	1998	1999	2000	2001	2002	2003
Africa	1.9	2.4	1.4	1.1	0.7	2.5	1.8	2.9
Central and Eastern Europe	3.4	4.2	3.7	2.5	2.1	3.3	4.8	4.1
East Asia	22.7	20.9	13.0	10.0	10.4	12.4	12.6	17.3
European Union	36.8	28.5	37.9	45.6	50.3	45.3	57.9	57.1
Japan	0.4	0.7	0.5	1.2	0.6	0.8	1.4	1.2
Latin America and the Caribbean	11.4	16.3	12.5	10.2	7.3	11.2	7.9	9.6
Middle East	0.9	1.3	1.1	0.1	0.1	0.8	0.5	0.8
North America	22.4	25.6	29.9	29.3	28.5	23.7	13.0	7.0

Source: UNCTAD (2004).

Table 4: FDI Inflows by East Asian Country: 1991-2003

(in percent)								
Country	1991-96	1997	1998	1999	2000	2001	2002	2003
Brunei	0.4	0.7	0.7	0.7	0.4	0.5	1.3	2.2
Cambodia	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.1
China	47.0	47.1	51.1	38.5	29.2	47.9	64.9	59.7
Hong Kong	11.2	12.1	17.2	23.4	44.4	24.3	11.9	15.1
Indonesia	5.5	5.0	(0.4)	(2.6)	(3.3)	(3.0)	0.2	(0.7)
Lao PDR	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Malaysia	10.0	6.7	3.2	3.7	2.7	0.6	3.9	2.8
Mongolia	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Philippines	2.3	1.3	2.0	1.6	1.0	1.0	2.2	0.4
Singapore	12.7	14.4	9.0	15.3	12.3	15.4	7.1	12.7
South Korea	2.3	2.4	0.3	2.8	3.5	4.2	1.8	0.5
Taiwan	2.4	2.4	0.3	2.8	3.5	4.2	1.8	0.5
Thailand	3.6	4.1	8.7	5.8	2.4	3.9	1.3	1.2
Vietnam	2.2	2.8	2.0	1.4	0.9	1.3	1.5	1.6

Source: UNCTAD (2004).

The major regional sources of FDI stock in the world IN 2003 were the EU and the US, both of which accounted for 49% and 29% of global FDI outward stock, respectively. The third-largest source of FDI stock was East Asia with 11.4% in 2003. In the Asian region, Japan was the largest source of FDI stock as it supplied 4.1% of global FDI outward stock in 2003 (see Table 5).

Table 6 depicts the distribution of FDI in top sectors in selected East Asian countries in certain periods. The manufacturing and electronic sectors were the predominant sectors that largely received FDI flows in most East Asian countries. The top suppliers of FDI in East Asia were the US and Japan.

Table 5: Regional Share of World's FDI Outward Stock, 1980-2003

(in percent)						
Region	1980	1985	1990	1995	2000	2003

Africa	1.2	1.5	1.2	1.1	0.8	0.5
Central and Eastern Europe	—	—	0.0	0.2	0.4	0.8
East Asia ^a	4.3	7.2	13.7	14.4	14.2	11.4
European Union	38.5	41.2	45.3	44.8	49.7	49.2
Japan	3.5	6.0	11.5	8.2	4.7	4.1
Latin America and the Caribbean	8.4	6.9	3.3	3.0	2.6	2.2
Middle East	0.2	0.4	0.4	0.3	0.2	0.3
North America	42.7	38.1	29.3	28.2	25.6	29.0

Source: UNCTAD (2004).

Table 6: Distribution of FDI in Selected East Asian Countries
(in percent)

Country and Data Year	Top Sectors	Top Originating
China (1998-2000 Accumulated Flows)	Manufacturing (46); Real estate (16)	Hong Kong (41); United States (10)
Hong Kong (2000 Year-end Stock)	Investment holding/real estate (60); Wholesale/retail (11)	Virgin Islands (32); China (31)
Indonesia (1967-2000)	Chemicals and pharmacy (30); Paper (10); Electronics, trading, and other services (10)	Japan (16); United Kingdom(9); Singapore (8)
Malaysia (2000-2001 Flows)	Electrical and electronics (51)	United States (28); Japan (16)
Philippines (2000 Flows)	Manufacturing (46); Energy-related (32)	United States (36); Japan (27)
Singapore (2000 Inflows)	Electronic products and components (48); Chemicals (30)	United States (40); Japan (16)
Taiwan (1952-2000 Approved Flows)	Electrical and electronics (24); Banking and insurance (15)	United States (24); Japan (21)
Thailand (1995-1999 Inflows)	Trade (25); Machinery & transport (11); Electrical appliances (10)	Japan (27); United States (17)
Vietnam (2000 Flows)	Oil and gas (59); Light industry (18)	United Kingdom (30); India (25)

Source: OECD (2002) as reported in Sakakibara and Yamakawa (2003).

B. Trade in Merchandise Goods

As of 2002, world merchandise exports amounted to US\$6.27 trillion with Western Europe being the largest merchandise exporter at US\$2.66 trillion followed by Asia with US\$1.62 trillion. In Asia, the largest regional exporter of merchandise goods in 2002 was East Asia. Note that the world share of Asian merchandise exports increased to 26.4% in 2000 from 21.8% in 1990 and this was brought about by increasing world shares of China and East Asia.

World merchandise imports in 2002 were valued at US\$6.51 trillion. Western Europe was the largest merchandise importer with US\$2.66 trillion while Asia was next with US\$1.46 trillion. Merchandise imports of East Asia in 2002 figured US\$550 billion. The region's world share in merchandise imports in the first half of the 1990s had increased from 8.0% in 1990 to 11.0% in 1995 but it declined in the second half to 9.4% in 2000.

In East Asia, among the countries that gained large increases in the value of merchandise exports during 1995-2000 were Vietnam (22%), the Philippines (18%), and China

(11%). By 2002, China posted the largest annual growth in the value of merchandise exports with 22% followed by the Philippines with 11%. In terms of changes in the value of merchandise imports, Vietnam earned the highest annual growth during 1995-2000 with 14% with China second at 11%. In 2002 alone, China and Vietnam acquired the largest annual growth rates in terms of merchandise import values with 21% and 19% respectively (see Table 7).

Table 7: Leading Merchandise Exporters and Importers in Asia
(in USD billion and percent)

Country	Value		Share		Annual Percentage Change in		
	2002	1995	2002	1995-2000	2001	2002	
Exporters							
China	325.6	11.4	20.1	11.0	7.0	22.0	
Hong Kong, China	201.2	—	—	3.0	(6.0)	5.0	
Indonesia	57.1	3.5	3.5	6.0	(9.0)	1.0	
Japan	416.7	34.0	25.7	2.0	(16.0)	3.0	
Malaysia	93.3	5.7	5.8	6.0	(10.0)	6.0	
Philippines	36.3	1.3	2.2	18.0	(18.0)	11.0	
Singapore	125.2	9.1	7.7	3.0	(12.0)	3.0	
Thailand	68.9	4.3	4.2	4.0	(6.0)	6.0	
Vietnam	16.5	0.4	1.0	22.0	5.0	9.0	
Importers							
China	295.2	10.5	20.2	11.0	8.0	21.0	
Hong Kong, China	207.2	—	—	2.0	(6.0)	3.0	
Indonesia	31.3	3.2	2.1	(4.0)	(7.0)	1.0	
Japan	337.2	26.7	23.1	2.0	(8.0)	(3.0)	
Malaysia	79.9	6.2	5.5	1.0	(10.0)	8.0	
Philippines	35.2	2.3	2.4	4.0	(7.0)	12.0	
Singapore	116.4	9.9	8.0	2.0	(14.0)	0.0	
Thailand	64.7	5.6	4.4	(3.0)	0.0	4.0	
Vietnam	19	0.6	1.3	14.0	2.0	19.0	

Source: WTO (2003).

In the last ten years or so, manufactures constituted the largest share in Asia's merchandise exports at US\$1.36 trillion in 2002 or 83.6% of total merchandise exports of the region. In 2002, the annual growth in manufactures exports was 8% and this was a sharp improvement from 2001's annual growth of -10% and slightly better than its average annual growth of 5% in 1995-2000. Almost half of manufactures exports of Asia to the rest of the world in the last decade or so comprised of machinery and transport equipment (see Table 8).

Table 8: Merchandise Exports of Asia by Product
(in USD billion and percentage)

Type of Merchandise	Value		Share in Asian Exports		Share in World Exports		Annual Percentage Change	
	2002	1995	2002	1995	2002	1995	2001	2002
Total Merchandise Exports	1,620.2	100.0	100.0	26.2	25.8	5.0	(9.0)	8.0

Agricultural Products	106.2	8.3	6.6	18.6	18.2	(2.0)	(1.0)	7.0
Food	83.8	6.1	5.2	17.7	17.9	(1.0)	2.0	7.0
Raw Materials	22.4	2.3	1.4	21.7	19.6	(4.0)	(11.0)	7.0
Manufactures	1,354.6	83.2	83.6	29.3	28.8	5.0	(10.0)	8.0
Chemicals	106.8	5.8	6.6	15.7	16.2	6.0	(5.0)	11.0
Clothing	89.9	5.4	5.6	44.4	44.8	5.0	(4.0)	3.0
Iron and Steel	33.4	2.6	2.1	22.4	23.5	0.0	(14.0)	11.0
Machinery and Transport	797.3	48.3	49.2	32.6	31.4	6.0	(13.0)	9.0
Automotive Products	122.8	7.4	7.6	21.0	19.8	4.0	(6.0)	14.0
Office and Telecom	422.1	23.7	26.1	51.1	50.4	8.0	(15.0)	10.0
Other Machinery and Transport Equipment	252.4	17.2	15.6	25.7	23.4	4.0	(11.0)	5.0
Other consumer goods	163.8	9.9	10.1	30.0	29.6	5.0	(7.0)	7.0
Other semi-manufactures	95.6	6.2	5.9	20.5	20.8	3.0	(5.0)	10.0
Textiles	67.7	5.0	4.2	42.8	44.5	1.0	(8.0)	6.0
Mining products	114.8	6.3	7.1	15.5	14.6	9.0	(10.0)	2.0
Fuels	78.3	4.0	4.8	14.2	12.7	11.0	(12.0)	2.0
Non-ferrous Metals	20.9	1.3	1.3	16.2	19.0	5.0	(9.0)	4.0
Ores and Other Minerals	15.6	1.0	1.0	21.7	25.0	4.0	0.0	(2.0)

Source: WTO (2003).

By 2002, intra-regional merchandise trade in Asia amounted to US\$792 billion, the second-largest in the world; this represents 48.9% of Asia's intra-regional merchandise trade flows in terms of its total merchandise exports or 12.6% of the region's trade flows to world merchandise exports as shown in Table 9. Within Asia, ten member countries of the Association of Southeast Asian Nations (ASEAN) had shown impressive growth in intra-regional merchandise trade in the last fifteen years or so; from US\$28.95 billion in 1990, intra-regional merchandise exports in ASEAN reached US\$97.23 billion by 2002. Among ASEAN members, Singapore was the largest merchandise exporter to the region with US\$38.1 billion. In terms of annual change, during 1990-2002, the Philippines posted the largest growth in merchandise exports to the ASEAN region as illustrated in Table 10. Similarly, Ng and Yeats (2003) observed that over 1985-2001 the share of East Asia's total exports to other countries in East Asia grew by around 11% while the region's import demand growth over the said period was approximately 11.6%. Such trend changes, according to Ng and Yeats (2003), have strengthened East Asia's level of intra-regional trade.

Table 9: Intra- and Inter-regional Merchandise Trade, 2002
(in USD billion and percent)

Origin	North America	Latin America	Western Europe	Central and Eastern Europe/Baltic States/CIS	Africa	Middle East	Asia	World
Africa	24	5	71	1	11	3	24	140
Asia	394	39	260	21	26	48	792	1,620
Central and Eastern Europe/Baltic States/CIS	14	6	176	80	4	7	24	314

Latin America	215	54	44	3	4	5	23	350
Middle East	38	3	40	2	9	17	116	244
North America	382	152	170	7	12	20	204	946
Western Europe	270	55	1,787	168	66	68	208	2,657
World	1,336	315	2,549	282	133	169	1,391	6,272

Source: WTO (2003).

C. Trade in Manufactures

Most of the regions around the world have had manufactures comprising the largest component of merchandise trade. In 2002, the world share of manufactures in merchandise trade was 75.1% with Asia posting the largest share of manufactures exports in its merchandise exports with 83.6% while Western Europe was second with 80.7%. On the other hand, Asia was second to Africa in having the lowest share of manufactures imports in its merchandise imports in 2002 with 71.1% while the top region was North America with 79.8% as seen in Table 11.

The top five exporters of manufactures in East Asia as of 2002 were Japan (US\$387.5 billion), China (US\$292.6 billion), Hong Kong, China (US\$191.6 billion), South Korea (US\$148.8 billion) and Taipei (US\$126.5 billion). Note that with the exception of Japan, most East Asian economies registered rising shares in their exports of manufactures to world exports from 1990 up to 2002. On the other hand, the top five importers of manufactures in the region in 2002 were China (US\$236.8 billion), Japan (US\$193.7 billion), Hong Kong, China (US\$188.3 billion), South Korea (US\$95.4 billion) and Singapore (US\$93.0 billion). Only Indonesia, Japan, and Thailand incurred decline in their shares of exports of manufactures to world exports from 1990 up to 2002 (see Table 12).

Table 10: Merchandise Exports of ASEAN Countries, 1990-2002
(in USD billion)

Origin	Year	Destination		
		ASEAN (10)	Asia	World
ASEAN (10)	1990	28.95		144.20
	1995	81.88		320.88
	2002	97.23		404.93
Indonesia	1990	2.57	15.31	25.68
	1995	6.50	22.15	45.42
	2002	9.93	26.56	57.13
Malaysia	1990	8.62	9.65	29.45
	1995	20.41	22.83	73.91
	2002	24.28	32.70	93.27
Philippines	1990	0.59	2.59	8.17
	1995	2.36	5.04	17.50
	2002	5.53	13.36	36.27
Singapore	1990	13.57	15.16	52.73
	1995	38.24	34.81	118.27

	2002	38.10	43.59	125.18
Thailand	1990	2.75	6.78	23.07
	1995	12.33	18.17	56.44
	2002	13.57	24.36	68.85

Source: WTO (2003).

Table 11: Share of Manufactures in Total Merchandise Trade
(in percent)

Region	Exports	Imports
World	75.1	75.1
Africa	25.2	70.9
Asia	83.6	71.1
Central and Eastern Europe/Baltic States/CIS	57.2	75.5
Latin America	59.5	76.3
Middle East	23.8	78.1
North America	76.9	79.8
Western Europe	80.7	75.5

Source: WTO (2003).

Table 12: Exports and Imports of Manufactures of Selected Economies in Asia, 1990-2002
(in USD billion)

Country	Exports			Imports		
	1990	1995	2002	1990	1995	2002
China	44.31	124.84	292.57	42.39	103.41	236.81
Hong Kong, China	75.64	160.77	191.55	70.53	170.56	188.25
Indonesia	9.04	22.96	30.91	16.64	29.57	18.41
Japan	275.13	421.62	387.5	99.95	177.91	193.75
Malaysia	15.82	55.09	74.04	22.87	64.42	65.43
Philippines	5.59	13.78	32.31	8.96	21.83	28.41
Singapore	37.55	99.04	105.64	44.42	103.32	92.96
South Korea	60.6	114.4	148.84	44.1	89.85	95.44
Taipei	62.05	104.88	126.5	36.77	76.85	86.04
Thailand	14.58	41.22	51.98	24.83	56.7	48.32
World	2,391	3,702	4,708	2,391	3,702	4,708

Source: WTO (2003).

D. Trade in Office Machines and Telecom Equipment

By 2002, the shares of Asia of exports and imports of office machines and telecom equipment to the region's total trade of manufactures were 31.2% and 28.9% respectively; both values were larger than the world average. Also, Asia's shares of exports and imports of such goods to the region's share in total merchandise were the largest in the world as provided in Table 13. By the same year, the value of exports of office machines and telecom equipment within Asia figured US\$211.3 billion, the largest among regional flows of world exports of office machines and telecom equipment. The average annual growth of such regional flows in Asia during the second half of the 1990s was 10% and this increased to 14% by 2002 (see Table 14).

The top exporter of office machines and telecom equipment in East Asia and the third largest in the world for 2002 was Japan with US\$81.24 billion. The Philippines was ranked eleventh in the world in 2002 in terms of exports of office machines and telecom equipment to the rest of the world with US\$22.72 billion. Over 1980-2002, most of East Asian economies experienced rising export shares of office machines and telecom equipment in the world with China leading the group. Only Japan and Hong Kong, China lost some of its export shares over the given period. On the other hand, the top importer of office machines and telecom equipment in East Asia as of 2002 was China with US\$66.41 billion; it was ranked third largest importer in the world. All of the leading importers of office machines and telecom equipment in East Asia incurred growth in its imports of such goods albeit at varying degrees over 1980-2002 as shown in Table 15.

Table 13: Share of Office Machines and Telecom Equipment in Total Merchandise and in Manufactures by Region, 2002

Region	(in percent)	
	Exports	Imports
Share in Manufactures		
Africa	2.5	8.2
Asia	31.2	28.9
Central and Eastern Europe/Baltic States/CIS	8.8	10.5
Latin America	17.4	14.6
Middle East	8.9	9.0
North America	16.4	17.0
Western Europe	11.1	14.7
Share in Total Merchandise		
Africa	0.6	5.8
Asia	26.1	20.5
Central and Eastern Europe/Baltic States/CIS	5.0	7.9
Latin America	10.3	11.1
Middle East	2.1	7.0
North America	12.6	13.5
Western Europe	9.0	11.1

Source: WTO (2003).

Table 14: Major Regional Flows in World Exports of Office Machines and Telecom Equipment, 2002

Region	(in USD billion and percent)			
	Value	Annual Percentage Change		
	2002	1995-2000	2001	2002
Intra-Asia	211.3	10.0	(14.0)	14.0
Intra-Western Europe	169.5	10.0	(7.0)	(5.0)
Asia to North America	108.4	5.0	(21.0)	4.0
Asia to Western Europe	76.0	8.0	(16.0)	1.0
North America to Asia	47.4	9.0	(20.0)	(7.0)
Latin America to North America	32.4	24.0	0.0	(8.0)

Source: WTO (2003).

Table 15: Leading Exporters and Importers of Office Machines and Telecom Equipment in East Asia, 2002

(in USD billion and percent)

Country	Value	Share in World Exports/Imports		
	2002	1980	1990	2002
Exporters				
China	75.52	0.1	1.0	9.0
Indonesia	6.14	0.1	0.0	0.7
Hong Kong, China	59.30	2.0	1.6	0.3
Japan	81.24	21.1	22.4	9.7
Malaysia	46.88	1.4	2.7	5.6
Philippines	22.72	0.8	0.6	2.7
Singapore	62.90	3.2	6.4	7.5
South Korea	52.35	2.0	4.8	6.2
Taipei	50.00	3.2	4.7	6.0
Thailand	16.95	0.0	1.2	2.0
Importers				
China	66.41	0.6	1.3	7.8
Japan	49.30	2.6	3.7	5.8
Malaysia	27.64	1.6	1.9	3.2
Philippines	12.72	0.8	0.7	1.5
Singapore	44.44	2.6	4.5	5.2
South Korea	28.48	1.3	2.6	3.3
Taipei	31.77	1.4	2.5	3.7
Thailand	13.28	0.2	1.1	1.6

Source: WTO (2003).

E. Trade in Automotive Products

In 2002, Asian exports of automotive products to its largest market, i.e., North America amounted to US\$60.9 billion with annual growth for the year of 14%. However, intra-Asia trade of automotive products was only US\$23.8 billion; but this regional flow gained an impressive annual growth of 21% during the year (see Table 16). In the same year, the share of Asia's exports of automotive products in terms of the region's exports of manufactures was 9.1%, while the region's share of imports of automotive products in terms of its imports of manufactures was 4.6%; both shares were lower than the world average of 13.2% (see Table 17).

As of 2002, the leading exporters of automotive products in East Asia were Japan (US\$92.5 billion), South Korea (US\$17.3 billion), Thailand (US\$2.9 billion) and China (US\$2.7 billion). It is noticeable that the share of Japan's exports of such products to world exports declined dramatically in the 1990s whereas the shares of automotive exports to world exports of South Korea, China, Taipei, and Thailand, all went up albeit at different degrees in the last two decades or so. In the same year, the leading East Asian importers of automotive products were Japan (US\$9.9 billion), and China (US\$7.0 billion). In the 1990s, the shares of exports of automotive products to world exports of Japan, Singapore, Taiwan, and Thailand dropped at differing levels. On the other hand, during the same period, China and South Korea saw a rise in the export shares of their respective automotive products to the world (see Table 18).

Table 16: Major Regional Flows in World Exports of Automotive Products, 2002
(in USD billion and percent)

Region	Value		Annual Percentage Change	
	2002	1995-2000	2001	2002
Intra-Asia	23.8	(2.0)	(10.0)	21.0
Intra-Western Europe	219.5	3.0	0.0	6.0
Asia to North America	60.9	7.0	(3.0)	14.0
Intra-North America	93.0	7.0	(10.0)	6.0
Western Europe to N. America	36.0	10.0	5.0	24.0
Latin America to North America	31.2	17.0	0.0	2.0

Source: WTO (2003).

Table 17: Share of Automotive Products in Total Manufactures and in Merchandise by Region, 2002
(in percent)

Region	Exports	Imports
Share in Manufactures		
Africa	6.5	11.9
Asia	9.1	4.6
Central and Eastern Europe/Baltic States/CIS	12.9	12.3
Latin America	18	12.4
Middle East	3.1	13.7
North America	17	20.8
Western Europe	14.4	13.9
Share in Total Merchandise		
Africa	1.6	8.5
Asia	7.6	3.3
Central and Eastern Europe/Baltic States/CIS	7.4	9.2
Latin America	10.7	9.4
Middle East	0.7	10.7
North America	13.1	16.6
Western Europe	11.7	10.5

Source: WTO (2003).

Table 18: Exporters and Importers of Automotive Products of East Asian Economies, 2002
(in USD billion and percent)

Country	Value		Share in World Exports/Imports	
	2002	1980	1990	2002
Exporters				
China	2.68	0.0	0.1	0.4
Indonesia	0.45	0.0	0.0	0.0
Hong Kong, China	1.27	0.0	0.0	0.0
Japan	92.51	19.8	20.8	14.9
Philippines	0.77	0.0	0.0	0.0

Singapore	0.77	0.0	0.0	0.0
South Korea	17.30	0.1	0.7	2.8
Taipei	2.31	0.0	0.0	0.4
Thailand	2.88	0.0	0.0	0.5

Importers

China	6.96	0.6	0.6	1.1
Japan	9.89	0.5	2.3	1.6
Philippines	0.97	0.0	0.0	0.0
Singapore	2.00	—	0.4	0.3
South Korea	2.54	—	0.3	0.4
Taipei	2.13	—	0.8	0.3
Thailand	2.43	—	0.8	0.4

Source: WTO (2003).

F. Trade in Clothing

In 2002, the world shares of clothing in manufactures and in total merchandise were 4.3% and 3.2% respectively. Asia's export share of clothing in manufactures was 6.6%, which was greater than the world share while its import share of clothing in manufactures was 2.7%, which was the second-lowest among regional shares. Also, Asia's export share of clothing in total merchandise of 5.6% exceeded the world average but its import share of clothing in total merchandise was one of the lowest among regional shares with 1.9% as illustrated in Table 19.

Total clothing exports of Asia to the rest of the world as of 2002 figured US\$89.92 billion, the largest among all regions. Its biggest market was North America with US\$34.46 billion followed by Asia itself with US\$22.84 billion. Note that in the second half of the 1990s, the region's clothing exports had the largest annual growth in Latin America with 16%. By 2002, the annual growth of Asia's clothing exports had its highest figure with Central and Eastern Europe including the Baltic States and CIS with 23% followed by Latin America with 18% (see Table 20).

In East Asia, the leading clothing exporters in 2002 were: China, the second-largest exporter of clothing in the world with US\$41.3 billion; Hong Kong, China, the third-largest clothing exporter with US\$22.34 billion; Indonesia, which ranked ninth with US\$3.95 billion; South Korea, which ranked tenth with US\$3.69 billion; Thailand, which ranked eleventh with US\$3.37 billion; and the Philippines, which ranked fifteenth in the world in terms of clothing exports with US\$2.61 billion. The clothing export shares of China, Indonesia, and Thailand grew significantly from 1980 until 2002 while the rest of the economies in the region posted differing reductions in their export shares of clothing in world exports. Note that the Philippines's share of clothing exports in world exports in 1980 was 1.4%, and it went up to 1.6% in 1990 and then declined to 1.3% in 2002 (see Table 21).

Table 19: Share of Clothing in Trade in Total Manufactures and in Merchandise by Region, 2002
(in percent)

Region	Exports	Imports
Share in Manufactures		
Africa	20.9	2.6

Asia	6.6	2.7
Central and Eastern Europe/Baltic States/CIS	6.4	4.2
Latin America	10.0	3.4
Middle East	4.7	3.3
North America	1.1	6.1
Western Europe	2.8	4.3

Share in Total Merchandise

Africa	5.3	1.9
Asia	5.6	1.9
Central and Eastern Europe/Baltic States/CIS	3.6	3.1
Latin America	6.0	2.6
Middle East	1.1	2.6
North America	0.8	4.8
Western Europe	2.3	3.3

Source: WTO (2003).

Table 20: Clothing Exports of Asia to Principal Region, 2002
(in USD billion and percent)

Region	Value	Share	Annual Percentage Change	
	2002	2002	1995-2000	2002
World	89.92	100.00	5	3
North America	34.46	38.30	7	(1)
Asia	22.84	25.40	4	(4)
Western Europe	20.88	23.20	4	4
C. & E. Europe/Baltic States/CIS	3.56	4.00	7	23
Middle East	2.75	3.10	2	14
Latin America	2.39	2.70	16	18
Africa	1.15	1.30	7	12

Source: WTO (2003).

The leading importers of clothing in East Asia in 2002 would include: Japan, the third-largest clothing importer in the world with US\$17.6 billion; Hong Kong, China (US\$15.64 billion); South Korea (US\$2.17 billion); Singapore (US\$1.81 billion) and China (US\$1.36 billion). Most of the East Asian economies registered rising growth in their respective shares of clothing imports in world imports over 1980-2002. The Philippines was not a major clothing importer in the region as it purchased only US\$51 million worth of clothing from the rest of the world in 2002 as shown in Table 21).

Table 21: East Asia's Exporters and Importers of Clothing, 2002
(in USD billion and percent)

Country	Value	Share in World Exports/Imports		
	2002	1980	1990	2002
Exporters				
China	41.3	4.0	8.9	20.6
Indonesia	3.95	0.2	1.5	2.0
Hong Kong, China	22.34	—	14.2	11.1
Malaysia	1.96	—	1.2	1.0
Philippines	2.61	1.4	1.6	1.3

Singapore	1.65	—	1.5	0.8
South Korea	3.69	7.3	7.3	1.8
Taipei	2.2	—	3.7	1.1
Thailand	3.37	0.7	2.6	1.7
Importers				
China	1.36	0.1	0.0	0.6
Hong Kong, China	15.64	—	6.4	7.8
Japan	17.6	3.6	7.8	8.4
Philippines	0.05	—	0.0	0.0
Singapore	1.81	0.3	0.8	0.9
South Korea	2.17	0.0	0.1	1.0
Taipei	0.83	—	0.3	0.4
Thailand	0.15	—	0.0	0.0

Source: WTO (2003).

G. Trade in Textiles

The world shares of textiles in manufactures and in merchandise as of 2002 were 3.2% and 2.4% respectively. In terms of region, Asia had the highest export share of textiles in manufactures as well as in merchandise. Also, its import share of textiles in manufactures and in merchandise was above the world share (see Table 22).

As of 2002, almost half of the top fifteen textile exporters in the world come from East Asia. Topping the list was China with export sales valuing US\$20.56 billion followed by Hong Kong, China with US\$12.37 billion. The rest of the top exporters of textiles in the region were South Korea (US\$10.59 billion), Taiwan (US\$9.53 billion), Japan (US\$6.03 billion), Indonesia (US\$2.9 billion), and Thailand (US\$1.93 billion). Note that most of the countries in East Asia (with the exception of Japan and perhaps Singapore) incurred rising export shares of textiles in world exports over 1980-2002 (see Table 23).

Table 22: Share of Textiles in Trade in Total Manufactures and Merchandise by Region, 2002
(in percent)

Region	Exports	Imports
Share in Manufactures		
Africa	4.1	7.8
Asia	5.0	4.4
Central and Eastern Europe/Baltic States/CIS	3.1	5.6
Latin America	2.0	4.6
Middle East	3.4	5.1
North America	1.8	1.8
Western Europe	2.7	2.6
Share in Total Merchandise		
Africa	1.0	5.5
Asia	4.2	3.1
Central and Eastern Europe/Baltic States/CIS	1.8	4.2
Latin America	1.2	3.5

Middle East	0.8	4.0
North America	1.4	1.5
Western Europe	2.2	2.0

Source: WTO (2003).

Table 23: East Asia's Exporters and Importers of Textiles, 2002
(in USD billion and percent)

Country	Value	Share in World Exports/Imports		
	2002	1980	1990	2002
Exporters				
China	20.56	4.6	6.9	13.5
Indonesia	2.90	0.1	1.2	1.9
Hong Kong, China	12.37	—	—	—
Japan	6.03	9.3	5.6	4.0
Philippines	0.25	—	0.1	0.2
Singapore	0.74	—	0.9	0.5
South Korea	10.59	4.0	5.8	7.0
Taipei	9.53	3.2	5.9	6.3
Thailand	1.93	0.6	0.9	1.3
Importers				
China	13.06	1.9	4.9	8.1
Hong Kong, China	12.02	—	—	—
Japan	4.54	2.9	3.8	2.8
Philippines	1.30	—	0.9	0.9
Singapore	1.03	—	1.7	0.7
South Korea	3.17	0.7	1.8	2.0
Thailand	1.50	0.3	0.8	0.9

Source: WTO (2003).

In the same year, the top textile importers in the world that are based in East Asia were China (US\$13.06 billion), Hong Kong, China (US\$12.02 billion), Japan (US\$4.54 billion), South Korea (US\$3.17 billion), and Thailand (US\$1.5 billion). With the exception of Japan, the rest incurred increasing import shares of textiles in terms of world imports over 1980-2002. Note that over 1990-2002, the Philippines's import share of textile to world imports remained unchanged as provided in Table 23.

III. INTRA-REGIONAL TRADE TRENDS IN EAST ASIA

A. Product Composition of East Asian Intra-Regional Trade

There have been significant changes in the structure of East Asian intra-regional trade since the mid-1980s. As seen in Table 24, most of the economies in the region, namely, China, Malaysia, Singapore, the Philippines, and Thailand have incurred significant increases in its relative importance of machinery and transport equipment in East Asia's intra-regional trade. Conversely, there has been a significant decline in the relative importance of mineral fuels in the region's intra-trade since the mid-1980s. As of 2001, there existed differing concentrations of exports among countries. For instance, the exports of China, Hong Kong, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand, are heavily concentrated in machinery and transport equipment. On the other hand, the exports of Brunei, Indonesia, and

Vietnam are highly concentrated in mineral fuels while Mongolia's exports are largely concentrated in ores, minerals, and metals.

B. Dominant Products in East Asian Intra-Regional Trade

Ng and Yeats (2003) report that the largest thirty four-digit Standard International Trade Classification products in East Asia comprised a little over half of intra-regional trade in 2001 and this was a significant increase from its share of around 35% of regional trade in 1985. Electronic microcircuits, with Malaysia as its major supplier, were the largest exportable commodity in terms of intra-regional trade as it amounted to around US\$49 billion in 2001. Moreover, the authors indicate that most of the largest products in regional trade consist of components and parts, which supports the contention of rising importance of production sharing in East Asia (see Table 25).

C. Export Product Dynamics

Table 26 shows the "dynamic" or fast-growing manufactured products in East Asia. The fastest growing exportable product in the region was radiotelegraphic and telephonic equipment with 605.5% growth over 1995-2001; such commodity was largely made in South Korea and China. Note that sixteen of the twenty-seven "dynamic" manufactured goods being exported within the region were largely supplied by China while eleven in the list were largely produced in Taiwan. As of 2001, the "dynamic" intra-regional export product that was largely produced by East Asia was electronic microcircuits with US\$48.98 billion.

Table 24: Export Structure of East Asian Intra-regional Trade by Major Product Categories, 1985-2001
(in USD millions and percent)

Exporter	Year	Exports	Share of Product Category in Total Exports to East Asia (in percent)				
			Chemicals	Machinery and Transport Equipment	Mineral Fuels	Ores, Minerals, and Metals	Other Manufactures
Brunei	1985	921	0.2	0.4	98.3	0.1	0.1
	2001	1,213	0.0	3.5	82.5	0.3	12.3
Cambodia	1985	2	0.3	0.0	0.0	0.0	0.0
	2001	154	0.2	6.6	0.0	2.1	49.5
China	1985	10,818	4.0	5.6	21.6	2.2	33.8
	2001	124,283	3.1	37.9	3.2	3.2	25.3
Hong Kong	1985	10,279	3.6	39.5	1.0	1.3	34.0
	2001	19,597	6.4	49.7	0.9	3.5	21.8
Indonesia	1985	2,221	5.6	1.0	44.4	2.0	25.2
	2001	16,812	9.5	14.0	32.1	6.6	16.7
Lao PDR	1985	14	0.0	1.5	0.0	0.9	0.7
	2001	102	0.2	2.8	1.7	5.1	3.1
Malaysia	1985	6,939	1.3	15.5	37.5	1.3	5.8
	2001	44,724	5.3	64.5	9.4	2.0	7.0
Mongolia	1985	5	0.0	0.0	0.0	2.5	13.7
	2001	243	0.0	0.1	0.7	77.6	13.1
Philippines	1985	1,120	11.4	40.1	10.1	10.0	6.4
	2001	14,727	1.6	84.1	1.3	3.0	2.2
Singapore	1985	6,273	9.4	25.5	46.7	2.6	4.3
	2001	38,076	11.7	59.3	15.6	1.5	3.5
South Korea	1985	2,573	12.5	28.3	3.6	11.8	30.0
	2001	52,511	16.0	45.9	7.1	8.8	16.1
Taiwan	1985	5,525	7.1	26.9	2.6	7.0	36.7
	2001	59,992	13.8	53.3	1.1	8.3	15.9
Thailand	1985	2,091	4.0	12.2	0.4	5.3	11.8
	2001	22,020	11.7	50.1	5.7	2.9	9.2
Vietnam	1985	183	0.5	0.1	0.3	2.3	1.1
	2001	4,062	2.6	15.2	42.4	1.6	10.4

Source: Ng and Yeats (2003).

Table 25: Dominant 4-digit SITC Intra-regional Exports in East Asia, 1985-2001
(in USD billion and percent)

Commodity	Major Supplier (% share)	Regional Trade (USD billion)		Growth Rate (%)
		1985	2001	
Electronic microcircuits	Malaysia (23)	1.11	48.98	26.7
Parts of office machinery	China (25)	0.29	22.37	31.1
Parts of telecommunications equipment	China (45)	0.65	9.84	18.6
Radiotelegraphic and telephonic equipment	Korea (32)	0.01	8.33	56.3
Digital central storage units	Singapore (23)	0.00	8.19	98.9
Petroleum oils	Indonesia (30)	5.90	6.29	0.4
Diodes and transistors	Malaysia (20)	0.28	6.21	21.3
Children's toy and games	China (95)	0.95	6.13	12.4
Other electrical machinery	China (28)	0.20	6.05	23.8
Piezo-electric crystals	Taiwan (24)	0.33	5.50	19.2
Peripheral control units	China (33)	0.09	5.35	29.5
Footwear	China (93)	0.19	5.19	23.0
Other electrical power machinery	China (56)	0.13	4.51	24.9
Electrical switches and relays	China (35)	0.18	4.48	22.4
Printed circuits and parts thereof	Taiwan (28)	0.13	4.48	24.6
Jerseys and pullovers	China (88)	0.24	4.06	19.4
Polystyrene	Taiwan (44)	0.13	4.01	23.8
Petroleum gases	Indonesia (47)	0.10	3.88	25.6
Knitted fabrics	China (38)	0.14	3.87	23.1
Woven fabrics	Taiwan (45)	0.84	3.32	9.0
Miscellaneous art materials	China (54)	0.21	3.31	18.9
Travel goods and handbags	China (95)	0.27	3.29	16.9
Electric motors and generators	China (46)	0.05	3.11	29.8
Specialized machinery and appliances	Taiwan (42)	0.44	2.99	12.7
Woven cotton fabrics	China (48)	2.37	2.90	1.3
Insulated electrical wire and cable	China (45)	0.13	2.85	21.1
Telephonic electrical line	China (61)	0.04	2.74	30.8
Other sound recorders	China (72)	0.07	2.73	25.6
Copper and copper alloys	Taiwan (38)	0.09	2.55	22.9
Gas oils	Singapore (50)	1.61	2.52	2.8

Source: Ng and Yeats (2003).

D. Changes in Global Market Share of Major Exports

Since the mid-1980s, China has been the major destination of goods coming from its East Asian counterparts. As shown in Table 27, around half of the region's exporters had incurred their largest export market share increase with China. The largest bilateral regional trade increase was that of Mongolia's exports to China. On the other hand, the largest decline in bilateral regional trade was that of Lao PDR's exports to China. Ng and Yeats (2003) confirm that such trend supports the view of China's increasing relative importance as a regional destination for exports supplied by East Asia. In the case of the Philippines, it is worthwhile to note that the country's largest export share increase over 1985-2001 was with Taiwan while its largest export share decrease during the same period was with Malaysia.

E. Intra-industry Trade (IIT)²

East Asia's intra-industry trade ratios for selected economies in the region during 1985, 1995, and 2001 are depicted in Table 28. Note that as of 2001, Singapore had the highest IIT index in manufactures of 0.746 with Malaysia and Thailand following closely with 0.738 and 0.692 respectively. The relatively strong degree of IIT in manufactures between East Asia and Malaysia was very much evident since the mid-1980s. From 1985 up to 2001, only China and Hong Kong, China were not able to post an increase of more than a hundred percent in its respective IIT ratios.

In the category of "other manufactures" Malaysia had the highest IIT level of 0.681 in 2001. Also, other countries that gained a hundred-fold increase in their IIT ratios over 1985-2001 were Indonesia, the Philippines, South Korea, Taiwan, and Vietnam. Note that Thailand, which used to have the highest IIT ratio during the mid-1980s, did not incur the same rate of increase as that of its counterparts mentioned above.

Since the mid-1980s, Singapore had maintained its high level of IIT in machinery and transport equipment albeit a slight drop in its IIT index to 0.810 in 2001. Most of the economies in East Asia have at least a moderate level of IIT in this product category. And as witnessed over 1985-2001, some economies in the region posted a surge of at least a hundred percent in their respective IIT ratios and these were Indonesia, South Korea, Taiwan, Thailand, and Vietnam.

In the case of chemicals, the highest IIT ratio in 2001 belonged to Malaysia with 0.743 and this was followed by Indonesia with 0.672. Both countries alongside China and Thailand posted a hundred percent growth in their IIT ratios over 1985-2001.

Table 26: "Dynamic" Intra-Regional Export Manufactured Products in East Asia, 1995 and 2001

(in USD billion and percent)

Product	Major Supplier(s) and Share 2001	Regional Trade		Percentage Increase
		1995	2001	
Radiotelegraphic & Telephonic	South Korea (38), China (29)	1.18	8.33	605.5
Peripheral Electronic Units	China (33), South Korea (30)	1.47	5.34	262.5
Digital Central Storage Units	Singapore (23), China (19)	3.32	8.20	146.5
Piezo-electric Crystals	Taiwan (24), Singapore (20)	2.36	5.50	132.8
Electronic Microcircuits	Malaysia (23), Taiwan (23)	22.76	48.98	115.2
Other Coal	China (58), Indonesia (41)	1.13	2.41	112.3
Parts of Office Machinery	China (34), Malaysia (33)	10.61	22.37	110.8
Printed Circuits and Parts	Taiwan (28), China (27)	2.14	4.47	109.5
Jerseys and Pullovers	China (89)	2.04	4.06	98.8
Diodes and Transistors	Malaysia (25), Taiwan (20)	3.28	6.21	89.3

² Intra-industry trade (IIT) is a pattern of trade when a country both exports and imports good(s) in the same product classification category (Apleyard and Field 2002). The World Bank (2003) shows the computation of IIT as:

$$IIT_{jk} = 1 - \frac{\sum [X_{ijk} - M_{ijk}]}{\sum [X_{ijk} + M_{ijk}]}$$

Where X_{ijk} and M_{ijk} , respectively denote exports and imports of goods from industry i in country j to and from country k . The IIT ratio ranges between 0 and 1 with the former implying no existence of IIT and 1 suggesting perfect IIT. Higher IIT ratios indicate that the participating country is incurring marginal benefits from international trade as is specializing in the production of different goods and is becoming closely integrated with the rest of the world.

Petroleum Gases	Indonesia (47), Malaysia (32)	2.08	3.88	87.1
Fuel Oils	Singapore (48)	1.07	1.96	84.0
Other Outer Garments	China (84)	1.38	2.42	75.7
Other Electric Power Machinery	China (56)	2.68	4.51	68.2
Iron Sheets and Plates	Taiwan (48), South Korea (40)	1.34	2.24	67.7
Other Electrical Machinery	China (28), Taiwan (19)	3.64	6.05	66.5
Electrical Switches and Relays	China (36), Taiwan (16)	2.83	4.48	58.6
Telephonic Equipment	China (61), Taiwan (12)	1.76	2.74	56.1
Polyethylene	South Korea (37), Singapore	1.31	2.04	56.1
Kerosene and Other Medium Oils	Singapore (46)	1.12	1.67	48.3
Cameras and Camera Parts	China (59)	1.33	1.97	47.5
Other Outer Garments	China (87)	1.44	2.13	47.4
Polypropylene	South Korea (36), Taiwan (24)	1.14	1.67	46.5
Electric Motors and Generators	China (46), Thailand (17)	2.15	3.11	44.1
Other Polymerization Material	Taiwan (30), South Korea (26)	1.37	1.95	42.5
Insulated Wire and Cable	China (45), Taiwan (15)	2.03	2.85	40.8
Cyclic Hydrocarbons	South Korea (58), Singapore	1.40	1.97	40.7

Source: www.worldbank.org; Ng and Yeats (2003).

Table 27: Major Changes in East Asian Regional Trade Dependency, 1985-2001
(in percent)

Exporter	Largest Market Share Increase		Largest Market Share Decrease	
	Importer	Change	Importer	Change
Brunei	South Korea	13.7	Singapore	(11.4)
Cambodia	Thailand	6.8	Vietnam	(23.1)
China	South Korea	10.4	Singapore	(15.3)
Hong Kong, China	Malaysia	5.9	China	(26.9)
Indonesia	Malaysia	6.0	South Korea	(8.1)
Lao PDR	Thailand	33.5	China	(53.8)
Malaysia	China	10.4	Singapore	(11.6)
Mongolia	China	46.2	Vietnam	(47.4)
Philippines	Taiwan	12.4	Malaysia	(9.0)
Singapore	China	8.3	Malaysia	(10.1)
South Korea	China	42.0	Hong Kong, China	(25.2)
Taiwan	China	43.8	Hong Kong, China	(31.5)
Thailand	China	6.0	Malaysia	(10.0)
Vietnam	China	23.2	Hong Kong, China	(48.7)

Sources: www.worldbank.org; Ng and Yeats (2003).

Table 28: Intra-Industry Trade Ratios for Individual East Asian Regional Trade, 1985, 1995, and 2001

Country	All Manufactures			Chemicals			Machinery and Transport			Other Manufactures		
	1985	1995	2001	1985	1995	2001	1985	1995	2001	1985	1995	2001
China	0.32	0.29	0.37	0.21	0.42	0.38	0.52	0.39	0.46	0.29	0.23	0.28
Hong Kong,	0.42	0.36	0.33	0.37	0.24	0.30	0.54	0.46	0.34	0.34	0.30	0.31
Indonesia	0.30	0.65	0.67	0.30	0.65	0.67	0.11	0.34	0.57	0.23	0.34	0.37
Japan	0.20	0.34	0.46	0.36	0.34	0.47	0.10	0.35	0.53	0.28	0.33	0.34
Malaysia	0.59	0.69	0.74	0.36	0.62	0.74	0.71	0.74	0.75	0.44	0.56	0.68
Philippines	0.38	0.42	0.48	0.51	0.24	0.31	0.45	0.56	0.53	0.21	0.21	0.33

South Korea	0.27	0.39	0.50	0.32	0.32	0.31	0.31	0.38	0.61	0.23	0.43	0.40
Taiwan	0.21	0.41	0.52	0.34	0.29	0.34	0.28	0.55	0.65	0.15	0.29	0.31
Thailand	0.47	0.65	0.69	0.28	0.46	0.47	0.53	0.72	0.78	0.51	0.55	0.58
Vietnam	0.03	0.12	0.21	0.01	0.06	0.14	0.11	0.08	0.24	0.03	0.17	0.21

Sources: www.worldbank.org; Ng and Yeats (2003).

F. Production Sharing

Table 29 illustrates recent data on East Asia's regional trade in parts and components; such data is relevant in understanding production sharing, which is defined by Ng and Yeats (1999) as "the internationalization of a manufacturing process in which several countries participate in different stages of a specific good's fabrication." It encompasses labor-intensive activities within "vertically integrated manufacturing activities."

As of 2001, trade in parts and components in East Asia amounted to around US\$66 billion, which constituted around 20% of total intra-trade in manufactured goods in the world. Trade in office and adding machinery comprised the largest intra-trade in the region with US\$24.6 billion (or 37.5% of regional trade in manufactured goods), and this was followed by regional trade in telecommunications equipment with US\$18.2 billion or around 28% of regional trade in manufactured goods.

Table 29: Regional Trade in Parts and Components in East Asia, 2001
(in USD million and percent)

Component Part Description	Value	Share	Component Part Description	Value	Share
Steam boilers and auxiliary plants	50.72	0.08	Centrifuges and filters	287.15	0.44
Aircraft internal combustion engines	32.18	0.05	Fork lift trucks	18.88	0.03
Outboard motors	80.06	0.12	Lifting and loading machines	447.66	0.68
Internal combustion engines	317.29	0.48	Power hand tools	30.45	0.05
Engines and motors	170.47	0.26	Packing machinery	22.09	0.03
Rotating electric motors	488.21	0.74	Non-electrical machinery	162.63	0.25
Water turbines and motors	4.82	0.01	Office and adding machinery	24604.4	37.48
Cultivating equipment	9.94	0.02	Telecommunications equipment	18198.7	27.72
Harvesting machinery	6.97	0.01	Electric power machinery	750.14	1.14
Dairy machinery	0.76	0.00	Switchgear	8477.54	12.91
Wine making machinery	1.45	0.00	Domestic electrical equipment	49.73	0.08
Agricultural machinery	11.55	0.02	Electro-thermal appliances	208.01	0.32
Construction machinery	540.24	0.82	Electronic components	4374.73	6.66
Spinning machinery	40.59	0.06	Electronic accumulators	73.36	0.11
Looms and knitting machinery	69.14	0.11	Electric lamps and bulbs	30.76	0.05
Textile machinery	83.25	0.13	Electrical machinery	370.17	0.56
Paper making machinery	24.57	0.04	Motor vehicles and accessories	1542.92	2.35
Bookbinding machinery	0.85	0.00	Carriages and cycles	854.23	1.30
Printing and typesetting machinery	119.39	0.18	Trailers and non-motor vehicles	60.10	0.09
Grain milling machinery	7.26	0.01	Railroad equipment and vehicles	12.76	0.02
Food processing machinery	14.94	0.02	Aircraft and helicopters	426.85	0.65
Mineral working machinery	31.08	0.05	Chairs	54.47	0.08
Machines for special industries	602.01	0.92	Other furniture parts	166.97	0.25
Machine tools for metal working	175.36	0.27	Measuring or drawing machines	119.80	0.18
Foundry equipment	15.25	0.02	Still cameras	686.95	1.05
Rolling mill parts	26.55	0.04	Unmounted optical elements	23.52	0.04
Refrigerating equipment	117.51	0.18	Clocks and watches	328.59	0.50

Pumps for liquids	75.18	0.11	Umbrellas and canes	38.09	0.06
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Source: Ng and Yeats (2003).

The geographic pattern of intra-trade in parts and components in East Asia is depicted in Table 30. It is obvious that Japan is the center of production sharing as its exports of parts and components to the region in 2001 figured US\$38.7 billion, or around 31% of total regional exports of parts and components. The largest export market of Japan was China with US\$8.3 billion. Moreover, over 50% of regional imports of parts and components of Indonesia, the Philippines, South Korea, and Taiwan came from Japan. On the other hand, Hong Kong, China had the largest amount of imports of parts and components from the region with US\$29.8 billion, or roughly one-fourth of regional imports of parts and components. The largest exporter of parts and components to Hong Kong, China was China with US\$13.6 billion.

Ng and Yeats (2003) argue that a good indicator of whether a country has a competitive advantage (disadvantage) in the production and assembly of parts and components is the size of the given country's trade balance. That is, if a country has a negative trade balance, then it may be argued that that country is a major importer of parts and components and has a competitive advantage in assembly operations. Conversely, a country is said to have a competitive disadvantage in assembly operations, which implies that it has a competitive advantage in production of parts and components, if its exports exceed its imports (or it has a positive trade balance).

As shown in Table 30, countries that have negative trade balances are Hong Kong, China, Malaysia, the Philippines, Singapore, and Thailand. With this, Ng and Yeats (2003) observe that a possible reason as to why countries like Malaysia, the Philippines, and Thailand, are major importers of parts and components and may have a competitive advantage in assembly operations would be due to its relatively low labor costs. And in the case of Hong Kong, China, and Singapore, both of which have a relatively high wage rates, it was likewise noted that the negative trade balances incurred by these two could be due to its respective strategic policy of strengthening production of high-technology products; but such policy required high importation of office machinery and telecommunication equipment.

G. Revealed Comparative Advantage

In order to determine which country in East Asia has a comparative advantage in the production of a given commodity, an empirical measurement called revealed comparative advantage (RCA) is utilized.³ As provided by Ng and Yeats (2003), Table 31 showcases the proportion of around sixty component product groups in which East Asian countries have a comparative advantage in the production or assembly of components over 1985-2001. First, it is clear that Japan over the sad period had the largest fraction of parts and components in which it

³ Revealed comparative advantage (RCA) is an empirical measurement of comparative advantage. The RCA index is generally computed as:

$$RCA = (X_{ij} / X_{wj}) / (X_i / X_w)$$

Where: X_{ij} refers to country i 's exports of good j ; X_{wj} denotes world exports of good j ; X_i is country i 's total exports; and X_w is total world exports. If RCA is greater than unity, it is said that country i has a revealed comparative advantage in good j . On the other hand, if RCA is below unity, then this implies that country i has a revealed comparative disadvantage in good j . (Bowen, Hollander, and Viaene 1998)

had a RCA in the production of parts and components. This may conform to factor proportions theory since production operations are usually capital-intensive and that Japan is largely known to be capital-abundant.

In terms of assemble operations, in 1985, more than half of component product groups assembled by Indonesia and Malaysia had RCA indices exceeding unity. Ten years later, China and the Philippines alongside Indonesia and Malaysia had comparative advantage in majority of the assembly of parts and components in the region. By 2001, at least one-half of assembly operations in China, Indonesia, and Thailand had comparative advantages. In general, it may be argued that since the assembly of parts and components is typically labor-intensive, then it is expected that labor-abundant and relatively low wage countries like China, Indonesia, and Thailand, among others, would be the major importers of parts and components in the region. Overall, East Asia (excluding Japan) has almost half of its assembly operations with RCA whereas slightly more than half of production of parts and components in Japan has a comparative advantage.

Table 32 shows the 2001 data of RCA of each component product group produced in a certain country in East Asia. Among the parts and components produced in Japan and have relatively high RCA indices would include outboard motors (9.71), clocks and watches (4.90), still cameras (4.68), and fork lift trucks (4.11). It is worthwhile to note that the Philippines has six products that had RCA indices valuing greater than one and these are: 1) office and adding machinery (3.39); 2) other furniture parts (2.44); 3) electronic components (2.38); 4) electrical machinery (1.53); 5) electronic accumulators (1.04); and 6) telecommunications equipment (1.02). This suggests that the Philippines's has a comparative advantage in the production of these six components.

Table 33 depicts RCA indices of selected East Asian countries in terms of assembly operations in 2001. Clearly, those countries that have a comparative advantage in the assembly of all component product groups listed in the table in 2001 are China, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. Note that Japan has the lowest number of assembled parts and components that have RCAs exceeding one while China, Indonesia, and Thailand have comparative advantage in more than half of assembly operations. In the case of the Philippines, there are nineteen parts and components that have RCAs exceeding unity and the major ones would include: 1) Electronic components (10.25); 2) Still cameras (7.10); 3) Forklift trucks (4.87); and 4) Water turbines (3.59).

Table 30: Intra-Trade in Parts and Components among East Asian Countries, 2001
(in USD million)

Importer	Exporter										Total Imports
	China	Hong Kong, China	Indonesia	Japan	Malaysia	Philippines	Singapore	South Korea	Taiwan	Thailand	
China	0	1,542	313	8,292	1,267	342	759	2,442	3,279	952	19,188
Hong Kong, China	13,556	0	97	6,119	2,070	494	1,980	2,038	2,928	513	29,795
Indonesia	109	13	0	1,558	40	10	219	114	64	82	2,209
Japan	5,587	238	500	0	1,086	1,229	766	1,728	2,866	1,230	15,230
Malaysia	1,394	745	500	3,610	0	416	1,697	748	1,102	687	10,899
Philippines	170	502	26	3,683	259	0	804	788	523	256	7,011
Singapore	1,989	808	1,426	3,890	4,611	390	0	838	1,118	1,623	16,693
South Korea	1,695	230	64	4,317	330	183	287	0	754	162	8,022
Taiwan	1,308	237	42	3,502	303	202	529	719	0	97	6,939
Thailand	1,030	153	139	3,714	729	625	490	486	363	0	7,729
Total Exports	26,838	4,468	3,107	38,685	10,695	3,891	7,531	9,901	12,997	5,602	123,715

Source: Ng and Yeats (2003).

Table 31: The Percentage of Parts and Component Products in which Selected Selected East Asian Countries Have a Comparative Advantage
(percentage of products with RCAs greater than 1)

Country	Export-Production Operations			Import-Assembly Operations		
	1985	1995	2001	1985	1995	2001
China	6.7	11.7	20.0	41.7	55.0	53.3
Hong Kong, China	18.3	23.3	23.3	36.7	23.3	31.7
Indonesia	0.0	5.0	10.0	65.0	55.0	63.3
Japan	43.3	58.3	56.7	3.3	8.3	21.7
Malaysia	8.3	15.0	18.3	53.3	45.0	43.3
Philippines	6.7	10.0	10.0	38.3	50.0	31.7
Singapore	20.0	23.3	20.0	36.7	40.0	38.3
South Korea	6.7	13.3	15.0	25.0	41.7	33.3
Taiwan	20.0	31.7	28.3	13.3	35.0	31.7
Thailand	8.3	11.7	15.0	33.3	55.0	58.3
Vietnam	—	8.3	5.0	—	30.0	38.3

Sources: www.worldbank.org; Ng and Yeats (2003).

IV. THE EVOLUTION OF EAST ASIAN PRODUCTION NETWORKS

There are various definitions of international production networks. In this paper, we follow Borrus, Ernst, and Haggard (2000a) who define international production networks (or in their term “cross-border production networks”) as “the inter- and intra-firm relationships through which the firm organizes the entire range of its business activities: from research and development (R&D), product definition and design, to supply of inputs, manufacturing (or production of a service), distribution, and support services.” Given this definition, they note that such networks encompass “the entire network of cross-border relationships between a lead firm and its own affiliates and subsidiaries, but also its subcontractors, suppliers, service providers, or other firms participating in cooperative relationships, such as standard setting or R&D (research and development) analysis.”

Various studies emphasize certain economic factors that led to the formation and increasing role of international production networks in various parts of the world. Ernst & Kim (2001) argue that globalization had a tremendous impact in the proliferation of production networks worldwide; in particular, the formulation and implementation of capital and trade liberalization measures, the increasing role of ICT in business operations, and the growing complexity of competition, which basically influences corporate strategy and structure, were cited as major drivers of international production networks. Moreover, Ando and Kimura (2003) note that significant changes in the development strategies of governments in East Asia also influenced the existence of production networks in the region; these strategies focused on attracting FDIs by providing certain economic benefits and incentives.

The evolution of international production networks in East Asia can be traced to the region’s industrial development stages, which according to Borrus, Ernst, and Haggard (2000a), created “complementary capabilities” across economies in the region that were conducive to the emergence of such networks.

A. Changes in Foreign Investment Policies in East Asia

Various research into the East Asian production networks have attempted to explain the evolutionary process which was experienced, by focusing on the role that FDI had played in the

region as well as the industrial policies being adopted by the host countries which may have influenced such outcomes.

Ando and Kimura (2003) explain that the formation of international production and distribution networks in East Asia was initiated by drastic changes in the development strategies of each country. In the mid 1980s and 1990s, the East Asian developing economies started applying new development strategies in which the benefits from hosting FDI was aggressively explored. The new development strategies do emphasize the utilization of market forces, but they are not simple *lassiez-faire* policies: rather pursue new roles of government involvement in the process of development.

Most of the East Asian economies have traditionally applied a “dual track approach,” which involves attempting to foster both import-substituting industries and export-oriented industries at the same time. There was, however, an important difference between forerunners (i.e., Japan, Korea, and Taiwan) and latecomers (i.e., the Southeast Asian countries and China); the latter actively utilized incoming FDI not only in export-oriented industries but also in some major import-substituting industries such as automobiles, domestic electric appliances, pharmaceuticals, food processing, and others.

While the Southeast Asian countries and China have maintained the dual track approach throughout their path of industrialization, they have changed the weights between import substituting and export oriented industries over time. From the 1970s to the mid 1980s, the Northeast Asian countries introduced selective FDI primarily in import substituting industries and at the same time, potentially competing domestic industries were insulated by policies that limited the activities of foreign companies only in geographically segregated places such as export processing zones.

Table 32: The Revealed Comparative Advantage of East Asian Countries in Production of Components, 2001
(export statistics)

Component Product Group	China	Hong Kong	Indonesia	South Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand	Japan
Steam boilers	0.22	0.01	1.24	6.68	0.16	0.40	0.16	0.14	1.32	0.68
Aircraft engines	0.03	0.12	0.01	0.19	0.16	0.38	1.17	0.06	0.03	1.97
Outboard motors	0.02	0.09	0.00	0.01	0.05	0.00	0.01	0.00	0.10	9.71
Outboard motors, nes	0.06	0.04	0.00	1.95	0.04	0.00	0.88	0.04	0.15	2.66
Combustion engines, nes	0.15	0.04	0.13	0.27	0.04	0.10	0.23	0.24	0.30	2.31
Engines and motors, nes	0.11	0.24	0.05	0.35	0.07	0.02	0.84	0.10	0.20	0.65
Rotating electric motors	0.79	0.65	0.34	0.88	0.34	0.65	0.76	1.14	0.78	1.98
Water turbines	0.91	0.01	0.02	0.90	0.01	0.00	0.21	0.06	0.02	1.08
Cultivating equipment	0.36	0.01	0.03	0.34	0.02	0.02	0.12	0.14	0.01	0.10
Harvesting machinery	0.27	0.05	0.02	0.16	0.03	0.02	0.06	0.56	0.01	0.40
Dairy machinery	0.03	0.08	0.02	0.00	0.00	0.03	0.20	0.09	0.00	0.03
Wine making machinery	0.26	0.11	0.00	0.10	0.50	0.08	0.20	0.52	0.08	0.11
Agricultural machinery, nes	0.49	0.29	0.01	0.10	0.14	0.01	0.24	0.22	0.19	0.05
Construction machinery	0.18	0.09	0.07	0.21	0.31	0.09	2.11	0.02	0.19	0.25
Spinning machinery	0.34	0.12	0.17	0.40	0.07	0.00	0.73	0.82	0.05	1.60
Knitting machinery	0.23	0.38	0.14	0.57	0.08	0.01	0.28	0.93	0.09	1.56
Textile machinery, nes	0.73	0.48	0.06	1.58	0.05	0.18	0.18	0.57	0.27	0.51
Paper making machinery	0.06	0.02	0.12	0.26	0.02	0.01	0.14	0.33	0.07	0.43
Bookbinding machinery	0.04	0.12	0.00	0.04	0.02	0.00	0.18	0.15	0.00	0.31
Printing machinery	0.20	0.38	0.12	0.14	0.11	0.06	0.42	0.30	0.16	0.96
Grain milling machinery	0.44	0.02	0.27	0.06	0.26	0.01	0.36	0.72	0.61	0.66
Food processing machinery	0.07	0.09	0.01	0.07	0.03	0.04	0.16	0.21	0.06	0.30
Machines for special industries	0.26	0.20	0.01	0.48	0.23	0.02	0.39	1.46	0.19	1.80
Mineral working machinery	0.34	0.07	0.28	0.48	0.59	0.05	0.29	0.23	0.21	0.25
Special industry machines, nes	0.20	0.64	0.16	0.55	0.44	0.13	0.81	0.59	0.28	2.09
Metal working machine tools	0.24	0.16	0.01	0.57	0.15	0.12	0.30	1.10	0.28	2.52
Foundry equipment	0.19	0.07	0.00	1.32	0.09	0.01	0.11	0.35	0.20	1.81
Rolling mill parts	0.16	0.04	0.03	0.56	0.06	0.05	0.08	0.21	0.07	1.79
Refrigerating equipment	0.50	0.22	1.29	0.92	0.48	0.41	0.64	0.39	0.64	0.84
Pumps for liquids	0.45	0.11	0.13	0.35	0.10	0.11	0.66	0.47	0.87	1.07
Centrifuges and filters	0.29	0.34	0.12	0.43	0.17	0.20	0.47	0.59	0.33	1.65

Fork lift trucks	0.20	21.15	0.00	0.25	0.09	0.02	2.24	0.27	2.10	4.11
Lifting and loading machines	0.31	0.10	0.27	0.85	0.18	0.11	0.51	0.20	0.14	1.43
Power hand tools	0.56	0.16	0.15	0.20	0.09	0.02	0.20	1.84	0.04	1.30
Picking machinery	0.12	0.06	0.02	0.07	0.09	0.04	0.24	0.24	0.10	0.39
Non-electric machinery	0.19	0.18	0.19	0.50	0.29	0.29	1.16	0.61	0.25	1.36
Office and adding machinery	1.74	2.23	0.47	1.18	4.22	3.39	3.87	3.82	2.30	1.72
Telecommunications equipment	1.68	1.49	0.41	2.70	2.01	1.02	1.31	1.28	1.07	1.10
Electric power machinery	1.72	2.30	3.05	1.94	1.17	0.84	0.95	2.27	0.96	1.80
Switchgear	1.08	2.07	0.59	0.76	0.96	0.93	1.65	2.33	0.82	1.86
Domestic electrical equipment	2.17	0.97	0.08	0.44	0.39	0.01	0.20	0.94	0.43	0.33
Electrothermic appliances	1.97	1.86	0.58	3.27	0.54	0.10	1.13	1.07	0.58	0.81
Electronic components, nes	0.27	1.06	0.23	1.58	1.25	2.38	2.92	1.92	0.88	3.01
Electronic accumulators	0.64	2.71	0.24	0.26	3.14	1.04	0.30	1.01	0.43	3.09
Electric lamps and bulbs	1.29	0.97	0.10	0.59	0.07	0.31	0.26	0.85	0.09	1.02
Electrical machinery, nes	0.68	1.99	0.14	0.51	0.62	1.53	1.87	1.41	1.24	2.99
Motor vehicles and accessories	0.11	0.02	0.14	0.38	0.06	0.29	0.06	0.38	0.30	1.64
Carriages and cycles	2.06	0.80	0.58	0.26	1.59	0.30	1.27	5.88	1.84	3.54
Trailers and non-motor vehicles	0.60	0.09	0.05	0.54	0.45	0.01	0.10	0.58	0.06	0.03
Railroad equipment	0.13	0.02	0.02	0.13	0.01	0.00	0.01	0.02	0.02	0.88
Aircraft and helicopters	0.05	0.17	0.03	0.30	0.02	0.14	0.39	0.07	0.05	0.70
Chairs	0.39	0.05	0.19	0.19	0.16	0.27	0.04	0.33	0.71	0.26
Other furniture parts	2.11	0.71	3.07	0.23	1.05	2.44	0.11	1.41	0.79	0.05
Measuring or drawing machines	0.17	0.73	1.48	0.30	0.65	0.50	0.84	0.45	0.47	1.21
Still cameras, nes	2.70	5.42	0.31	0.60	1.65	0.77	0.81	5.27	6.79	4.68
Cameras under 16mm	0.21	0.83	0.04	0.18	2.85	0.04	0.64	1.00	0.23	2.10
Cameras under 16mm, nes	0.24	2.63	0.07	0.17	3.83	0.06	0.56	0.50	0.19	1.49
Unmounted optical elements	0.15	1.03	8.37	0.25	0.06	0.28	0.54	0.20	1.14	0.19
Clocks and watches	1.50	8.37	0.04	0.39	1.36	0.60	1.64	0.96	4.89	4.90
Umbrellas and canes	7.05	4.62	0.72	0.11	0.01	0.02	0.27	6.57	0.17	0.11

Sources: www.worldbank.org; Ng and Yeats (2003) as computed from United Nations SITC Revision 2 COMTRADE statistics.

Table 33: The Revealed Comparative Advantage of East Asian Countries in Assembly Operations, 2001
(import statistics)

Component Product Group	China	Hong Kong	Indonesia	South Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand	Japan
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Steam boilers	2.89	0.19	1.41	0.57	5.83	0.96	0.90	1.27	0.51	0.27
Aircraft engines	0.43	0.45	0.20	0.86	0.82	0.10	1.59	0.60	1.13	1.64
Outboard motors	0.30	0.20	2.31	0.52	0.91	0.12	0.23	0.19	0.28	0.07
Outboard motors, nes	2.38	0.19	2.10	1.47	1.07	1.82	2.65	2.62	0.72	0.28
Combustion engines, nes	0.76	0.18	2.74	0.85	0.80	0.56	0.83	0.60	1.51	0.34
Engines and motors, nes	0.26	0.57	0.57	0.40	0.65	0.31	1.95	0.48	0.90	1.00
Rotating electric motors	1.99	1.23	1.19	1.17	1.09	1.90	1.26	0.80	2.48	0.80
Water turbines	4.04	0.27	0.15	0.10	0.76	3.59	0.10	0.11	0.40	0.18
Cultivating equipment	0.24	0.16	0.89	0.13	0.24	0.85	0.46	0.14	0.79	0.78
Harvesting machinery	0.15	0.07	0.32	0.18	0.14	0.12	0.09	0.11	0.14	0.36
Dairy machinery	0.36	0.05	1.04	0.52	0.10	0.09	0.07	0.12	0.27	0.77
Wine making machinery	2.14	0.27	2.02	0.07	0.78	0.28	0.14	0.35	0.35	0.36
Agricultural machinery, nes	0.59	0.14	2.26	0.30	0.60	1.37	0.15	0.18	1.30	0.73
Construction machinery	0.67	0.32	1.84	0.44	2.12	1.12	3.61	0.11	1.06	0.35
Spinning machinery	3.94	0.48	5.82	1.31	0.70	0.61	0.36	1.97	3.09	0.52
Knitting machinery	1.94	2.06	4.23	1.06	0.54	0.47	0.64	1.28	1.91	0.78
Textile machinery, nes	1.94	0.65	2.22	0.47	1.47	0.91	0.24	0.50	3.46	0.78
Paper making machinery	1.52	0.15	1.76	0.57	0.64	0.37	0.24	0.32	1.63	0.52
Bookbinding machinery	0.15	0.33	0.50	0.52	0.20	0.23	0.47	0.30	0.20	0.60
Printing machinery	1.34	0.78	1.55	1.00	0.64	0.83	0.58	0.77	0.96	1.05
Grain milling machinery	1.17	0.29	1.53	0.72	0.46	1.63	0.32	0.36	1.12	0.39
Food processing machinery	0.88	0.20	1.75	0.51	0.40	0.95	0.29	0.24	1.87	0.80
Machines for special industries	1.06	0.67	1.63	1.00	1.91	0.97	1.72	3.00	1.11	0.95
Mineral working machinery	1.10	0.19	3.44	0.30	1.01	0.56	0.77	0.34	0.53	0.45
Special industry machines, nes	1.66	0.67	1.35	2.19	2.42	1.87	1.86	2.26	1.98	0.96
Metal working machine tools	1.11	0.52	0.64	1.12	1.04	0.72	0.87	2.23	1.71	1.02
Foundry equipment	1.92	0.50	1.61	0.91	0.66	0.30	0.43	1.39	1.09	0.82
Rolling mill parts	3.17	1.07	3.61	2.78	0.95	0.26	0.13	1.81	1.72	0.29
Pumps for liquids	0.85	0.24	1.24	1.21	0.58	0.44	1.29	0.60	0.86	0.43
Centrifuges and filters	1.46	0.49	1.07	1.29	1.17	0.70	1.21	1.06	1.71	0.75
Fork lift trucks	0.54	0.47	0.76	0.27	0.56	4.87	0.40	0.28	4.23	0.89
Lifting and loading machines	1.37	0.36	2.41	0.74	0.73	0.51	1.02	0.45	0.82	0.45
Power hand tools	0.25	0.42	1.28	0.40	1.56	1.00	0.81	0.52	0.57	0.62
Picking machinery	0.93	0.39	1.59	0.37	0.39	0.77	0.60	0.41	1.30	0.54
Non-electric machinery	0.92	0.52	0.79	1.20	1.13	0.68	1.30	1.67	1.30	0.64
Office and adding machinery	1.50	2.06	0.59	0.86	2.15	2.18	3.45	1.80	2.92	1.30

Telecommunications equipment	1.61	1.69	1.17	0.85	1.61	1.17	1.17	0.91	1.45	0.91
Electric power machinery	3.87	2.85	1.98	1.25	2.58	2.57	1.91	0.86	1.72	0.90
Switchgear	1.59	1.86	1.05	1.04	2.50	2.12	2.12	1.20	1.73	0.64
Domestic electrical equipment	1.75	1.04	0.29	0.52	1.81	0.12	0.48	0.23	0.30	0.79
Electrothermic appliances	2.85	1.56	1.40	0.30	1.59	0.22	0.32	0.48	2.75	0.77
Electronic components, nes	2.97	2.02	1.92	3.68	14.7	10.25	2.39	4.93	5.83	0.94
Electronic accumulators	3.67	1.50	2.07	1.53	2.77	0.58	0.24	2.36	0.51	0.29
Electric lamps and bulbs	1.79	1.13	3.45	1.09	0.43	0.43	0.84	0.77	2.46	1.08
Electrical machinery, nes	1.17	2.59	0.35	2.52	2.21	2.89	3.01	2.23	1.79	0.88
Motor vehicles and accessories	0.67	0.11	1.04	0.44	0.44	0.44	0.18	0.38	0.99	0.41
Carriages and cycles	0.64	1.02	9.80	0.29	0.76	1.69	0.75	2.27	1.40	0.97
Trailers and non-motor vehicles	0.19	0.18	0.65	0.13	1.02	0.30	0.34	0.15	0.28	0.39
Railroad equipment	0.50	0.18	0.20	1.38	0.37	0.23	0.25	0.54	0.06	0.31
Aircraft and helicopters	0.34	0.30	0.33	1.21	0.28	0.30	1.23	0.74	0.68	1.31
Chairs	0.37	0.14	0.40	0.14	0.23	0.14	0.12	0.11	0.57	0.40
Other furniture parts	0.14	0.53	0.23	0.24	0.35	0.30	0.44	0.33	0.16	1.12
Measuring or drawing machines	1.03	0.60	0.40	1.35	1.90	1.20	2.26	2.38	1.38	1.64
Still cameras, nes	6.55	7.47	1.58	0.48	4.39	7.10	0.54	1.03	3.97	2.52
Cameras under 16mm	0.45	1.64	0.13	0.89	0.54	0.81	2.07	0.46	1.05	1.15
Cameras under 16mm, nes	0.49	1.34	0.24	1.89	2.68	0.71	0.78	0.92	0.75	1.61
Unmounted optical elements	0.25	0.60	0.48	0.39	0.24	0.06	2.69	0.58	0.37	4.49
Clocks and watches	4.07	10.64	0.31	0.65	3.23	2.34	1.86	0.46	8.91	1.18

Sources: www.worldbank.org; Ng and Yeats (2003) as computed from United Nations SITC Revision 2 COMTRADE statistics.

On the other hand, from 1985 to 1992, Malaysia, Thailand, the Philippines, Indonesia and China began to switch their FDI schemes from selective acceptance to a basically “accept everybody” policy. They started trying to host as many foreign companies as possible (including export oriented firms) and formulate industrial clusters while still keeping trade protection for import-substituting industries.

The dual trade approach requires a complicated policy package wherein it continually invites export oriented foreign firms by providing the world’s best or second best location advantages but at the same time imposes trade protection for its import substituting industries which negatively affects the location advantages. In order to partially neutralize the negative effects of trade protection the Southeast Asian countries introduced a duty drawback system, which in effect refunds duties and indirect taxes on imported inputs in export production. In addition, other types of FDI facilitation measures were implemented that were crucial in attracting foreign firms. In particular, the aggressive policy of inviting foreign small and medium enterprises which effectively works in the formation of industrial clusters. These countries have concentrated their public resources on the development of economic infrastructure including roads, ports, electricity and water supply, telecommunications, and industrial estate services and at the same time, improved the services of FDI hosting agencies.

Along with the aggressive FDI policy, MNCs recognized the advantages behind fragmenting the production process. The concept of fragmentation neatly presents the logic behind such a location pattern. Deardorff (2001a) defines fragmentation as “the splitting of a product process into two to more steps that can be undertaken in different locations but that lead to the same final product.” Japanese production from upstream to downstream activities particularly in the machinery and electronics industries could be divided into individual production blocks where it becomes possible to locate these blocks separately in several Southeast Asian countries and significantly reduce total production cost. Since the East Asian countries still have relatively lower labor costs compared to Japan, the concept of fragmentation becomes an acceptable strategy towards raising competitiveness and expanding international market shares. Fragmentation becomes economical when the cost of service links connecting production blocks is low enough. Service link cost which heavily depends on the nature of technology in an industry includes transport costs, telecommunication costs, and various coordination costs between production blocks. Globalization generally reduces service link cost and enables firms in many industries to fragment their production blocks to further reduce total production cost. As service links tend to carry strong external economies of scale, the concentration of fragmented production blocks is often observed (Ando & Kimura 2003).

B. FDI by the U.S. in Asia

FDI by U.S. electronics firms also contributed significantly to the growth of East Asian international production networks. Borrus (1996) presents key developments in the expansion of these networks in the Asian region. From the late 1960s, after an earlier round of market access investments by a few large U.S. MNCs notably IBM, GE and RCA, most of these firms sought not market access but cheap production locations in Asia. U.S. investment was led by American chip-makers, then consumer electronics and calculator producers, and finally, toward the end of the 1970s, producers of industrial electronic systems like computers and peripherals. Most of the American investments in this first stage established local assembly affiliates. Cheap but disciplined Asian labor permitted American firms to compete in terms of prices in the U.S. and in Europe. Asian affiliates of U.S. electronics firms were established as part of a multinational production network to serve advanced country markets.

Because Asian affiliates of U.S. electronics firms were integrated into a production operation serving advanced country markets, American firms upgraded their Asian investments in line with the pace of development of the lead market being served (the U.S.). In essence they upgraded in line with American rather than local product cycles. As local American affiliates became more sophisticated through several rounds of reinvestment, a division of labor premised on increasing local technical specialization developed throughout the American firms' global production operations. Local needs began to diverge from elsewhere in the American firm's overall operations and affiliates sought out and where necessary, trained local partners to meet them.

From 1980 to 1985, American owned assembly platforms were upgraded and enhanced technically to include more value added such as from assembly to test in chips, from hand to automation assembly techniques, from simple assembly of printed circuit boards to more complex subsystems and final assembly in industrial electronics. As local firms gained more autonomy, American affiliates began to source more parts and components locally (e.g., a range of mechanical parts, monitors, discrete chips and even power supplies). As American affiliates developed and as the U.S. industry exited the consumer segment, local electronics producers in places like Taiwan shifted to concentrate more and more of their own investment (and their government's attentions) on industrial electronics. As these developments occurred, the contour began to appear of an ever more elaborate and deepening technical division of labor between U.S. and Asian based operations, bound together in production networks serving the American firm's advanced country markets.

From 1985 to the early 1990s, American firms focused scarce corporate resources more intensely on new product definition and the associated skills (such as design, architecture and software) necessary to create, maintain and evolve de-facto market standards. They also continued to upgrade their Asian affiliates, giving them responsibility for hardware value-added and manufacturing, contracted out design and manufacture of some boards and components and significantly increased sourcing of components, parts and sub-assemblies. Asian affiliates of American firms continued to migrate from printed circuit boards to final assembly with increased automation; to increase both component production and final system value added; and to assume global responsibility for higher value added systems (such as monochrome desktops to color notebook personal computers). Their production networks extended to more and more capable local Asian producers who became increasingly skilled suppliers of components, sub-assemblies and in some cases, entire systems.

Borras (1996) provides examples illustrating the above-mentioned events by describing the experience of leading US producers of personal computers like Apple. Apple Computer Singapore (ACS) opened a printed circuit board assembly plant for the Apple II personal computer in 1981. By 1983, nine local companies were contract manufacturing printed circuit boards for the Apple IIe and Lisa personal computers. By 1985, ACS was upgraded to include final assembly of Apple IIes for the world market. From 1986 to 1989, ACS was expanded and upgraded to begin some component design work. In 1990, ACS assumed final assembly responsibility for two of three new Macintosh personal computers (and printed circuit boards for the third), and designed (locally) and manufactured associated monitors. By then, essentially all components were sourced in Asia (except the U.S. fabbed microprocessor). ACS's 130 major suppliers included local firms like Gul Technologies and Tri-M (printed circuit boards). ACS had also demonstrated that its growing technical prowess could pay dividends in speeding time to market. It was able to move from designs to production roll-out in up to half the time of Apple's other facilities. By 1992, ACS assumed responsibility for final assembly for all Asia Pacific markets including Japan, was designing and supplying boards globally, manufacturing monitors

and some peripherals and designing chips. Over \$1 billion was being procured annually through ACS. In 1993, ACS set up a design center for Macs for high volume desk top products, the only hardware design center outside the U.S. By 1994, ACS had become the center for distribution, logistics, sales and marketing for the Asia Pacific region, and was assembling the MacClassic II, LC III and IV, mid range Centris, and Quandra 800 for global distribution. Regional sourcing reached \$2 billion, half from Japan (LCD displays peripherals, memory, hard disk drives), another quarter from Singapore, \$250 to \$500 million in Taiwan for OEM desktops, monitors, printed circuit boards, Powerbooks, digital assistants and chips. Korea's Goldstar also supplied monitors. By late 1994, ACS had begun to design the motherboard and tooling for, and assemble the multimedia system Mac LC 630 personal computer for worldwide export. Two new Mac products completely designed and manufactured at ACS were launched in 1995.

The value added/ local sourcing progression of other major U.S. electronics players in Asia is broadly similar. For example, Compaq Asia (hereafter: CAS for Compaq Asia Singapore) established its Singapore factory in 1986 for printed circuit board assembly of components sourced from Asia (including Japan), for desktop PCs to be final assembled in the U.S. By 1994, after terminating an OEM relationship with Japan's Citizen Watch, CAS was designing and manufacturing all notebook and portable personal computers for worldwide consumption, and all desktop personal computers for the Asia Pacific. Similarly, Hewlett-Packard's Singapore operations evolved from the assembly of calculators in 1977 to global responsibility for portable printers and Pentium desk-top personal computers and servers, with local manufacturing, process design, tooling development and chip design. Motorola's Singapore operations evolved from simple printed circuit board assembly of pagers and private radio systems destined for the U.S. in 1983, to world wide mandates for design, development and automated manufacture of double sided six layer printed circuit boards, for design and development of integrated circuits for disk drives and other peripherals, for some research and development and for sourcing of at least \$500 million of parts and components within the region. Similar developments were experienced by ATT in telecommunications products, IBM and DEC in personal computers and peripherals, Maxtor, Connon, Seagate and Western Digital in hard disk drives, and for TI, Intel and National Semiconductor.

By the early 1990s, the division of labor between the U.S. and Asia, and within Asia between affiliates and local producers deepened significantly and U.S. firms effectively exploited increased technical specialization in the region. While Asia's indigenous electronics capabilities (excluding Japan) developed in close symbiosis with the strategies and activities of American MNCs, they were driven by local private investment and supported by government policies. Outside of Korea (where the chaebol dominated domestic electronics development) resident ethnic Chinese investors played the principal, private entrepreneurial role in Taiwan and Hong Kong, Singapore and later in Malaysia, Indonesia, Thailand and along the Coastal provinces of Mainland China. First in the newly industrialized countries (NICs) and then in Southeast Asia, governments provided a panoply of fiscal and tax incentives, invested heavily in modern infrastructure, generic technology development, and the technical up-skilling of the work force, engaged in selective strategic trade interventions, and in some cases, even provided market intelligence and product development roadmaps. The aims were both to plug into the developing multinational production networks in the region, and to use them as a lever toward autonomous capabilities. The result, by the early 1990s, was burgeoning indigenous electronics production throughout the region, mainly under the control of indigenous capital.

C. The Plaza Accord and the Japanese FDI Boom

The existence of international production networks in East Asia may also be attributed to the massive flow of Japanese FDI which initially went to Hong Kong, Singapore, South Korea and Taiwan, and then later on flowed in to Southeast Asia particularly Indonesia, Malaysia, Thailand and the Philippines. Altbach (1988) provides an explanation of the Japanese FDI boom by focusing on the impact of the Plaza Accord. Following the 1985 Plaza Accord, in which the central banks of the United States, Japan and Germany agreed to seek the increase in the value of the yen vis-à-vis the dollar, Japan's FDI increased rapidly. North America attracted the largest share of Japanese FDI, as it had for much of the postwar period, although the character of the investments was changing. In the past, much of Japanese FDI had been focused on establishing marketing and service networks in order to facilitate exports to the United States and to a lesser extent, the European markets. Asia had been less important. Investments in Asia had either established subsidiaries that would ensure stable sources of raw material imports for domestic Japanese industries or built assembly operations that would circumvent new protectionist trade barriers in the region and retain access to local markets.

Altbach (1998) continues by explaining that after 1985, the magnitude and character of Japanese FDI in Asia began to change. The strong yen, combined with rising land, labor and other costs of production in Japan, caused many firms to decide to shift part of their production activities overseas. Their inclination to begin FDI was encouraged further by a period of loose monetary policy in Japan that decreased the cost of financing needed for overseas expansion. In addition, the increase in the value of the yen against other Asian currencies, as well as the dollar boosted the buying power of firms that borrowed yen at home or used retained yen earnings to finance their overseas investments. Neighboring Asian countries, especially those in Southeast Asia, offered cheap labor and the prospect of growing domestic markets.

The focus of Japanese manufacturing investment within Asia shifted over time. Before 1985, it went primarily to the so-called Newly Industrialized Countries of the region — Hong Kong, Singapore, South Korea and Taiwan—largely to bypass import restrictions, although it was also intended to take advantage of their skilled and inexpensive labor forces. In the early post-1986 investment boom, most of the investments also went to the NICs.

By 1988, however, manufacturers had switched their attention to the four core members of the ASEAN—Indonesia, Malaysia, the Philippines and Thailand—and these countries began to attract the lion's share of Japanese investment in Asia. Beginning in 1992, the focus again shifted, this time toward the People's Republic of China, which by 1996 had become the most popular destination in Asia for Japanese manufacturing investment.

Between 1985 and the beginning of the Asian crisis last summer, Asia rapidly increased its importance as Japan's global manufacturing base. In 1988, nearly two-thirds of the total number of cases of overseas investment by Japanese manufacturing firms went to Asia. By 1993, the region's share had increased to more than 90 percent (JETRO, 1995). The total value of new Japanese manufacturing FDI in Asia began to rival that of North America for the first time in the mid-1990s. While Asia was still getting slightly less manufacturing FDI than the United States, the number of jobs generated by Japanese firms in Asia was much larger, indicating that the character of Japanese production activities in Asia was more labor-intensive.

By 1995, total employment by Japanese firms in Asia had increased to over 1.25 million employees from only 500,000 in 1985. In contrast, employment in the U.S. factories of Japanese firms reached approximately 550,000 in 1995, up from about 200,000 in 1985 (MITI,

1997) The much larger number of cases of FDI in Asia as well as the sizable workforce they employ, reflects the large number of small-scale, labor intensive factories established by small and medium-sized firms, which saw Asia as their most attractive destination. While only slightly more than 40 percent of the value of total FDI from small and medium-sized enterprises was directed toward Asia in 1986, this number had increased to over 90 percent by 1996 (MITI, 1998).

The motivations of Japanese manufacturers for establishing production facilities in Asia also have changed since 1985. While the initial 1986 surveys indicated that approximately 30 percent of companies had established a production base in Asia primarily to take advantage of lower production costs, this number declined to just over 20 percent in 1998. Firms that intended to use FDI to gain access to local and regional markets in Asia increased to nearly 20 percent in 1998 from approximately 15 percent in 1986 (MITI, 1998) Until the recent regional downturn, Japanese enterprises clearly had begun to view Asia — and especially the ASEAN member countries and China — as a promising future market in its own right and not merely a low-cost export platform (Johnstone and Yamakoshi 1997).

Japanese firms have established production facilities to make semiconductors, computers and computer peripherals, consumer electronics and electrical appliances, automobiles, trucks and motorcycles in the East Asian Pacific region. Most of the production that has been shifted from Japan to the other East Asian economies is electronics which accounts for almost half of the total increase in Japanese manufacturing FDI between 1985 and 1993 (Ernst 1997).

D. Regional Production Networks in the Electronics Industry

Borras (1996) narrates that during the late 1970s, Japanese overseas investments, led by consumer electronics and appliance makers were aimed at serving nascent local markets behind tariff walls of the other East Asian economies. Japanese investment was often turnkey with knockdown kits exported from Japan for local final assembly and sale in the local affiliate's domestic market.

From 1980 to 1985, the pattern of Japanese investment led to a dual production structure under the control of Japanese firms and premised on traditional product cycles wherein sophisticated products were produced at home with sophisticated processes to serve advanced country markets, while lower-end products were produced with simple processes in regional affiliates to serve local Asian markets. Both sets of operations sourced from a common supply base, located largely in Japan and controlled, directly or indirectly, by Japan's major electronics companies. Where Japanese companies responded to government or commercial pressures to localize, they did so from within their established supply base -- that is, by transplanting the operation of an affiliated domestic Japanese supplier -- not by sourcing locally from the emerging Asian supply base. In short, the Japanese production networks boasted redundant investment and remained relatively closed, even as the US networks became more open and specialized.

By the end of 1993, Japanese firms still controlled their Asian affiliates' major decision making and sourcing activities from Japan. More low end processes and product technology had been located offshore, including production of audio systems (cassette recorders, headphones, low end tuners, etc.), under 20 inch televisions and some VCR models, cameras, calculators and appliances like microwave ovens. Local Asian content had risen toward 60 percent, but core technological inputs like magnetrons, chips and recording heads were

exclusively sourced from Japan, and the 60 percent local content was mostly supplied by the off-shore branch plants of traditional Japanese suppliers. All advanced design and development were undertaken in Japan including input sourcing for high end components.

From an initial emphasis on domestic markets, production consequently shifted to exports for third markets and back to Japan with manufacturing plants being concentrated at a few sites in Malaysia, Singapore, Taiwan and Thailand for purposes of maximizing quality and price competitiveness.

Ernst (2004) confirms this experience of Japanese FDI in electronics. Japan's electronic industry critically depends on East Asia. Over time, this dependency has deepened, and it also has become much more complex and multi-faceted. Of primary importance has been the region's role as a global export production platform. Since the catalytic shock of the 1985 Plaza Agreement, when the Yen appreciation inflated Japan's production costs, Japanese firms relocated manufacturing to lower labor cost locations in Asia, first in Korea, Taiwan, Hong Kong and Singapore, then in Malaysia, Thailand, Indonesia and the Philippines. China's role as Japan's global low cost export platform production base has substantially increased over the last decade. In the year 2002, almost two-thirds of the overseas manufacturing bases of Japanese manufacturing firms that have responded to the JBIC surveys were concentrated in East Asia (JBICI 2003).

Initially, the focus has been on consumer electronics and home appliances, as well as related components. Yet, over the last few years, there has been a substantial diversification in the product mix that Japanese firms produce in Asia, to include both hardware and software required for computing, communication and industrial applications. At the same time, increasingly complex stages of production and overall supply chain management have gradually been relocated from Japan to Asian locations and this process of upgrading is a response to the intensifying competition that Japanese electronics firms face both from the American electronics industry, from European industry leaders both in telecommunications and in consumer electronics (which have strengthened their market position by aggressively partnering with Asian companies, particularly China) and from six major Asian countries namely: China, Korea, Taiwan, Singapore, Malaysia and India (Ernst 2004).

China has become the third largest exporter of electronics products, and the second largest importer. Taiwan ranks as the leading global supplier for 14 electronic products, which includes silicon foundry services (involving leading edge wafer fabrication) with a 73 percent share in global production value; wireless local area networks, and digital audio video equipment like CD-ROM and DVD, with most of these devices being produced in China. Similar dominant world market positions exist for Korea (in computer memories, flat panel displays and mobile phones), Singapore (storage devices, printers), and China (computers and peripherals and digital consumer devices). Furthermore, while India has failed to excel as a global manufacturing exporter, the country has firmly established itself as a global export production base for software and information services (Ernst 2004).

An equally important aspect of Japan's growing dependence on East Asia are demand side factors, wherein Asian markets for electronic products and services have become more sophisticated. Procurement by Japanese subsidiaries in Asia has created a thriving market for Japanese exports of parts and components and capital equipment (Ernst 2000). The development of rapidly growing electronics industries has further expanded the region's demand for such input imports. Over time, however, the procurement of Japanese subsidiaries and Asian firms has become less Japanese centered, substituting imports from Japan with

purchases from within the region. Over the last decade, Japanese firms in Asia have substantially increased their localization of sales and procurement (METI 2002: 10).

To some degree, this reflects the relocation of production by Japanese component suppliers to Asia, as part of an increasingly sophisticated division of labor within Japanese East Asian production networks (Ernst and Ravenhill 2000). One important result is that the sales of Asian subsidiaries now outpace Japan's exports to Asia: in the year 2000, Asian subsidiaries recorded sales of Y36.4 billion, 1.7 times the value of Japan's exports to Asia (Takeuchi 2003). An equally important cause for the regionalization of procurement by Japanese subsidiaries in Asia has been the emergence of highly competitive suppliers of manufacturing services in Korea, Taiwan, Hong Kong, Singapore, Malaysia, Thailand, the Philippines and more recently China (Ernst 2003a).

E. Regional Production Networks in the Automotive Industry

The Southeast Asian automotive industry is heavily dominated by Japanese firms because of their early investment in regional production facilities which have taken the form of wholly or partially owned plants, licensed assembly deals and technical assistance agreements (MacKnight 1997). Toyota Motor Corporation is the top producer in the region and has about 21 percent of the market share, operating assembly plants in Indonesia, Malaysia, the Philippines and Thailand, and maintaining an extensive infrastructure of ASEAN based parts suppliers and a vast regional sales and service network. Nearly half of Toyota's production occurs at its largest plant in Thailand (Altbach 1998).

The ASEAN Brand to Brand Complementation (BBC) scheme established in 1988 by the aforementioned countries and the more ambitious ASEAN Industrial Cooperation (AICO) program that was later set up, has allowed Toyota to send parts throughout its regional production network at preferential tariff rates. As a result, Toyota has been able to increase the local content of nearly two-third of the vehicles it produces in ASEAN member countries to at least 40 percent (MacKnight 1997). The BBC scheme allowed an approved auto part to enjoy a minimum of 50 percent margin of tariff preference and local content accreditation if it is a component for the manufacture of any product in the participating countries. Yoshimatsu (1999) explains that Japanese automakers have developed the parts complementation system on the basis of the BBC scheme.

The Basic Agreement on the AICO scheme on the other hand, was signed at the Third ASEAN Economic Ministers (AEM) Retreat in Singapore in April of 1996 and was opened to any ASEAN brand company which has a minimum 30 percent ASEAN national equity, and is willing to undertake resource pooling, industrial complementation, or other industrial cooperation activities. A minimum of two companies in two different ASEAN countries is required to form an AICO arrangement, and AICO approved products get a preferential tariff rate in the range of zero to five percent, local content accreditation and other non-tariff incentives.

Unlike the BBC scheme, whose target is the automobile sector, the AICO is open to all manufacturing sectors but expects its immediate beneficiary to be auto manufacturers. The AICO is similar to the BBC in a sense that it sees the ASEAN area as a common market, and grants the ASEAN made products the same preferential treatment as domestic products. The automakers are the leading manufacturers that have developed their operations based on these concepts, creating the most advanced complementation system in the region. The AICO allows zero to five percent preferential tariffs before the CEPT comes into effect and thereby enables

insiders to enjoy benefits resulting from the ASEAN market and to strengthen their competitiveness before the full market liberalization (Yoshimatzu 1999).

Tecson (2001) points out that multinational automotive firms were in constant search for new markets, low cost assembly points, as well as component suppliers that would enhance their competitive advantage in export markets. Japanese firms in particular had fine-tuned their subcontracting networks in Japan and took advantage of ASEAN developing countries desire to jump-start their local automotive industries.

Toyota for example rapidly established the complementation scheme in 1989 (see Figure 1). Toyota retained three production plants in Thailand, one in Indonesia, one in Malaysia and one in the Philippines. In the summer of 1990, Toyota began to construct two parts plants in order to promote complementation of parts production: T&K Autoparts in Malaysia, and Toyota Autoparts Philippines. In July 1990, Toyota established Toyota Motor Management Services in Singapore. The objectives of the company were to coordinate the circulation of parts under the BBC and to manage logistic costs in Asia. In early 1993, T&K Autoparts began the exports of steering systems to Thailand, the Philippines and Indonesia. Toyota Autoparts Philippines also started the offer of transmissions to Malaysia, Thailand and Indonesia. Toyota Astra Motor began to provide gasoline engines to Malaysia, while Toyota Auto Body Thailand exports floor panels to UMW Toyota Motor in Malaysia. In the Toyota group, the transaction value of parts and components within the ASEAN region increased from 1.6 billion yen in 1992 to 8.4 billion yen in 1993 to 15.5 billion in 1994 (Yoshimatzu 1999).

Figure 1: Toyota Motors' Brand to Brand Complementation and the ASEAN Industrial Cooperation (AICO) Network

Thailand Diesel engines Steering columns Body parts	Philippines Transmissions Constant velocity joints Combination switches
Malaysia Steering links Engine computers Wiper arms and blades	Indonesia Gasoline engines Clutches Door locks, door frames

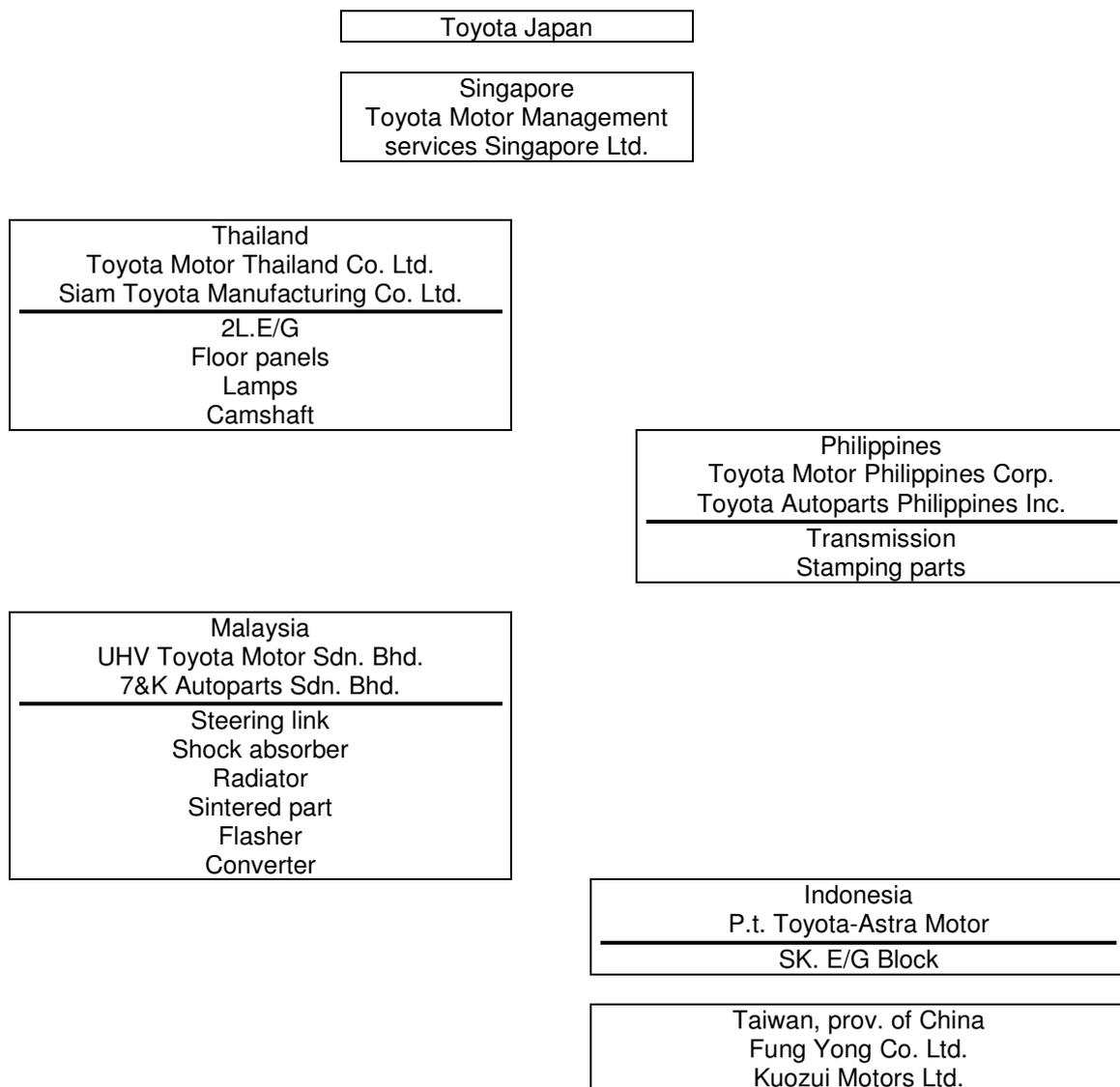
Source: Toyota Motor Co.

Toyota's vehicle production network in the Asian region, which was partly created as a result of these countries' import substitution policies, was also at the same time, a rational response to the regional industrial cooperation policies of ASEAN. Toyota continues with its intra-firm trade in parts and components throughout the region, coordinated by Toyota Motor Management Company located in Singapore, leverages the comparative advantage of each country in the region. The firm continues with its exports of steering links from Malaysia, diesel engines from Thailand, transmissions from the Philippines and engines from Indonesia (UNCTAD 1996). Presented in Figure 2 is an illustration of Toyota's parts and components ASEAN framework.

Among ASEAN's most notable automotive investors is Honda Motor Co. Ltd., which is the only Japanese automobile firm to have manufacturing plants in all four markets –Malaysia, Thailand, Indonesia and the Philippines. Satoshi Toshida, the managing director of Asian Honda Motor Co. Ltd., which oversees Honda operations in the region says that "Honda production bases in ASEAN are fully empowered to serve as many customers as possible, and is looking to further make its products competitively priced by focusing on specific production models in respective markets".

Honda chose Bangkok as its production base because Thailand is Honda's largest market in Southeast Asia. The firm's activities in the ASEAN region are not confined to the assembly of vehicles but also involve manufacturing car parts. In Malaysia, Honda produces constant velocity joints (CVJ), a kind of drive shaft, while its counterpart in the Philippines manufactures intake valves, in Indonesia it produces engine parts and in Thailand it makes body and stamping parts. Toshida further states that this is part of Global Honda's policy which is a strategy of global production and procurement of resources.

Figure 2: Toyota's Parts and Components ASEAN Framework



Source: UNCTAD Report 1996

As tariff rates are reduced to a level of zero to 5 percent under the AFTA-CEPT scheme and local content requirements eliminated, Asian Honda is planning better coordination of the various plants in Southeast Asia. Toshida states that the strategy is to bring the benefits of

ASEAN market liberalization to both the customers and host economies by utilizing economies of scale to transfer products between countries. Honda Bangkok has begun to streamline its production facilities including the unifying all production processes of its City subcompact model in Thailand. By 2005, Honda will cease assembly of the subcompact (the most saleable model) in Indonesia and the Philippines, and will have its largest plant in Thailand for the entire ASEAN region having an annual production capacity of 120,000 vehicles, the bulk of which is the City subcompact model.

Toshida continues by saying that AFTA has changed the way of doing business in Southeast Asia wherein the production strategy is no longer to manufacture for the local market but to exchange models and engine parts between one market and the next. The scheme started recently with the exchange of the Accord from Thailand with the Stream from Indonesia. Beginning 2004, all City and Accord models will be fully exported from Thailand to Indonesia and the Philippines (Nguoi 2003).

Mitsubishi Motors Corporation is investing US\$178.6 million into its Philippine operations, to make the country its production base in the ASEAN region for its new sports utility vehicle (SUV) model. Hideyasu Tagaya, executive officer and corporate general manager of Mitsubishi's international operations headquarters indicated that the investment decision was based on the country's potentials of becoming a globally competitive automotive manufacturing center. The project involves the production of more than 200,000 SUV units that will be exported over the next six to seven years. Of the total units, two-thirds will go to the ASEAN countries and the remaining units will be shipped to the Middle East, Africa and South America. These exports are expected to generate about \$200 to \$240 million in revenue for the Philippine economy annually. Regional parts and component flows undertaken by Mitsubishi, Honda, Toyota and the other major Japanese assemblers in the ASEAN region are presented in Table 34.

Table 34: Regional Component Flows in ASEAN by Major Japanese Assemblers

Country of Origin	Parts and Components	Destination
Thailand	Toyota: engine pressed parts, alternators, starter, steering coil, in panel, stabilizers Mitsubishi: Engine 1200 and parts Honda: side panel, flow panel, door panel, trunk hood, right handle for City Nissan: high pressure cable, pressed parts, interior trim, rear combination, water pump, oil pump, radiator Isuzu: diesel engine, pressed parts, engine parts	Indonesia, Malaysia, Philippines Philippines Indonesia, Malaysia, Philippines Indonesia, Malaysia, Philippines Indonesia, Malaysia, Philippines
Indonesia	Toyota: 7K engine, clutch, door locks, door frame, seat adjuster Mitsubishi: brake body Honda: cylinder block, cylinder head Nissan: meter Isuzu: AUV parts, brake parts	Thailand, Malaysia, Philippines Thailand Philippines Malaysia, Philippines Thailand Thailand
Malaysia	Toyota: steering link, engine computer, aircon, joint pressure relay, antenna Mitsubishi: steering coil Honda: bumper, in panel Nissan: pressed parts, spring suspension Isuzu: steering gear	Thailand, Philippines Thailand, Indonesia, Philippines Thailand, Indonesia, Philippines Thailand, Indonesia, Philippines

Philippines	Toyota: transmission, joint, combination switch, steel parts	Thailand, Indonesia Malaysia
	Mitsubishi: transmission	Thailand, Indonesia Malaysia
	Honda: intake manifold, coil, console, pedal, converter, right handle for City	Thailand, Indonesia Malaysia
	Nissan: pressed part, ventilator, pedal waist	Thailand, Malaysia
	Isuzu: manual transmission	Thailand

Source: JETRO 2000.

Other Japanese automotive companies with production facilities, parts factories and affiliated parts suppliers in the region are Nissan Motor Co., Ltd. and Mazda Motor Corp.

F. The Exclusive Nature of Japanese MNCs and their Regional Production Networks

Ravenhill (1995) states that Japanese firms generally have been more reluctant to transfer technology from the parent company to the local subsidiary, slower to shift research and development activities overseas and have promoted fewer local employees to important positions in management, choosing instead to depend on Japanese managers. They are highly centralized, hierarchical and exclusionary relative to American and European firms and rely mostly on subsidiaries of their Japanese subcontracting partners (as opposed to locally owned firms). Large Japanese MNCs have organized “keiretsu” like production networks that have the effect of limiting the localization of production which also slows down local procurement of components as compared to U.S. and European firms (Hatch and Yamamura 1997).

Ernst (1997) explains that a broader regional specialization has begun to emerge in electronics for Japanese production networks in Asia. Singapore and Hong Kong compete for a position as regional headquarters; South Korea and Taiwan compete for OEM contracts and as suppliers of precision components; Malaysia and Thailand and the Philippines are preferred locations for the volume production, especially of mid-level and some higher end products; and China Indonesia and possibly Vietnam compete for low end assembly and simple components manufacturing.

G. The Need to Strengthen Positions within an International Production Network

A country’s participation in an international production network, whether it being global or regional, provides major advantages that would serve developing economies well under an intensely competitive and very liberal trading environment. Being a contributor of higher value added products and services within the network creates new jobs, opens opportunities for new investments, gains access to larger export markets, new technologies and the opportunity to further move up the network in order to continue upgrading existing production facilities and provide higher end products in the medium and long term. Production of higher value added goods and services generates more income for host countries which puts it in a better position to achieve its development goals.

However, countries which are part of these existing networks cannot always expect to stay firmly entrenched in their current positions because of dynamic changes which are occurring in the competitive global economy. Flows of FDI (which are responsible for establishing the networks) have been known to shift towards countries which provide better location advantages, have good macroeconomic fundamentals, large domestic markets, cheap production inputs, reasonably priced skilled labor, attractive investment incentives, efficient export processing zones, adequate infrastructure, excellent logistical services and a stable

political environment. In addition, external shocks similar to the Asian financial crisis of 1997 had influenced the movement of portfolio and FDI into countries with more stable macro-economies.

Other factors which may also contribute to the shifting direction of investments would be the completion of new trade and investment agreements either under a bilateral, regional or multi-lateral arrangement. And finally, the accession of China to the WTO has already diverted a substantial amount of FDI coming from Japan, the U.S. and Europe because of the enormous potential offered by its market made up of 1.5 billion people, its large production base and low cost labor. These investments could have gone into one of the member countries in ASEAN but have found the potential offered by China's domestic market to be more attractive.

In view of these possible changes which will influence movements in FDI, host countries must be aware of the necessary adjustments which need to be made on industrial policy in order to ensure that their position within the international production network can be further entrenched, strengthened and consequently upgraded so that they can continue to maximize the benefits from participation. The experiences of Singapore, Malaysia and Thailand in terms of upgrading their position in the international production networks set up by American and Japanese MNCs may provide some insights on the type of adjustments which need to be undertaken particularly with regard to changes in incentive schemes for investments, research and development activities and the establishment of export processing zones, industrial and science parks and other types infrastructure support necessary in order to create an attractive business environment.

H. Reduced FDI Inflows to the ASEAN-4

Aside from the major advantages created by the participation in an international production network, the need to firmly entrench and strengthen an economy's position in the network can further be justified by the drastic changes and movements observed in FDI flows during the period beginning in 1995 up to 2003. Felker (2003), shows that the direction taken by foreign investment inflows have changed significantly, with the largest portion going to China, and the shares of the ASEAN member countries declining. Table 35 below illustrates that FDI inflows have generally been larger in 1995, compared to the 10 year averages (from 1984 to 1994) for all countries. Going into the year 1996, the same increasing trend is observed for all the countries listed in the table except for Brunei which had negative net foreign investment inflows of US \$ 69 million. However by the year 1997 drastic reductions in net foreign investments inflows can be observed in several Southeast Asian countries namely Brunei, Cambodia, Laos, Malaysia, and the Philippines. The other countries namely: Burma, Singapore, Thailand, Vietnam, China and Hong Kong continued to receive large investment inflows by the end of 1997.

By the end of 1998, net FDI inflows continued to decline for all the Southeast Asian countries except for Thailand and Hong Kong which still experienced modest increases. From 1999 up to the year 2003, the only countries which had consistently enjoyed increases in net FDI inflows were: Brunei and China, while the rest of the countries reflected wide fluctuations in net investment inflows during the next five years. It can also be observed that the major ASEAN member countries continued to experience declines in net foreign investment inflows namely: Indonesia (in 1999, 2000 and 2003), Malaysia (from 2001 to 2003), the Philippines (in 1999, 2001, 2003), Singapore (in 2000 and 2002) and Thailand (in 1999, 2000 and 2002).

Table 35: Net FDI Inflows in Selected Asian Countries

(in USD million)

Country	1984-1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Brunei	6	13	(69)	2	(20)	(38)	(19)	526	1035	2009
Cambodia	52	151	294	204	121	135	153	—	—	—
Indonesia	1,542	4,346	6,194	4,677	(356)	(2,745)	(4,550)	(2,977)	145	-597
Laos	19	95	160	91	46	79	72	24	25	19
Malaysia	3,964	5,816	7,296	6,513	2,700	3,532	5,542	4,438	3,203	2,474
Burma	135	277	310	387	314	253	240	—	—	—
Philippines	879	1,459	1,520	1,249	1,752	737	1,489	982	1792	319
Singapore	4,798	8,788	10,372	12,967	6,316	7,197	6,390	15,038	5,730	11,409
Thailand	1,927	2,004	2,271	3,627	5,143	3,562	2,448	3,813	1,068	1802
Vietnam	651	2,336	2,519	2,824	2,254	1,991	2,081	1,300	1,200	1450
ASEAN	13,973	25,285	30,867	32,541	18,270	14,703	13,846	—	—	—
China	13,951	35,849	40,180	44,237	43,751	40,319	40,772	46,878	52,743	53,505
Hong Kong	4164	6,213	10,460	11,368	14,776	24,591	64,448	23,775	9,682	13,561
China & HK	18,115	42,062	50,640	55,605	58,527	64,910	105,220	70,653	62,425	67,066
Developing World	59,578	113,338	152,493	187,352	188,371	222,010	240,167	219,721	157,612	172,033
South/East/SE Asia	35,078	73,639	89,406	98,507	86,004	96,224	137,348	102,228	86,326	96,915

Source: UNCTAD Report 2004

China has been the receiving the largest share of net FDI inflows among the selected Asian countries in the group. Except for the years 1998 and 1999 (when inflows had decreased by US\$ 486 million and US\$3.432 billion, respectively), all other years beginning 1995 up to 2003 reflected increasing FDI inflows, which had even gone beyond US\$ 53 billion by the year 2003.

In addition, Felker (2003) also attributes the change in the direction of FDI inflows to the collapse of the world electronics market that began in the latter stages of the year 2000. Table 36 shows that electronics exports registered negative growth rates from the year 1999 to 2000 for the advanced newly industrialized countries as well as the five member nations of ASEAN. The largest decline in electronic exports was experienced by Taiwan (at 28.4 percent), while the lowest decrease was registered by Indonesia at 0.2 percent. Singapore is the most dependent on the electronics industry as a source of export revenue with its ratio of electronic exports to total exports at 64 percent. Electronic exports in Singapore declined by 24 percent. The Philippines, Malaysia and Taiwan have ratios of electronics exports to total exports at 59, 58 and 47 percent respectively. In these countries, exports had declined by 25, 13.5 and 28.4 percent respectively. Only China reflected positive export growth at 6.6 percent from 1999 to 2000.

Felker (2003) explains that the reduction in net FDI inflows may be attributed to the following reasons: 1) the occurrence of the 1997 Asian Financial crisis, 2) the “structural squeeze” exerted by China and the more advanced newly industrialized economies; and 3) the failure of the four major ASEAN countries (Indonesia, Malaysia, the Philippines and Thailand) to develop design and innovation capabilities similar to those of South Korea and Taiwan.

Table 36: Export Performance among Asia’s Electronics Producers
(in percent)

Country	Exports as % of GDP 1999	Electronics as % of exports	Yearly Change in Exports 1999-2000
South Korea	42	38	(20.0)
Taiwan	54	47	(28.4)
China	22	24	6.6
Thailand	57	33	(8.0)
Malaysia	122	58	(13.5)
Singapore	180	64	(24.0)
Philippines	51	59	(25.0)
Indonesia	35	14	(0.2)
USA	11	—	—

Source: Asiaweek, 31 August 2001.

The drastic depreciation of currencies in Southeast Asia and its contagion effects during the 1997 Asian financial crisis was partly responsible for the reduction in net FDI inflows into the region. The crisis was characterized by shortages in foreign currency, rising interest rates, rising costs in the importation of inputs, a drastic slowdown in domestic demand, production cuts, firm closures and a recession in the badly affected countries. These events induced MNCs and other foreign businesses to defer any further investment activity into the region until the affected economies begin to stabilize. After the crisis began in July 1997, the affected Southeast countries only began to experience recovery in 1999, with some economies still struggling with the lag effects of some macroeconomic policies used in order to respond to the crisis.

Felker (2003) also indicates that the sluggish FDI and export trends suggest that Southeast Asia's ailing tiger economies are caught in a "structural squeeze" between ascendant China and more advanced newly industrialized countries like South Korea and Taiwan. Notwithstanding its tremendous export performance during the boom period of the 1980s and 1990s, Southeast Asia's aspiring economies failed to develop the design and innovation capabilities necessary to move towards the more sophisticated production profiles of Taiwan and South Korea. During the past five years, China's export profile has come to include not only labor intensive products like textiles, toys, plastic items and electrical items, but also a growing share of ODM and even OBM in white goods and consumer electronics, along with aggressive thrusts into high technology sectors such as wafer fabrication.

The large market in Mainland China is major attraction for FDI. Ernst (2004), supports this view by indicating that during the year 2002, total consumer spending in East Asia was estimated to be \$1.461 billion with China's share being almost 40 percent. The region's middle and upper class market, the primary target of global competition, was estimated to be around 140 million people, which is roughly 10 percent of East Asia's total population. The four newly industrialized economies (Singapore, Korea, Taiwan and Hong Kong) dominate these high end sophisticated consumer markets, but China, with almost 41 million high end consumers accounts for almost 30 percent of the region's higher income market. China's market for electronic products and services are becoming more sophisticated. It is the world's biggest market for telecommunications equipment (wired and wireless), the third largest market for semiconductors, and one of the largest and most sophisticated markets for digital consumer and computing devices. Major global market leaders count on a continuous rapid growth of the China market to reduce the negative impact of the persistent demand stagnation in global electronics markets. This is true for the telecommunications market where Japanese producers of infrastructure equipment (Fujitsu and NEC) and mobile phones (Matsushita, Sharp, Sanyo,

Sony Kyocera) are intensely competing as well as collaborating with global industry leaders such as Motorola, Alcatel, Nokia, Cisco, Samsung, Siemens, Ericsson and LG), and where all of them are competing for market shares with emerging local giants such as Huawei, ZTE, Datang, TCL, Haier and Ningbo Bird. Global industry leaders are also eager to penetrate China's markets for computing and consumer devices and key components like semiconductors and this may be accomplished by direct investments into the Chinese electronics industry.

I. Clustering Trends, Government Policies that Create Location Advantages and Generic Trends in International Production Networks

Greg Felker's views on Southeast Asian industrialization and its changing global production system provide meaningful insights on trends that can be observed from the ongoing changes occurring in the international production networks of the region. Felker (2003) provides a comprehensive discussion of the observable trends in Southeast Asia which focus on clustering, the creation of location advantages and other generic trends. A brief comparison of the experiences of the newly industrialized economies focusing on their participation in the international production networks is provided below as well as the policy adjustments which Southeast Asian countries must consider to undertake in order to firmly entrench their positions in the network as well as move towards the direction of upgrading their roles, improve technological capabilities and proceed to the next level of producing higher value added goods and services. These insights are presented as follows:

J. The Limited Progression of Southeast Asian Economies into the International Production Network Value Chain

Relative to Taiwan, South Korea and Singapore, the difficulty being experienced by the four major ASEAN countries (Indonesia, Malaysia, the Philippines and Thailand) in terms developing the design and innovation capabilities needed in order to move into the more sophisticated stages of the international production network may be partly explained by the difference in the governance arrangements that regulated these networks. For Taiwan and South Korea, these key differences are:

- i) A strong national ownership presence in electronics afforded sufficient autonomy to invest in localized technological upgrading and linkage formation, such that local electronics firms steadily expanded from simple manufacturing into more engineering design and ultimately innovation intensive activities. Hobdays (1995) describes how localized learning propelled East Asian electronics makers' mobility along the value chain, as leading firms moved from OEM, or capacity subcontracting to, ODM and in some cases, to OBM and exports.
- ii) State intervention through imposition of performance requirements on inward FDI which included local content requirements and continued subsidies for investments in skills and technology to support the upgrading and expansion of local industry (Mardon, 1990; Dahlman & Sananikone, 1990).
- iii) When rapid industrial growth was beginning to be experienced by Southeast Asia during the 1980s, Japanese electronics makers did not upgrade their joint venture affiliates in the region, but instead continued establishing green-field operations under 100 percent owned subsidiaries in order to serve global production roles as low cost export production platforms. Such an arrangement was justified by the Japanese view that internationalization was a source of strategic comparative

advantage. In addition, there was generally a basic reluctance to transfer proprietary technologies (needed for upgrading) to potential competitors among locally owned firms. Such technologies had been developed after long years of experience and have incurred substantial research and development costs. Japanese MNCs have been slow or in some cases hesitant to transfer technology because this was considered to be the core of their competitive advantage (Tecson, 2001). While shifting manufacturing and testing to offshore affiliates in developing countries during the 1980s and the 1990s, even in high technology sectors, MNCs retained control over design, research and development and brand management in home country headquarters, resulting in a stark “international division of labor” in the Asia Pacific region (Morris and Suzuki, 1992).

American firms on the other hand, gradually divested the manufacture of maturing or medium technology product lines to nationally owned subcontractors in Korea and Taiwan during the late 1970s with the upgrading of these Asian affiliates continuing up to the early 1990s. However, in Southeast Asia, they only expanded there wholly-owned semiconductor assembly facilities into the export processing zones as the boom progressed.

Although FDI into Southeast Asia increased after the 1985 Plaza Accord, linkage effects and technological upgrading were still relatively limited compared to those experienced by Taiwan South Korea, Singapore and Hong Kong. In Southeast Asia, very few local firms were able to proceed towards turnkey OEM and ODM. Japanese principals often tightened their managerial grip over domestic market joint ventures in order to integrate their procurement and marketing functions with regional operations, further limiting the expected technological spill-over effects from their investments (Hatch and Yamamura 1996).

K. Clustering Trends in the Southeast Asian Region

Despite the difficulty encountered by Southeast Asian economies in their attempts to move upward within the value chain of the international production networks, it is also important to observe the clustering trends that have occurred during the industrial boom that was experienced in the region. Understanding the nature of these clustering trends will help set the parameters for policy formulation, particularly with regard to the provision of FDI incentives, the creation of industrial and science parks and export processing zones. Three clustering trends were observed namely: 1) the significant production deepening among export industries dominated by MNCs; 2) spatial co-location among MNCs in specific industry segments and; 3) the functional co-location pressure operating within individual foreign firms.

Production deepening occurs as foreign firms move from simple assembly into the production of parts and components whether in-house (if local firms supplying parts are non-existent) or through subsidiaries or affiliate firms (from their international supply networks), which set up operations in the local economy. A large number of FDI by small and medium sized enterprises from East Asia took advantage of liberal policies on foreign equity ownership to follow their principal assembly customers to Southeast Asia. The migration of foreign suppliers allowed flagship MNCs to resurrect a partial facsimile of their home country “keiretsu” or subcontracting systems in the region (Guyton, 1996). Japanese MNCs were willing to accept the imposition of local content requirements because they were forming linkages with other foreign firms (that also set up operations in the local economy) which turned out to be their trusted home country suppliers. Local value added would thus increase, but technology diffusion to local industry would remain non-existent. Felker (2003) cites the example Matsushita

Corporation which established 18 massive production facilities for its assembly, component and tool subsidiaries in Malaysia in order to produce air conditioners and color televisions for regional and global export markets.

Spatial co-location among MNCs in specific industry segments pertains to the movement of foreign firms belonging to the same industrial sector into a common area within the region that provides location advantages in terms of the availability of inexpensive, highly skilled local labor, attractive investment incentives and adequate infrastructure that facilitates the delivery of inputs and final goods and services to both domestic and global markets. Felker (2003) provides the example of Singapore which hosted Apple and IBM for the assembly of personal computers during the early 1980s followed by the relocation of a large share of global hard disk drive production late in the decade (McKendrick, Doner and Haggard 2000), and finally a wave of wafer fabrication investments in the early and mid 1990s. By the early 1980s, Malaysia's Penang hosted key assembly facilities of most of the world's leading semiconductor companies, including National Semiconductor and Intel, while Motorola and Texas Instruments set up operations near Kuala Lumpur, which were later followed by the world's leading Silicon wafer makers. In the mid 1980s Malaysia's Klang Valley became the favored location for Japanese and Taiwanese production bases in electrical and electronic home appliances, including air conditioners, television sets and video cassette recorders. Thailand attracted overflow investments in disk drive assembly from Singapore and in the 1990s lured the lion's share of new investments in car assembly. In the late 1990s, the Philippines developed clusters of computer assembly in the Subic Bay Zone and disk drive assembly in Laguna province south of Manila. The main purpose of the foreign firms for locating in these areas was to take advantage of the significant cost differentials in skilled labor and transport or shipment costs to global markets.

Functional co-location pressure operating within individual foreign firms refers to the need to transfer engineering, design and research and development close to the manufacturing/production plants located in Southeast Asia. This need to transfer the above mentioned functional areas was brought about by competitive pressures being exerted by the electronics industry. This sector began experiencing shrinking product life-cycle times wherein final goods become more obsolete earlier than expected because of the faster introduction of new products, with more features and better functional performance. Foreign firms respond to this pressure by introducing and upgrading automation technology that would ramp up to mass produce quickly, using new product and process technology. This induced local subsidiaries and affiliates to improve domestic engineering capabilities, and invest in upgrading workforce skills. In the case of Singapore, process engineering capabilities in several branches of electronics soon became world-class and subsidiaries there began to conduct research and development into process technology development (Wong 2001). This was eventually followed by investments into research and development and product design during the late 1980s.

In Malaysia, Matsushita Corporation established a formal research and development unit for its television subsidiaries in 1990, followed in 1992 by a separately incorporated air-conditioning research and development center (MACRAD), and a third subsidiary (MACTEC) to serve as a regional mould and die design and production center. By 1994 the three technology units employed more than 120 engineers and technician, fully equipped with sophisticated computer-aided design facilities, and linked to home-country R&D laboratories through electronic data interchange (EDI) systems. Like Matsushita, Sony corporations equipped its new audio, TV, VCR export plants with formal R&D units to create new model designs within a standard product range (The Star (Malaysia), 19 December 1996). In 1994, Hitachi moved its entire regional VCR division to Malaysia, including research and development, marketing and

product planning. Sharp-Roxy set up a research and development center in the same year for its audio compact disc products, video cassette recorder and color television sets.

L. Government Policies that Create Location Advantages

Singapore, Malaysia, Thailand and the Philippines made adjustment to liberalize their industrial policies and incentive schemes during the mid-1980's in order to attract a substantial share of FDI coming from Japan, as well as to respond to the recession that was occurring in the Southeast Asian region. The common adjustments undertaken referred to the lifting of restrictions on foreign ownership for export oriented projects as well as a few revisions in their respective fiscal incentives schemes. However, the more important changes that were undertaken focused on improving and increasing the efforts of each country's respective investment promotion agency, and investments by the ministries of trade and industry into specialized infrastructure and skills that are expected to complement the MNC's regional production strategies. Felker (2003) provides the following examples:

The Economic Development Board of Singapore revised its investment promotion scheme by focusing on incentives that encourage MNCs to invest in design and research and development activities. It went into partnership with foreign governments and individual MNCs to set up sector specific skills training centers to facilitate the integration of higher end manufacturing with innovation tasks, like design and research and development. Singapore continues to develop world class infrastructure that supports globally linked production. It is a world leader in the application of its electronic customs clearance technology currently being used by the Port of Singapore and continues to provide higher value added network services, ISDN and eventually island wide broadband infrastructure through its telephone monopoly. A Science Park opened in 1989 to host foreign research units, equipped with specialized prototyping equipment, patent database and services and links to the national university. The Economic Development Board also established capital investment funds as a partner with foreign companies in wafer fabrication and other strategic investments.

The Malaysian Industrial Development Authority on the other hand, provided tax incentives for research and development, offered full tax holidays for high technology strategic investments, and in 1993, set up the Human Resources Development Fund which levied a 1 percent deduction on corporate payrolls with the amount redeemable for firms' investment in worker skills in approved training programs. The government built a science park outside Kuala Lumpur, and a specialized infrastructure industrial park in Kedah state to house investments in wafer fabrication and other designated high technology projects.

The Board of Investment (BOI) in Thailand used sector specific investment promotion and initiated a research and development tax incentive in 1989. It has cooperated in granting promotion to projects affiliated with the National Science and Technology Development Agency, a quasi government body set up in 1991 to sponsor and conduct applied research in electronics, biotechnology and materials. It established a non-profit Investor Club Association to serve as an organizational interface for providing post-investment services which has enrolled 800 BOI promoted companies. The Association operates an electronic raw materials tracking system, linked to the Customs Department through electronic data interchange, which manages the documentation necessary to avail itself of import duty drawbacks. In 1995, the government relaxed its local content program in exchange for new commitments from major car manufacturing MNCs to expand investments and launch exports.

In the Philippines, the establishment of the Economic Zone Authority in 1995, as well as the Subic Bay and Clark Free Trade Zones were expected to attract inflows of export oriented FDI and these initiatives were accompanied by adjustments in investment promotion policies that would help upgrade skills and technological content coming from foreign firms. The establishment of zones had increased from 16 in 1994 to 40 in 1998 with 20 more under construction. Industrial parks with specialized infrastructure (pure water, industrial gases, and redundant power supplies) facilitated the clustering of Japanese semiconductor and disk drive assemblers in Laguna province south of Manila.

Indonesia was the only country in the region that undertook minimal adjustments in policies that could better attract FDI. Its economy put more emphasis on the development of heavy industries through inward looking policies and the only sector where FDI flowed into were light, export-oriented labor intensive assemblies.

From the above mentioned adjustments in investment promotion policies in Southeast Asia, a consequent grouping of firms (which may either be competitors or suppliers of inputs) which all belong to the same or related industrial sectors in certain specific areas of a country may be considered as a form of conditional or “contingent clustering “ wherein coordination economies from MNCs investment decisions gave rise to localized externalities among foreign affiliates and subsidiaries and that government policies encouraged vertical, horizontal, internal and external firm and co-location dynamics that drove local industrial upgrading beyond the point that local endowments of skills or technology would have otherwise allowed (Felker 2003). The investment promotion efforts in the region had encourage parallel investments in a series of sectors and individual product and technology categories where MNCs found it useful to be located where their competitors are, which gave rise to inter foreign coordination as well as spillovers of skills, information and infrastructure development.

M. Generic Trends in International Production Networks

Three general trends can be observed in the evolution of international production networks as MNCs change strategies in order to better compete in the global trading environment. These trends can be described as: 1) the emergence of systemic globalization; 2) the further reliance on systematic outsourcing and; 3) the use of electronic commerce as a generic technology for coordinating international production networks.

Systemic globalization refers to the international dispersal and potential integration of all elements in the value chain beginning with manufacturing and consequently to marketing, finance, logistics, design, training, procurement and even research and development functions which may be located abroad and coordinated with home country operations. Singapore and Hong Kong can be cited as examples of countries in the region which have benefited immensely from the occurrence of systemic globalization. These two countries have been identified by several MNCs as ideal locations for their Asian regional headquarters where newly internationalized functions such as research and development, engineering and product and process design, logistics and marketing responsibilities such as customer relations are currently being undertaken, long after initially being used as export production platforms. This transformation over time illustrates the vertical integration that is occurring along the supply chain. Superior transport (shipping and airlines) and telecommunications infrastructure as well as their efficient financial systems relative to other economies in Southeast Asia have made them attractive as locations for regional headquarters. In effect, it is not simply the production of parts or components that are being located overseas by MNCs but other functional elements of the entire value chain as well.

Systematic outsourcing on the other hand pertains to the continued outsourcing by MNCs of a growing range of functions including auxiliary or supplementary services, administrative functions, product and process design and engineering as well as the other stages of the entire production process. Borrus, (1999) and Borrus et al (2000), illustrate that MNCs choose to concentrate on a particular segment of the value chain in order to establish and dictate the architectural standards for the entire industry, and this strategy allows them to pass on or devolve, outsource the production or procurement of lower value added parts and components to other firms in the regional production network. The adoption of this arrangement also allows the MNC to specialize on product or technology definition, brand building and marketing. In Thailand's automotive industry, global sourcing has become a very important strategy for manufacturers, particularly for the procurement of complex parts for its modular approach which has a direct impact on vehicle quality and performance. Local content requirements were abolished in January 1, 2003, in order to support the global sourcing strategy and to promote closer regional cooperation in the production network (Chiasakul 2004).

The use of electronic commerce as a generic technology for coordinating international production networks has become necessary because of the advantage of speed and real time information exchange that it provides through state of the art telecommunications infrastructure. Business to business e-commerce technology allows the real time exchange of production related data worldwide, and makes the entire value added chain transparent to all network participants. Web based business to business technologies have substantially reduced fixed cost entry barriers to participation in the global electronic network. The procurement, distribution, maintenance and replacement of materials and personnel across the entire international production network can immediately be undertaken through the dissemination of instructions by the division heads in the Asian regional headquarters through their web based electronic systems.

These three trends that were observed in the continuing evolution of international production networks were part of the success of the U.S. MNCs in East Asia. Borrus (1999) insists that American firms such as Dell, Cisco, Qualcomm, Sun Microsystems, Intel and Microsoft were able to out-compete their Japanese rivals because their open networks (which manifested systemic globalization, systematic outsourcing, and extensive use of e-commerce technology) allowed them to fully exploit low cost manufacturing expertise across developing Asia more fully and systematically. Japanese and European MNCs are evaluating their positions and are considering following these trends in order to further exploit the cost advantages within the international production network.

In view of these trends, countries in the Southeast Asian region must make adjustments in their industrial and investment promotion policies in order to attract some of these functions which are either being integrated in the network as part of their vertical integration strategies or systematic outsourcing schemes. Aside from these functions, countries in the region could also undertake attempts to attract the design and training headquarters, information technology support centers, back office and other specialized business service center operations including research and development in order to move upward to more complex and lucrative value added roles and firmly entrench their position in the value-added chain and strengthen their roles in the MNCs' international production network.

However, the ability to attract these functions originating from the MNCs' decision to devolve other stages of the production process, depends on the ability of each country's government to upgrade their local capabilities (such as technical skills in engineering,

information technology, marketing, finance and training) to meet international standards and invest in infrastructure that would support e-commerce capabilities and an efficient transportation (shipping and airlines) distribution network.

N. Policy Adjustments in Southeast Asia

Felker (2003) also provides several examples of policy adjustments that have already been implemented by Singapore, Malaysia, Thailand and the Philippines not just for the purpose of attracting investments from MNCs, but also to promote investments into specific activities or functions that would secure their positions within the international production network., to root foreign multinationals to their territories, encourage localization of key functions and to exploit the formation of foreign linkages, technological diffusion and learning. These policies also attempt to take advantage of the trends that focus on systemic globalization, systematic outsourcing and the intensive use of e-commerce to coordinate international production network activities.

O. Capitalizing on Systemic Globalization

The Economic Development Board of Singapore grants special incentives to investments in regional or operational headquarters (RHQs or OHQs), to attract multinational corporate offices that provide managerial and technical support to affiliates and subsidiaries throughout Southeast Asia. The Operational Headquarters (OHQ) Incentive, wherein foreign firms providing management and other approved headquarters related services to subsidiary, associated, or related companies in other countries are taxed at the concessionary corporate rate of 10 percent (with global HQs eligible for full tax exemption), given up to 10 years with provisions for extension. The target set for this policy was 1,000 global and regional headquarters to be located in the country. By the end of 2000, the government had granted over 200 certificates to investments worth US\$543 million and employing 2,000 executives. Ariba, a leader in the global business to business service provider sector, established its regional headquarters in 2000, and Caltex Corporation decided in the same year to relocate its global headquarters from the U.S. to Singapore in order to be closer to its key production, refining and distribution networks.

In Malaysia, the cluster based Second Industrial Master Plan, announced in 1996 targeted the promotion of MNC investments in design, engineering and logistics projects. Thailand began in 1996, with a regional headquarters scheme whose criteria were liberally defined to include consulting, exporting, wholesaling and equipment maintenance and, by 1999, its Board of Investment approved some 102 trade and investment support offices, with cumulative investments of more than 3.2 billion baht.

The Philippines investment code offers incentives to foreign investors establishing regional or area headquarters, regional operating headquarters and regional warehouses that provide managerial support to affiliated companies abroad. Its eligibility was extended to a wider range of managerial activities and relaxed to permit regional headquarters to generate sales revenue in local markets. In particular, the incentive provides. In particular, the incentives include: 1) a special tax rate of 10 percent on taxable income for regional operating headquarters; 2) a value added tax with zero rating on their purchase or lease of goods, property and services; 3) exemption from all kinds of local taxes, fees or charges imposed by local government units, except for real property tax on land improvements and equipment and; 4) tax and duty free importation of equipment and materials for training and conferences.

P. Encouraging Systematic Outsourcing

Countries in the region also continue to promote investments in new sectors that offer high value added services that could be outsourced by MNCs. The Economic Development Board of Singapore granted pioneer status to telecommunication providers, network integrators and content developers. Promoted the engineering service sector which included precision engineering of metal and plastic parts, transport engineering and process engineering, and it granted the "Manufacturing Headquarters" (MHQ) promotion status to foreign firms that integrated their manufacturing base with information intensive functions. Because of these efforts, Hewlett Packard Singapore now designs and develops handheld computing devices, inkjet printers and cartridges. Seagate Singapore designed the new cutting edge disk drive, Dell Computer set up its online data center in Singapore, IBM joined Pacific Internet Singapore to develop new e-commerce tools, Cisco systems opened a "proof of concept" laboratory worth \$6 million, and Ericsson opened a \$7 million CyberLab to develop wireless e-commerce applications.

In the Philippines, the provision of special economic zones has given way to attracting the non-manufacturing business processes of MNCs. Federal Express set up operations at the Subic Bay Free Trade Zone for its regional logistics and flight operations headquarters in 1994, consequently followed by United Parcel Service. America On-line set up one of its global customer call centers in the Clark Development Zone citing low costs and high workforce English language proficiency. In April 2000, Amazon.com announced that it would locate distribution, accounting and data-coding operations in the Philippines. Based on these results, the Department of Trade and Industry as well as the special economic zone authorities formulated a new promotional drive to consolidate the Philippines's status as a primary regional center for back office operations like customer services, accounting, computer coding and data processing.

Q. Enhancing the Role of SMEs in the Production Network

The promotion of small and medium scale enterprises (SMEs) has been a common goal among countries in the Southeast Asian region and it has become necessary because of its greater immediate impact on reducing the extent of the poverty problem, improving income distribution and raising productive capacity in the countryside. However, its importance is not just confined to the above mentioned reasons but also to its role as a potential participant or contributor to the international production network. The low cost advantage found in labor intensive manufacturing by a relatively highly skilled workforce employed by SMEs can be a very attractive feature for MNCs in their search for new locations to be part of their production network. The SMEs can perform the role of second and third tier suppliers, not only in parts and components manufacturing but also into higher value added services that contribute to the logistical requirements of the network. The proliferation of SMEs that are capable of supplying goods and services as second or third tier suppliers within the network also contributes to the formation of clusters that complement the needs of foreign firms participating in the network. Singapore and Malaysia have government initiated programs which attempt to develop the capability of SMEs as subcontractors of services in the areas of information and communications technology as well as product and process engineering.

The Singaporean government recognized the importance of SMEs and their potential contribution to the network, by setting up programs that would upgrade their local capabilities in the area of e-commerce services. During the early 1980s the Economic Development Board set up the Local Industry Upgrading Program (LIUP) which provided technical assistance and

training to local sub-contractors of MNCs. The National Computer Board worked with major multinationals like Oracle Corp. to set up a parallel program for the diffusion of electronic commerce technology to local supplier firms. The goal of the information technology LIUP was to ensure that local suppliers would retain their position in the supply chain as MNCs migrated their regional procurement onto web-based systems or outsourced them to specialized contract electronics manufacturers and logistics providers.

Singapore's supplier development programs were consolidated under a new "Technopreneurship" strategy which packaged technical assistance with new financial incentives targeted at encouraging the formation of new technology start-ups (Wong 2001). In 2000, the Infocomm Development Authority established a new e-Business Industry Development Scheme to assist SMEs to adopt e-commerce technology

In Malaysia, a Vendor Development Program was launched in 1993, under which multinational and local "anchor companies" would provide guaranteed purchasing contracts and technical assistance to local vendors, who would also receive subsidized finance from local banks and technical support from government institutions. A Global Supplier Program launched in 1999 aimed to help established local subcontractors move beyond dependence on local linkages to a single principal buyer and enter international supply networks. The Small and Medium Sized Industry Development Corporation subsidized the secondment of engineers from foreign firms to local supplier companies for training and technical assistance. It also administers an Industrial Technology Assistance Fund which provided matching grants to SMEs for technology acquisition and productivity improvement. The Penang Skills Development Center offers engineering training courses jointly managed by MNCs as well as supplier development efforts subsidized by the Small and Medium Sized Industry Development Corporation under the Global Supplier Program.

V. CONCLUSION

In a very liberal global trading environment, the continued existence of business enterprises depends largely on how competitive they are. But aside from maintaining low average costs and achieving superior product quality, the presence of strong links as suppliers of intermediate inputs to other larger companies which produce final goods and services is a major advantage that may be established by a firm if it is part of an international production network. Subcontractors or suppliers of intermediate inputs or services are put in an attractive position where they benefit from external economies generated by foreign firms which have established the production network. As long as the flagship company has a sustained demand for its final product, the other firms which contribute to the entire value added chain will benefit from their participation in the network. These benefits include sustained demand, higher output, income and employment levels, greater opportunities for investments, the exposure to new technologies, new products, production processes, management techniques as well as the chance to move upward within the networks' value added chain and move into more sophisticated, complex and lucrative production activities.

The nature of international production networks in the East Asian region has been changing. With developing countries initially fulfilling the role of low cost export platforms over the past several years, their roles have been changing to the extent that higher value added activities within the value chain are now being passed on to them by the flagship firms. The experiences of Taiwan and South Korea show that international production networks set up by American electronics firms have more open competitive supply architectural configurations in the sense that they assisted these countries in upgrading and enhancing their role as suppliers

of higher value added components in line with U.S. product cycles and allowed them to compete with other Japanese, U.S. Singaporean, Taiwanese, Korean and other Asian firms in terms of cost, quality, time to market product launches and the creation of significant value added (Borras 1996). American firms had passed on higher value added production roles to their Asian affiliates so that they can focus on new product definition and the development of new associated skills necessary to create, maintain and evolve de facto market standards. Borras (1996) reiterates that the shape of a firm's international production network reflects its ability to exploit location specific advantages at its point of origin and to fill in complementary elements as necessary with relationships that exploit location specific advantages elsewhere.

Countries in the Southeast Asian region must identify the location specific advantages which they possess, magnify these advantages and use them as incentives that would attract investments that would give them a significant position within the international production network. Singapore has been very aggressive in implementing policies that would promote investments into higher value added production activities that would enhance, strengthen and upgrade their role in the production network. Malaysia has also made attempts to be more aggressive in attracting the same types of investment that would upgrade their role with the production network's value chain. However, Malaysia's success is limited relative to Singapore because of the latter's superiority in information technology, telecommunications, and transport (shipping and airlines) infrastructure. The Philippines has attempted to provide location specific advantages through its Subic Bay, Clark Free Trade and other Economic Zones, however, its local capabilities in terms of skilled labor that would match higher value added production activities being devolved by MNCs is still relatively limited.

The type of foreign investments to be attracted provides countries with better opportunities to move upward within the value chain of the international production network. Foreign investments in higher value added production and functional activities such as engineering, product and process design, marketing, finance, logistics and procurement and even research and development will only happen if the host country dramatically improves its local capabilities (information technology and engineering skills) and infrastructure support (in telecommunications, power, water and transport) that would be a basis for location specific advantages in the Southeast Asian region. In Southeast Asia, Singapore provides the best example of programs designed to upgrade the technical capabilities of small and medium scale enterprises so that these firms could complement FDI that would continue to establish international production networks, and provide superior infrastructure, both of which serve as source of location specific advantages.

Aside from upgrading local capabilities and providing adequate infrastructure, the investment promotion agencies should also intensify its match making efforts between MNCs and local supplier firms to the extent of providing guaranteed purchasing contract to ensure the localization of procurements of inputs. In addition, efforts should be further intensified towards setting up and industrial extension system that would provide technical support with either subsidies or financing programs, technical assistance to local vendors and grants for technology acquisition and productivity improvement.

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