

CHAPTER 6

Thailand Automotive Parts Industry

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CHAPTER 6

THAILAND AUTOMOTIVE PARTS INDUSTRY

Kriengkrai Techakanont

INTRODUCTION

Within less than 50 years of industrial development, Thailand's automobile industry has become a part of global production network of many car manufacturers. Completely built-up (CBU) vehicles and completely knocked-down (CKD kits) were produced by locally based suppliers, and have been a major export product since 2000. Automobile production in Thailand firstly surpassed one million units in 2005, and in 2008, where production reached a new high record at 1.39 million units. As an agrarian economy at the beginning, Thailand is one of a few developing countries that could reach this development stage. Thailand's industrialization success has attracted attention for policy makers and scholars in many developing countries that want to promote automotive industry. How could this development pattern happen and what are policy implications for other countries? Inquiries have long been to understand the dynamics of interactions among the roles of government, multinational and local firms, however, comprehensive research in explaining this evolution in terms of cluster and regional development seems to be incomplete. Therefore, this paper will use Thailand as a case study to understand such dynamisms and role of the Thai state in promoting automotive sector, with particular emphasis on automotive parts industry and trade integration with Asian

countries.

Historically, automobile production in Thailand started in 1960s as a result of government policies inducement incentive. Foreign assemblers then entered into the country and started their production to serve domestic market and later expanded their production. Local production and supporting industries have been developed and multinational car manufacturers gradually expanded their production and started export in 1990s. Despite the country was affected by the 1997-98 economic crisis, several assemblers restructured their business and made a strategic decision to use Thailand as one of their global production bases in the early 1990s. Why Thailand became a part of the global production network (hereafter, GPN) of multinational car makers? Previous studies argued that Thailand impressive development was a result of government incentive and trade protection for domestic producers, i.e., Kohpaiboon (2006, 2009), Techakanont (2008), Techakanont and Charoenporn (forthcoming). Although the development path of Thailand may resemble to other developing countries, understanding historical development would benefit for latecomers. This paper will attempt to provide a systematic explanation, particularly a discussion of government policies that favored MNEs, especially Japanese car makers, to expand their production in Thailand and to develop supporting industries in Thailand.

The organization of this paper is this. The next section provides a brief overview of the Thai automotive industry. Section 2 discusses about the Thai government's policies towards automotive industry and the actual development of autoparts industry in Thailand. After providing an overview of the industry, section 3 will discuss how Thailand's automotive industry connect within the production network of MNEs in ASEAN and other countries. Section 4 makes concluding remarks.

1. DEVELOPMENT OF THE THAI AUTOMOTIVE SECTOR IN BRIEF

Thai automobile industry was among the first industries to receive an investment promotion from the Board of Investment (BOI) and was promoted in line with the country's import substitution policy. In 1961, there were only 525 cars produced locally, while domestic sale was 6,080 units. From 1970 to the mid 1980s, the domestic market grew gradually as well as production volume. This growth resulted from the change in government policy from import substitution to a more rationalized policy, aiming at increasing localization of parts and components. Automobile production and sales grew significantly in the 1990s due to two major reasons. On the one hand, the appreciation of the Japanese yen in 1985 encouraged Japanese and part makers to expand their production in Thailand. On the other hand, the Thai government committed to liberalize the auto industry, e.g., the deregulation of the automobile industry in the early 1990s and the abolishment of the Local Content Requirement regulation in 2000. This significantly transformed the Thai automobile industry from a highly protected industry to a more liberalized one.

Asian Financial Crisis, triggered by the devaluation of the baht in July 1997, caused serious impact on manufacturing sector, including automotive industry. As shown in Figure 1, the domestic sale of new vehicles dropped sharply, by 38.36 percent in 1997 and 60.33 percent in 1998. The decline in domestic demand made assemblers adjust their production plans, by reducing their production, temporarily stopping production, and reducing the number of workers as well as operating and working time (Poapongsakorn and Wangdee 2000; Terdudomtham et al. 2002). Despite

the severe shock, both production and employment recovered quickly. Moreover, many assemblers tried to increase their exports in order to offset the loss of the domestic sale. The industry has been resilient quickly.

The economic aftermath has proved that Thailand has strong potential to be an export base. Consequently, Japanese and U.S. automobile assemblers, such as Mitsubishi, Toyota, Auto Alliance (a joint venture between Ford and Mazda), GM, and Isuzu, have decided to use Thailand as their export base. Production capacity expanded considerably after 2000 and it reached 2 million units per year in 2010. (see Table 1). In 2007, annual production was 1,301,849 units and total export was 690,100 units (see Figure 1). This was an important milestone for the Thai automobile industry because export volume exceeded domestic sales.

After only 40 years of development, the Thai automobile sector fully becomes an export-oriented industry, indicating that Thai made vehicles could achieve international quality standard and competitive price. It can be argued that earlier government policies were successful in the process of industrialization of the Thai state, under the series of protection policies, which attempted to streamline the industrialization process incrementally. Japanese assemblers, which tried to adjust and comply with those higher policy requirements, have played crucial roles in the development of local automobile production and supporting industries in Thailand. These important roles go beyond simply increasing the levels of localization of parts production for their operations in Thailand.

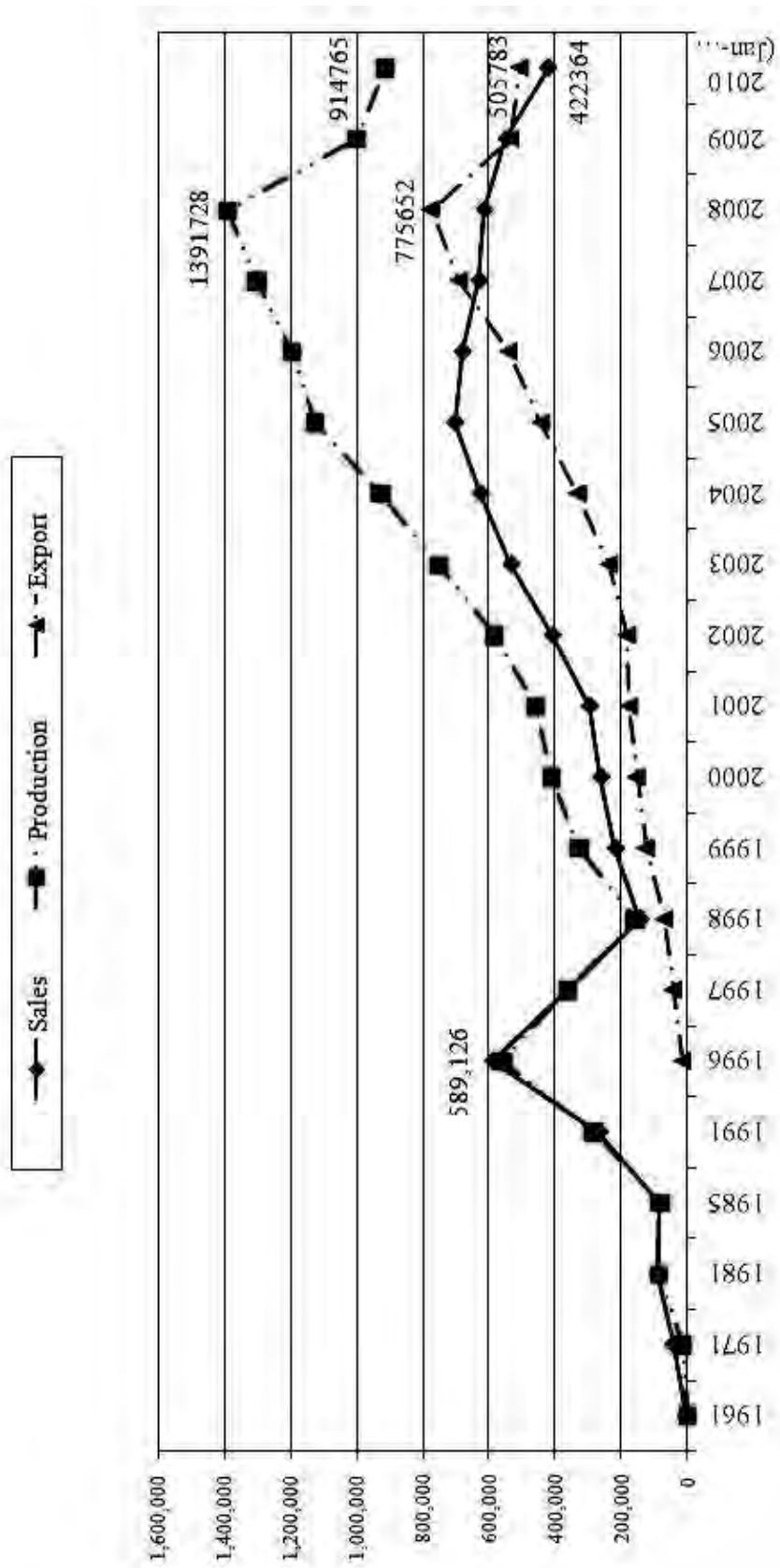
Table 1: Production Capacity (Units) of Assemblers in Thailand (1985 – 2010)

	1985	1989	1994	1999	2003	2005	2007	2010
Toyota	40,800	54,805	135,000	200,000	240,000	350,000	550,000	600,000*
Mitsubishi	n.a.	54,000	126,600	174,400	190,200	170,200	200,000	200,000
Isuzu	30,000	27,400	83,200	140,600	189,600	200,000	220,000	220,000
General Motor	n.a.	n.a.	n.a.	40,000	40,000	100,000	160,000	160,000
Auto Alliance & Mazda	n.a.	7,200	8,400	135,000	135,000	135,000	155,000	275,000
Nissan	n.a.	23,520	96,500	113,100	124,000	102,000	134,400	200,000
Honda	n.a.	8,220	39,000	70,000	80,000	120,000	120,000	240,000
Hino	9,600	19,200	24,000	9,600	28,800	28,800	28,800	28,800
DaimlerChrysler	n.a.	2,340	4,600	14,900	18,100	16,300	16,300	16,300
YMC Assembly	6,000	12,000	14,000	12,000	12,000	12,000	12,000	12,000
Volvo	3,000	6,000	7,000	6,000	6,000	10,000	10,000	10,000
BMW	n.a.	n.a.	n.a.	n.a.	n.a.	10,000	10,000	10,000
Tata Motors	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	35,000	35,000
Total	89,400	214,685	538,300	915,600	1,063,700	1,254,300	1,651,500	2,007,100

Source: Compiled by the author from various sources. Mainly from data reported by Thai Automotive Industry Association, Bank of Thailand, Ministry of Industry, and information received from companies, interviews conducted by the author.

Note: * This is an estimation by an executive of Toyota Motor Thailand (interview on September 22, 2010).

Figure 1: Thailand Production, Sales, and Exports of Automobile (1961 – 2010 July)



Source: Federation of Thai Industries, The Thai Automotive Industry Association.

2. EMERGENCE OF AUTO PARTS INDUSTRY AND SUPPLIER NETWORK IN THAILAND

Historically, most of assemblers started business enter into Thailand in order to supply to domestic market, due to protective trade policy, and their business was merely assemble imported parts (CKD kits) with small scale of production. The government thus shifted industrial and trade policy regime towards more rationalized and export-oriented. During the end of 1970s and early 1990s, the Thai government had implemented several policies to promote the industrial sector, especially the regional development. Regarding infrastructure and regional development, the BOI incentives were revised and privileges were granted to firms according to their location in three General Industrial Zones (see Table 2). This revision drove industrial decentralization towards the eastern provinces. Industrial estates and developed infrastructure were important for MNEs when choosing a location for their new plants.

Table 2: Investors' Privileges in Accordance with BOI and Industrial Estates Authority of Thailand (IEAT) for Location in Three General Industrial Zones

	Zone 1	Zone 2	Zone 3
Corporate Income Taxes	100% exemption for 3 years	100% exemption for 7 years if location in IE	100% exemption for 8 years + 50% reduction for a further 5 years
Duties on Capital Goods (Machinery, parts etc.)	Pay 50%	Pay 50%	Free
Duties on Imported Raw Material	Exemption for 1 year if exports at least 30%	Exemption for 1 year if exports at least 30%	5 year exemption if exports at least 30%; pay 25% for 5 years for domestic sales
VAT, Excise Tax, Surcharge (BOI), Import and Export Duty (IEAT)	Normal rates	Normal rates	Normal rates
Transportation, Electricity, Water	Not applicable	Normal rates	Double deduction from tax income for 10 years
Infrastructure Facilities	Not applicable	Not applicable	Deduction from taxable income 25%

Source: www.ieat.go.th (December 2007).

Note: Zone 1 = Bangkok (Bangchan IE, Lad Krabang IE), Samut Prakan (Bangpoo IE, Bangplee IE, Gemopolis IE), Samut Sakhon, Nakhon Pathom, Nonthaburi, Pathum Thani.

Zone 2 = Ayutthaya (Bangpa-In IE, Hi-Tech IE, Saha Rattana Nakorn IE), Chachoengsao (Gateway City IE, Wellgrow IE), Chonburi (Amata Nakhon IE, Chonburi IE, Pinthong IE). Special zone 3 privileges apply to Chonburi (Laem-Chabang IE), Ratchaburi (Ratchaburi).

Zone 3 = Rayong (Amata City IE, Eastern IE, Eastern Seaboard IE, Map-Ta-Phut IE, Padaeng IE, Thai Singapore 21 IE, Asia IE) Khon Kaen Mini IE, Northern Region IE, Pichit IE, Southern IE, and remaining provinces.

The Eastern Seaboard Development (ESB) Plan, initiated in the mid-1980s, reflects the Thai government intention to establish an industrial cluster in three eastern provinces (Chachoengsao, Chonburi, and Rayong). Consequently, the eastern region became the second largest manufacturing sector behind Bangkok. Industrial activities, in terms of Gross Regional Product (GRP), in these two regions increased significantly between 1995 and 2005 (see Table 3). The manufacturing sector of the eastern region

was the second highest, after the central region, and its manufacturing sector is also highly diversified. The largest sub-sector is refined petroleum products, followed by automotive, petrochemical and machinery sub-sectors, respectively. However, later on, auto industry has expanded and agglomerated in the Eastern region.

Another set of industrial policies that was crucial to the development of automotive parts industry was the rationalized policies. Among these policies, local content requirement (LCR) regulation, effective from 1975 to 1999, was the key. This regulation forced carmakers to procure parts locally, whereas local auto parts firms were virtually nonexistent. The government made clear that assemblers had to achieve local content ratio for specific type of vehicles (passenger cars and pickup). The ratio is shown in Figure 2. Manufacturers thus made an immediate response by expanding their in-house production and reducing reliance on imported CKD parts.

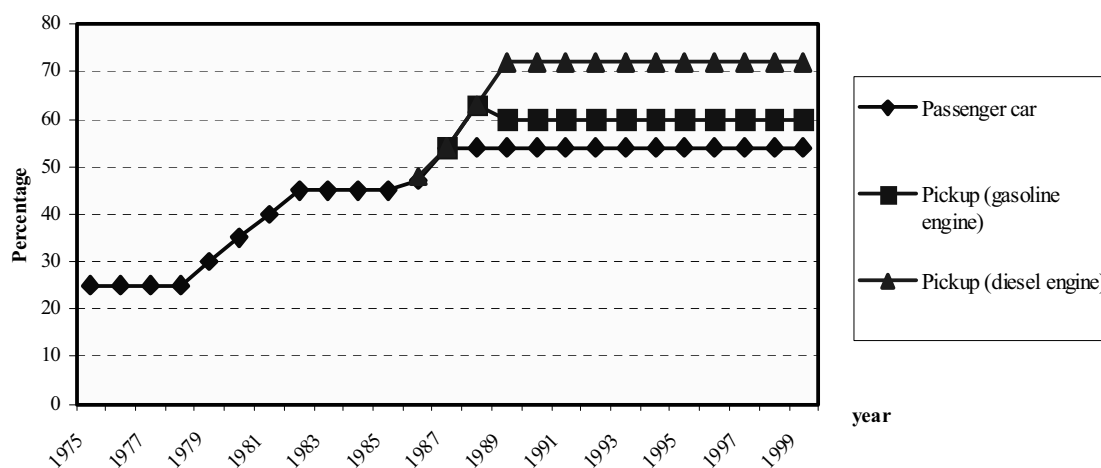
Table 3: Sectoral Share of GRP by Regions

(Unit: Percent)

Region	1995				2005			
	All	Agriculture	Industry	Services	All	Agriculture	Industry	Services
North	100	18.20	29.87	51.93	100	18.07	31.88	50.05
Northeast	100	20.69	24.13	55.18	100	18.45	24.21	57.34
Central	100	7.11	66.04	26.85	100	4.73	77.24	18.02
East	100	7.51	67.58	24.91	100	5.20	72.96	21.84
West	100	17.02	36.74	46.42	100	16.81	36.83	46.36
Bangkok and vicinities	100	1.00	44.86	54.15	100	1.31	45.57	53.12
South	100	33.17	23.13	43.70	100	33.18	22.62	44.20
Whole Kingdom	100	9.40	43.03	47.57	100	8.68	47.29	44.03

Source: National Economic and Social Development Board, GRP.

Figure 2: Local Content Requirement of Automobile Assembly



Source: Wattanasiritham 2000, Figure 2.1, page 23.

They started by producing bulky parts. Siam Nissan expanded in-house production for body parts and other stamping parts in 1974. Toyota established an affiliate companies (Toyota Autobody) in 1978, and Isuzu establish Isuzu Body around the same period (Techakanont 2002). At the same time, they invited Japanese suppliers to invest in Thailand or to match with Thai supplier through technical assistance agreement in order to comply with the LCR. Assemblers' firm boundaries expanded, resulting in an emergence of supporting industries. As reported in Poapongsakorn and Techakanont (2008), in 1970s, automobile and auto parts producers located their plants in industrial estates in Bangkok and the central area, such as Samut Prakan province. Agglomeration of firms in automotive industry developed, mostly in Bangkok and vicinities.

During the 1980s, the LCR had been revised and the requirements went beyond

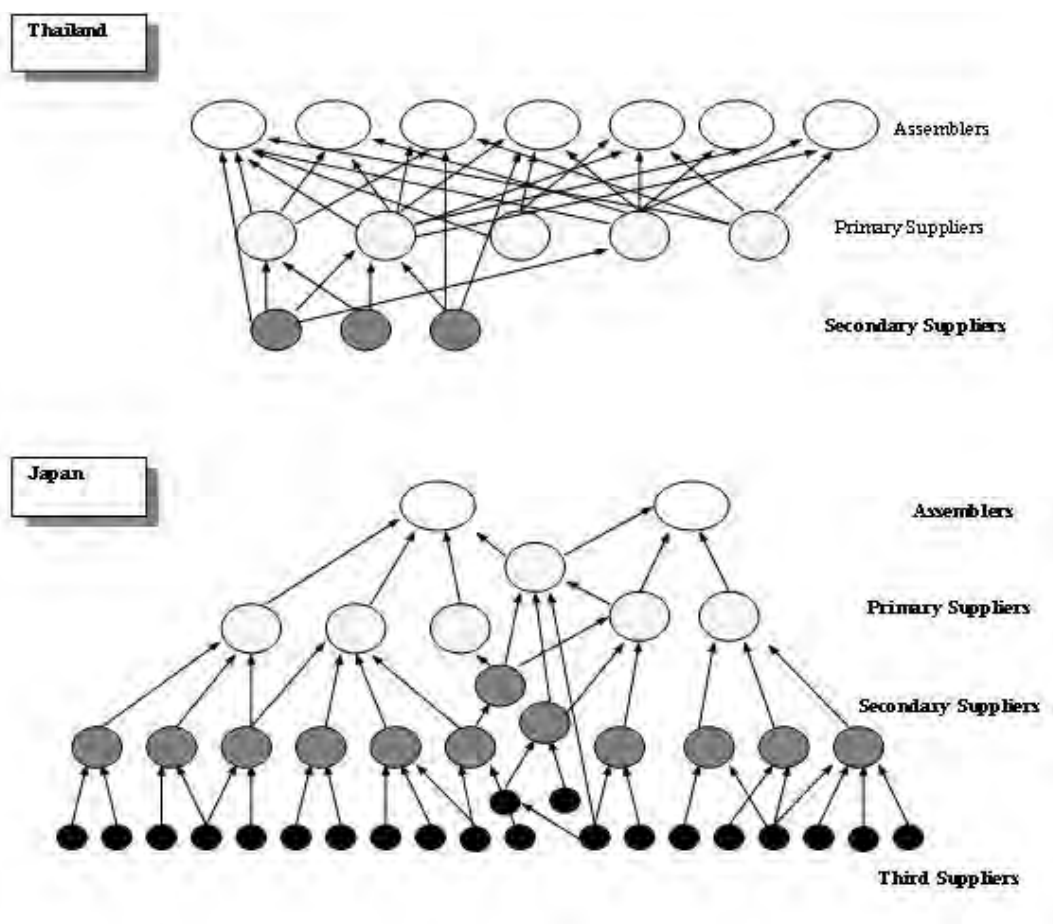
the assembly of automobiles (see Figure 2). Policy makers imposed further restrictions such as the local sourcing of certain compulsory parts such as radiators, batteries, exhaust pipes, and parts for diesel engines. Localization on diesel engines was imposed in 1989 at 20 percent and the ratio was set to increase to 70 percent in 1996. Because of this policy, assemblers could not rely on expansion of in-house production or to invite more suppliers, because the domestic market at that time was too small. At the request of assemblers, only some Japanese suppliers came to establish a new plant in Thailand, while some hesitated to do so. As the LCR policy was becoming more aggressive, turning to local firms for cooperation was inevitable.¹ Japanese firms responded to the Thai Government policies with two other major strategies: 1) develop and create supplier network and 2) collaboration among assemblers, especially for the diesel engine project.

To the first strategy, during the initial stage of development, the Japanese automobile manufacturers invited their parts suppliers to Thailand and locating them around their assembly plants (Doner 1991). Relationships between suppliers and assemblers are multiple, i.e., a supplier supplies parts to several assemblers (see Figure 3). Selling to multiple customers allowed each supplier to achieve economies of scale, which in turn benefited to carmakers. Moreover, automakers also had to provide technical advice and support to local part makers, even though these firms also supplied parts to their competitors. This method was proved economically

¹ Consequently, local firms were nurtured and subsequently went on to develop their businesses. Some successful cases were Summit Auto Body group, Thai Summit group, and Somboon group that received benefit from this rationalized policy. Starting as small enterprises during the LCR regime, long vision of the founders enables these firms to maintain long-run growth and diversification. They are now top three largest Thai conglomerates. Thai Summit and Sammit Autobody had annual sales higher than 10 billion Baht recently.

cost-effective.² Technology transfer occurred and local suppliers could improve their technological capabilities (see Techakanont 2002).

Figure 3: Structural Difference of the Supplier System between Thai and Japanese Automotive Industry



Source: Thailand case from Maruhashi (1995) and Japan case from Smitka (1991).

² However, the rapid growth of automobile production in Thailand and the fact that Thailand has recently been integrated into the global production network will certainly affect the structure and relationship of this supplier system in the future.

The other strategy of Japanese automobile manufacturers in response to the localization policy in Thailand has been an inter-assembler collaboration. This was one of the requirements of the BOI Engine Production Promotion scheme. It was compulsory for engine assemblers to utilize local engine parts that have undergone domestic casting and forging processes by a specified schedule.³ Three engine assemblers under the BOI promotion projects, i.e., Isuzu Engine Manufacturing (Thailand), Siam Toyota Manufacturing, and Thai Automotive Industry, initiated cooperative production for these five compulsory parts. Collaboration among engine manufacturers is as follows: Isuzu Engine Manufacturing (Thailand) is responsible for forging crankshafts and connecting rods; Siam Toyota Manufacturing for casting cylinder blocks; and Thai Automotive Industry for casting cylinder heads. Each assembler produces and supplies for the collaborative group.

Market size at that time was insufficient for each firm to enjoy economies of scale for engine production. Moreover, as engine parts require very high technology, a large amount of investment was necessary for production of all compulsory items. As a result, a unique procurement system was developed first in Thailand, in which three Japanese firms, Toyota, Isuzu and Nissan, procure engine parts among them (Wattanasiritham 2000, p. 65). However, this situation may be changing because of the export strategy of some major assemblers, such as Toyota and Isuzu. As production volume of each manufacturer grows, an efficient scale might be achieved, and hence there would be less incentive to maintain cooperative relationship among these engine

³ The promoted engine manufacturers had to increase local content every year from 20 percent in 1989 to 70 percent in 1998. From 1994, engine manufacturers had to use local cylinder blocks (casting), and local connecting rods (forging) and camshaft (casting) from 1996, cylinder head (casting) from 1997, and crank shaft (forging) from 1998. Main objectives of this incentive scheme were to deepen and upgrade the Thai autoparts industry to a higher level.

manufacturers. This example makes clear that collaboration was an economical alternative to comply with the local content regulation for engine and parts and the success of the rationalized policy to promote and upgrade the supporting industry.

With respect to the location of firms in automobile industry, IEs in the eastern provinces were quite successful in attracting car makers and part suppliers to agglomerate. Japanese corporate investment became concentrated in Chonburi, with auto makers such as Mitsubishi and its suppliers in Laem Chabang IE, Denso, Siam Toyota, and other part makers in the Chonburi IE, while Western automakers (AAT, GM, and BMW) invested in Rayong (Eastern Seaboard IE), followed by western part suppliers such as Visteon, TRW, and Dana. Some Japanese part makers also invested in these IEs to supply parts to western manufacturers. Significant growth in automobile projects has been realized in Chonburi and Rayong since the 1990s, which follows by newly establishment of part suppliers in the eastern region.⁴ Thus, it can be said that the eastern region of Thailand is becoming another major strategic location for Thailand automobile production (Poapongsakorn and Techakanont 2008).

However, since the 1990s, there has been significant growth in newly established part suppliers in the eastern provinces and some in Ayuthaya and Patumthani, located to the North of Bangkok. Table 4 shows that Bangkok has the largest number of automotive factories outside the IE, followed by the eastern region.⁵ This may be one

⁴ Locations in ESB were selected for many reasons: investment incentives (because these areas are in Zone 3), their proximity to port facilities (Laem Chabang), the proximity to part suppliers that were established previously in old IEs such as Lad Krabang, Chonburi, or some firms located outside IEs but on the Bangna-Trad road which provides easy access to their facilities, cheap prices and availability of land for creating supplier parks, and an abundant workforce (Lecler 2002).

⁵ Although there are more automotive factories outside the IEs, many of them are garage service operators and local parts suppliers. Most of the parts factories in the IEs are foreign-owned and relatively larger than those outside the IEs.

reason that influences the decision of multinational car makers to choose Thailand, particularly the eastern region, as part of their global production network (GPN).

Table 4: Location of Major Japanese Parts Suppliers in Thailand

Location	1969	1970-79	1980-89	1990-95	1996-98	Total
Bangkok	3	6	6	9	8	32
Samut Prakan	4	7	11	4	4	30
Chonburi	-	1	1	12	6	20
Rayong	-	-	-	4	16	20
Pathum Thani	1	1	8	4	1	15
Chachoengsao	-	-	3	3	2	8
Ayutthaya	-	-	-	5	2	7
Others	-	-	2	3	6	11
Total	8	15	31	44	45	143

Note: * The figures represent numbers of production bases in Thailand belonging to members of the Japan Auto Parts Industry Association (based on a survey of members in April 1999).

Source: Lecler (2002), Table 5, p. 808

3. REGIONAL AND GLOBAL INTEGRATION OF THAILAND'S AUTOMOTIVE INDUSTRY

Thailand's automotive industry has been gradually developed and ultimately become a part of the GPN of many assemblers. Fundamental reasons underlying this achievement are attributable to a series of rationalized policies to deepen the industry and Japanese

firms creating supplier networks.⁶ Mitsubishi and Auto Alliance started using Thailand as their export base in the mid - 1990s. In 2002, Toyota made an aggressive decision to use Thailand as a production base for its new Hilux VIGO, a part of the Innovative International Multi-purpose Vehicle (IMV) project that was launched in 2004, In 2005, Toyota became the largest exporter, with around 150,000 units. In 2010, accumulated production of Hilux VIGO reached 2 million units, more than half was for export market. Mitsubishi, Auto Alliance (Thailand), General Motors and Isuzu also expand their production base in Thailand as their export base (see Table 5). The Thai automobile industry has become an export-oriented one, and has been integrated into part of the global production networks of a number of models by many world manufacturers. This fact is confirmed by the rise of Thailand's export value and share of automotive products and parts during 1992 and 2008 (see Figure 4).

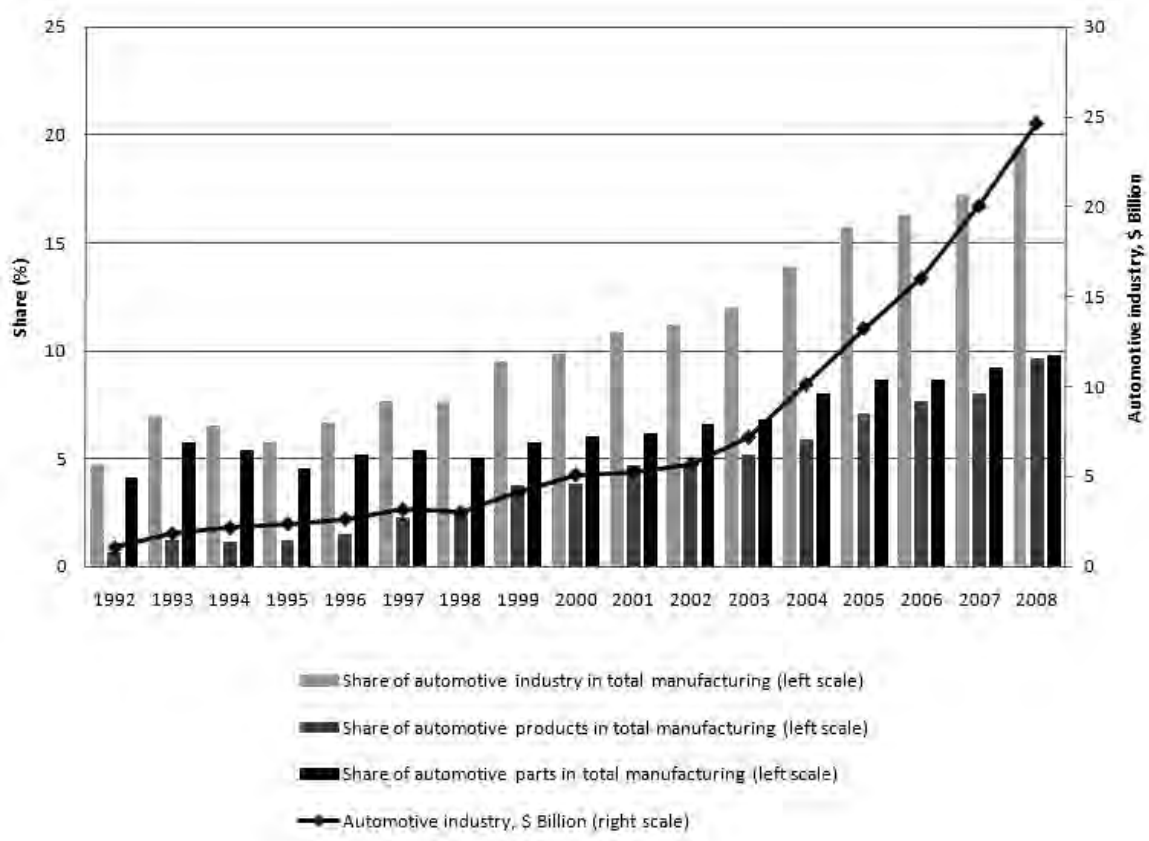
⁶ Since the end of 1990s, assemblers started launching new models for both the domestic and export markets. Many new models of pickup trucks were firstly launched in Thailand, such as Ford (new Ranger), Mitsubishi (Triton), Isuzu (D-Max), Mazda (BT-50), Nissan (Frontier), and Toyota (Hilux VIGO). In 2010, Nissan produces and exports new Nissan March, under the Eco car project, to Japan.

Table 5: Production Capacity and Export Plan from Thailand in 2008

Company	Year of announcement to use Thailand as export base	Annual production capacity (units)	Export in 2008	Main export market
Toyota	2002	550,000	312,900	Asia, Australia, New Zealand, Oceania
Mitsubishi	1990s	208,000	146,252 (2007)	EU, Africa, Middle East
Auto Alliance (Ford & Mazda)	1996	155,000	115,000	EU , Australia, New Zealand, Oceania
Isuzu	2001	220,000	61,048 (2007)	Middle East and EU
GM		160,000	24,583 (2006)	Australia, New Zealand, and Asia

Source: Compiled by the author, based on interview with companies, Thai Automotive Institute and Federation of Thai Industries.

Figure 4: Export Value and Share to Manufacturing Export during 1992 and 2008



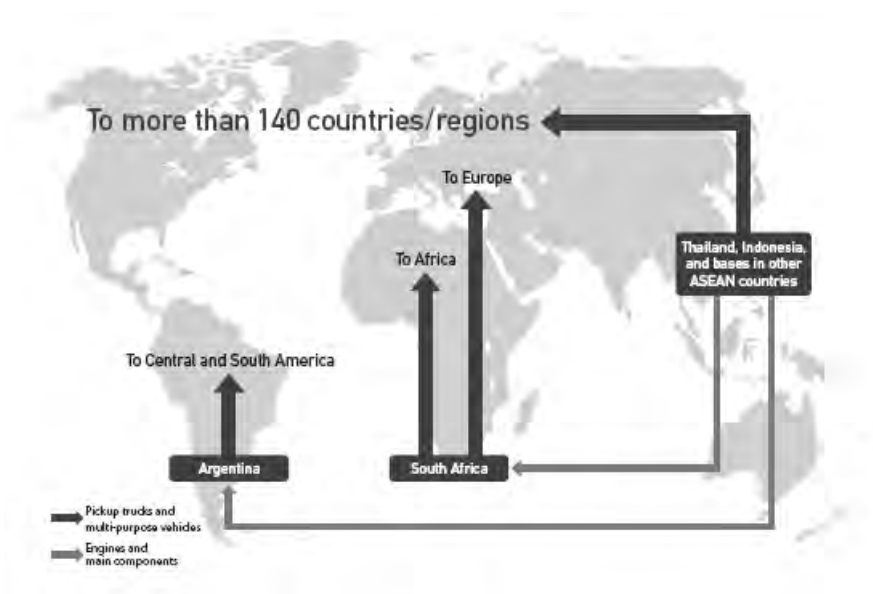
Source: Based on data compiled from Comtrade database.

Toyota IMV project is a good example of a GPN because production started at almost the same time at its four main production bases of Thailand, Indonesia, Argentina and South Africa. These bases will supply vehicles to countries in Asia, Europe, Africa, Oceania, Latin America and the Middle East.⁷ In addition, the project also includes the production of some major components in various locations, such as diesel engines in Thailand, gasoline engines in Indonesia and manual transmissions in

⁷ Although other assemblers also uses Thailand as an export base, their operation is different from Toyota in the sense that they concentrate their production network in Thailand but do not assemble the same model in other countries.

the Philippines and India, and their supply to countries in charge of vehicle production (see Figure 5). Japanese automakers produce different models in different countries, as well as components, and exchange through trade. Hence, we can expect that trade integration within the region and the world has been increasing. Among ASEAN countries, the ASEAN Industrial Cooperation (AICO) program was initiated to promote trade in intermediate inputs within the region, although AICO was replaced by AFTA from 2003. This regional free trade area helped promote product fragmentation in the region and ensured a deepening industrial base in Thailand.⁸

Figure 5: Toyota’s Production and Supply Network (IMV project)



Source: Annual Report 2005, Toyota Motor Corporation.

⁸ Thailand is expected to benefit considerably from the elimination of import duties on automobiles and parts under the ASEAN Free Trade Area scheme because it was selected as export bases by several carmakers. Moreover, ASEAN will benefit from trade integration, especially in parts and components export among members.

(http://www.nationmultimedia.com/2010/01/25/business/business_30121040.php, accessed on November 20, 2010).

The automotive industry requires thousands of parts and components, and assemblers prefer to source parts from suppliers located in proximity to their plant to minimize transportation costs. However, improvements in product development, production engineering activity and information communication technology allow carmakers to coordinate dispersed separation of their production processes along the value chain and locate them in the most efficient position in several countries. Thus, trade integration with plants, in the global production network, located in other countries should be increasing.

To assess the degree of regional integration, this study will disaggregate trade data to see the degree of intra-regional integration in this industry and calculate a simple index of intra-regional trade. Based on UN Comtrade data, in this paper, we categorize final products and parts in automotive sectors at the 3-digit level (the list is in Appendix 1). As shown in Table 6, during 1996 and 2008, composition of export automotive products (vehicles) and auto parts of ASEAN had been rising, while those of imports had been decreasing.

**Table 6: Composition of Automotive Products (vehicles) and Automotive Parts
Exports and Imports, 1996 and 2008**

(Percent)

Country/region	Automotive products (vehicles)				Automotive parts			
	Exports		Imports		Exports		Imports	
	1996	2008	1996	2008	1996	2008	1996	2008
ASEAN	0.59	1.94	2.76	1.84	2.19	3.37	7.20	5.42
Thailand	0.18	1.42	0.55	0.17	0.41	0.89	2.00	1.30
Indonesia	0.07	0.20	0.41	0.49	0.08	0.22	1.23	0.88
Malaysia	0.10	0.08	0.83	0.30	0.37	0.47	1.45	0.89
Philippines	0.01	0.02	0.48	0.21	0.09	0.18	0.43	0.12
Vietnam	0.00	0.02	0.00	0.17	0.00	0.10	0.00	0.49
ASEAN+3	21.01	24.60	6.84	5.26	18.76	21.57	16.59	16.72
Japan	16.89	16.18	3.51	1.11	14.37	8.81	2.98	2.77
China	0.31	2.42	0.33	1.90	1.24	7.16	2.88	6.41
Rep. of Korea	3.22	4.05	0.24	0.41	0.96	2.22	3.53	2.12
ASEAN+6	21.44	25.44	9.04	8.12	19.40	22.47	18.85	19.50
India	0.18	0.43	0.02	0.09	0.16	0.59	0.62	1.40
CER	0.25	0.41	2.18	2.76	0.48	0.31	1.64	1.39
EU	53.56	52.64	50.02	54.08	52.55	54.77	43.47	47.14
NAFTA	22.26	16.22	31.21	24.31	23.02	17.44	26.03	20.88
Mercosur+Chile	0.76	1.64	2.07	2.38	1.10	1.23	2.50	2.68
World	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
\$ billion	329.78	862.60	319.25	822.12	504.69	1,396.46	507.23	1,367.80

Source: Compiled from UN Comtrade database.

This suggests that automotive industry in ASEAN became more export of final products. Majority of parts and components are procured locally, while some parts are exchanged through intra-regional trade. Then, we calculate for intra- and extra-regional trade in vehicles and parts to see how Thailand integrates with ASEAN and the world, (see Table 7 and Table 8).

The results reveal that Thailand became export-oriented in automobiles, as the value of exports increased significantly, from 2.63 to 5.96 billion USD during 1996 and 2002, and increase to 24.7 billion USD in 2008. In 2008, Australia, Indonesia and Japan were top three destinations for Thailand automotive products. This was because the Japanese carmakers' strategy to use Thailand as their export for pickup trucks and to link with other production bases in Malaysia, Indonesia, the Philippines, and other ASEAN countries. In terms of imports, Thailand has strong linkage with ASEAN and Japan, although import value decreased from 11.87 to 7.41 billion USD, between 1996 and 2002, and then rose to 19.15 billion USD in 2008.

Table 7: Value of Thailand Automotive Industry Trade Integration (1992, 1996, 2002, 2008)

Exports		Exports: Automotive industry (\$ billion)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	2.25	0.45	0.03	0.78	0.14	0.07	3.29	0.76	0.13	0.16	3.52	0.07	0.16	1.02	0.84	0.02	6.55
	1996	5.90	1.00	0.13	2.20	0.43	0.32	7.88	1.30	0.40	0.28	8.39	0.18	0.32	1.54	1.15	0.08	12.98
	2002	6.29	0.99	0.45	1.75	0.56	0.37	9.84	1.99	1.11	0.45	10.95	0.30	0.80	2.76	2.04	0.10	18.70
	2008	22.19	3.04	7.17	4.93	1.76	1.41	32.13	5.36	3.14	1.43	38.20	1.83	4.25	7.73	4.94	1.14	63.91
Thailand	1992	0.27	-	0.01	0.04	0.01	0.01	0.61	0.31	0.003	0.02	0.62	0.001	0.01	0.17	0.15	0.004	1.04
	1996	1.02	-	0.05	0.12	0.11	0.13	1.63	0.52	0.05	0.04	1.68	0.01	0.04	0.37	0.30	0.03	2.63
	2002	1.58	-	0.27	0.27	0.19	0.14	2.58	0.74	0.18	0.09	3.09	0.06	0.45	0.96	0.46	0.06	5.69
	2008	7.07	-	2.36	1.57	0.90	0.65	9.89	2.09	0.55	0.18	13.53	0.51	3.13	3.00	1.33	0.82	24.70
ASEAN+3	1992	13.89	4.04	1.99	2.79	1.27	0.22	21.52	1.26	2.56	3.81	26.35	0.50	4.33	28.03	48.31	1.63	130.19
	1996	28.35	8.17	3.91	6.43	3.19	0.99	43.47	2.83	5.65	6.63	50.77	1.25	6.06	29.55	53.95	2.40	163.97
	2002	21.80	5.12	3.28	4.52	2.26	1.49	40.98	5.15	8.96	5.08	49.87	1.25	7.64	34.54	85.32	1.87	203.00
	2008	60.40	13.67	14.51	10.36	4.72	6.00	125.03	17.02	33.67	13.95	153.36	10.13	18.20	114.56	125.98	12.79	513.38

(continued)

Imports		Imports: Automotive industry (\$ billion)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	1.40	0.22	0.02	0.44	0.02	0.001	14.08	11.95	0.33	0.40	14.42	0.08	0.26	5.99	4.52	0.06	26.08
	1996	3.10	0.72	0.10	1.04	0.11	0.01	25.86	20.74	0.87	1.15	26.50	0.13	0.51	10.41	6.23	0.13	45.32
	2002	4.54	1.50	0.35	1.06	0.35	0.04	19.68	12.23	1.73	1.19	20.12	0.13	0.31	6.86	5.20	0.07	34.19
	2008	16.97	7.08	2.62	2.57	1.00	0.36	54.03	24.50	9.68	2.88	55.69	0.92	0.75	16.77	13.06	0.32	89.27
Thailand	1992	0.19	-	0.002	0.03	0.01	0.0001	4.09	3.74	0.06	0.10	4.14	0.01	0.03	1.29	0.41	0.003	6.07
	1996	0.49	-	0.02	0.15	0.07	0.002	8.08	7.20	0.17	0.22	8.18	0.02	0.08	2.29	0.98	0.01	11.87
	2002	0.76	-	0.13	0.27	0.20	0.02	5.09	3.92	0.27	0.15	5.14	0.02	0.03	1.20	0.67	0.01	7.41
	2008	2.68	-	0.72	0.84	0.53	0.16	13.74	8.69	1.69	0.68	14.02	0.16	0.12	2.80	1.54	0.06	19.15
ASEAN+3	1992	2.22	0.55	0.06	0.53	0.05	0.001	22.30	18.67	0.62	0.79	22.89	0.09	0.49	19.63	14.35	0.09	60.81
	1996	4.87	1.34	0.25	1.31	0.22	0.01	41.67	32.07	2.35	2.38	42.90	0.16	1.07	32.49	24.65	0.34	105.99
	2002	7.99	2.67	0.76	1.55	0.73	0.20	41.13	24.58	5.02	3.55	42.17	0.23	0.81	31.44	22.84	0.35	104.49
	2008	25.68	10.01	3.51	3.89	1.96	1.18	121.66	59.57	23.71	12.70	124.79	1.52	1.61	87.74	45.11	0.78	271.95

(continued)

Exports+Imports		Exports+Imports: Automotive industry (\$ billion)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	3.65	0.67	0.04	1.22	0.16	0.07	17.37	12.71	0.46	0.55	17.94	0.15	0.42	7.00	5.36	0.08	32.64
	1996	9.00	1.72	0.23	3.24	0.54	0.34	33.74	22.04	1.27	1.43	34.89	0.31	0.84	11.95	7.39	0.21	58.30
	2002	10.82	2.49	0.80	2.81	0.90	0.41	29.52	14.22	2.84	1.64	31.07	0.43	1.11	9.62	7.24	0.17	52.89
	2008	39.16	10.12	9.80	7.50	2.75	1.77	86.15	29.85	12.82	4.31	93.89	2.75	4.99	24.50	18.00	1.46	153.17
Thailand	1992	0.46	-	0.01	0.07	0.02	0.01	4.70	4.05	0.06	0.13	4.76	0.01	0.04	1.45	0.56	0.01	7.11
	1996	1.51	-	0.07	0.27	0.18	0.14	9.71	7.72	0.22	0.26	9.86	0.03	0.12	2.65	1.28	0.04	14.50
	2002	2.33	-	0.40	0.54	0.39	0.16	7.67	4.66	0.45	0.23	8.23	0.08	0.48	2.17	1.13	0.07	13.10
	2008	9.75	-	3.08	2.41	1.43	0.81	23.63	10.78	2.24	0.86	27.55	0.67	3.25	5.80	2.88	0.88	43.85
ASEAN+3	1992	16.11	4.59	2.05	3.32	1.32	0.22	43.82	19.93	3.18	4.60	49.23	0.59	4.82	47.66	62.66	1.72	191.00
	1996	33.22	9.51	4.16	7.74	3.41	1.00	85.13	34.91	8.00	9.01	93.67	1.41	7.13	62.04	78.60	2.74	269.95
	2002	29.79	7.79	4.04	6.06	2.99	1.69	82.12	29.72	13.97	8.62	92.04	1.48	8.44	65.97	108.16	2.22	307.49
	2008	86.08	23.68	18.01	14.25	6.68	7.18	246.70	76.59	57.38	26.65	278.15	11.64	19.81	202.30	171.08	13.56	785.33

Source: Calculated by the author based on UN Comtrade database.

Table 8: Share of Thailand Automotive Industry Trade Integration (1992, 1996, 2002, 2008)

Exports		Exports: Automotive industry (%)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	34.39	6.83	0.43	11.85	2.08	1.08	50.25	11.56	1.92	2.38	53.79	1.08	2.46	15.54	12.83	0.36	100.00
	1996	45.48	7.73	1.02	16.98	3.31	2.50	60.73	10.01	3.09	2.15	64.61	1.38	2.50	11.90	8.89	0.62	100.00
	2002	33.62	5.32	2.41	9.35	2.98	1.97	52.63	10.63	5.94	2.43	58.54	1.61	4.30	14.78	10.92	0.51	100.00
	2008	34.73	4.76	11.23	7.72	2.75	2.21	50.27	8.38	4.92	2.25	59.77	2.86	6.64	12.09	7.73	1.78	100.00
Thailand	1992	26.33	-	1.13	3.65	0.80	0.72	58.78	29.79	0.32	2.34	59.48	0.05	0.66	16.14	14.69	0.36	100.00
	1996	38.88	-	1.93	4.74	4.00	5.08	62.00	19.63	1.97	1.52	63.92	0.41	1.52	13.94	11.27	1.00	100.00
	2002	27.72	-	4.76	4.82	3.30	2.48	45.31	12.94	3.10	1.56	54.36	1.08	7.97	16.93	8.14	0.97	100.00
	2008	28.64	-	9.57	6.35	3.64	2.61	40.05	8.46	2.21	0.74	54.77	2.04	12.67	12.15	5.40	3.33	100.00
ASEAN+3	1992	10.67	3.11	1.53	2.14	0.97	0.17	16.53	0.97	1.97	2.93	20.24	0.38	3.33	21.53	37.11	1.25	100.00
	1996	17.29	4.99	2.39	3.92	1.95	0.60	26.51	1.73	3.45	4.05	30.97	0.76	3.69	18.02	32.90	1.47	100.00
	2002	10.74	2.52	1.62	2.22	1.11	0.73	20.19	2.53	4.41	2.50	24.57	0.62	3.76	17.01	42.03	0.92	100.00
	2008	11.77	2.66	2.83	2.02	0.92	1.17	24.35	3.32	6.56	2.72	29.87	1.97	3.55	22.31	24.54	2.49	100.00

(continued)

Imports		Imports: Automotive industry (%)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	5.37	0.86	0.06	1.69	0.08	0.00	53.98	45.81	1.27	1.53	55.29	0.32	0.99	22.95	17.33	0.22	100.00
	1996	6.83	1.58	0.22	2.30	0.24	0.02	57.05	45.76	1.92	2.54	58.47	0.29	1.13	22.96	13.75	0.28	100.00
	2002	13.26	4.38	1.03	3.10	1.02	0.13	57.56	35.77	5.06	3.47	58.84	0.37	0.90	20.06	15.21	0.21	100.00
	2008	19.01	7.93	2.94	2.87	1.12	0.40	60.52	27.44	10.84	3.22	62.39	1.03	0.84	18.79	14.63	0.36	100.00
Thailand	1992	3.16	-	0.03	0.52	0.19	0.00	67.45	61.64	0.93	1.73	68.19	0.17	0.57	21.19	6.74	0.04	100.00
	1996	4.14	-	0.14	1.23	0.63	0.02	68.12	60.67	1.43	1.87	68.92	0.14	0.67	19.28	8.25	0.09	100.00
	2002	10.23	-	1.71	3.62	2.70	0.21	68.74	52.92	3.63	1.96	69.34	0.23	0.38	16.24	9.01	0.14	100.00
	2008	13.97	-	3.74	4.37	2.78	0.84	71.73	45.39	8.83	3.53	73.23	0.86	0.64	14.63	8.05	0.29	100.00
ASEAN+3	1992	3.65	0.90	0.10	0.87	0.09	0.00	36.68	30.70	1.02	1.31	37.63	0.15	0.81	32.28	23.60	0.15	100.00
	1996	4.59	1.26	0.23	1.23	0.21	0.01	39.31	30.26	2.21	2.25	40.47	0.15	1.01	30.66	23.26	0.32	100.00
	2002	7.65	2.55	0.72	1.48	0.70	0.19	39.36	23.52	4.80	3.39	40.36	0.22	0.77	30.09	21.86	0.33	100.00
	2008	9.44	3.68	1.29	1.43	0.72	0.43	44.74	21.91	8.72	4.67	45.89	0.56	0.59	32.26	16.59	0.29	100.00

(continued)

Exports+Imports		Exports+Imports: Automotive industry (%)																
		ASEAN	Thailand	Indonesia	Malaysia	Philippines	Vietnam	ASEAN +3	Japan	China	Rep. of Korea	ASEAN +6	India	CER	EU	NAFTA	Mercosur +Chile	World
ASEAN	1992	11.20	2.06	0.14	3.73	0.48	0.22	53.23	38.93	1.40	1.70	54.99	0.47	1.28	21.46	16.43	0.25	100.00
	1996	15.43	2.95	0.40	5.57	0.92	0.58	57.87	37.80	2.18	2.45	59.84	0.53	1.44	20.50	12.67	0.36	100.00
	2002	20.46	4.71	1.52	5.31	1.71	0.78	55.82	26.88	5.37	3.10	58.73	0.81	2.10	18.19	13.69	0.32	100.00
	2008	25.57	6.61	6.40	4.89	1.80	1.15	56.25	19.49	8.37	2.82	61.30	1.79	3.26	16.00	11.75	0.95	100.00
Thailand	1992	6.54	-	0.19	0.98	0.28	0.11	66.18	56.99	0.84	1.82	66.92	0.15	0.59	20.46	7.90	0.09	100.00
	1996	10.45	-	0.47	1.87	1.24	0.94	67.01	53.22	1.53	1.81	68.01	0.19	0.82	18.31	8.80	0.25	100.00
	2002	17.83	-	3.03	4.14	2.96	1.20	58.56	35.55	3.40	1.78	62.83	0.60	3.67	16.54	8.64	0.50	100.00
	2008	22.23	-	7.02	5.48	3.26	1.84	53.89	24.59	5.10	1.96	62.83	1.53	7.42	13.23	6.56	2.01	100.00
ASEAN+3	1992	8.43	2.41	1.08	1.74	0.69	0.11	22.94	10.43	1.67	2.41	25.78	0.31	2.52	24.95	32.81	0.90	100.00
	1996	12.30	3.52	1.54	2.87	1.26	0.37	31.54	12.93	2.96	3.34	34.70	0.52	2.64	22.98	29.12	1.01	100.00
	2002	9.69	2.53	1.31	1.97	0.97	0.55	26.70	9.67	4.54	2.80	29.93	0.48	2.75	21.45	35.17	0.72	100.00
	2008	10.96	3.02	2.29	1.81	0.85	0.91	31.41	9.75	7.31	3.39	35.42	1.48	2.52	25.76	21.79	1.73	100.00

Source: Calculated by the author based on UN Comtrade database.

Based on UN Comtrade database, there exists asymmetry of intra-regional imports and exports of Thailand and ASEAN. Thailand, for instance, had a trade surplus in automobiles (final products), but recorded a trade deficit in autoparts. Although the automotive cluster in Thailand has been developed and local content for some specific models was very high, meaning that a large proportion of parts can be locally sourced, the trade deficit suggests that there exists product fragmentation in ASEAN, i.e., Thailand needs import parts from firms in the network of MNEs that are located in other countries. This study found that ASEAN and ASEAN+3 have become more integrated in parts and components trade, as indicated by an increase in the share of intra-regional imports and exports.⁹ This suggests that the region relies heavily on extra-regional exports in final products (CBUs) for its growth. Based on these findings, we may be able to say that in the past decade automotive and autoparts industries have been well developed and integrated within the ASEAN and ASEAN+3 region. This is a reaction of foreign firms to local government industrial and trade policies, and such a response was intended to improve their overall operative efficiency.

4. CONCLUSION AND POLICY IMPLICATIONS

This paper discussed the experience of Thailand's development in autoparts industry and intra-regional trade integration, with the main focus on the integration of Thailand with

⁹ Looking in detail, we found that Thailand has a trade surplus in automotive final products (vehicles) and the size of this surplus has increased significantly during 2002 and 2008, from surplus 1.91 billion USD to 10.85 billion USD. This was because of several new investment projects by various car manufacturers deciding to use Thailand as an export base. With regard to component trade, intra-regional trade (X+M) of autoparts among ASEAN members increased considerably during the period 1992, 1996, 2002, and 2008, which rose from 11.81 percent in 1992, to 16.38, 21.57, and 24.27 percent, respectively.

ASEAN and Asian countries. In East Asia, product fragmentation has tended to increase in the past decades, shown by the expansion of trade in parts and components. This has opened opportunities for development and industrialization. Furthermore, regional integration among East Asian countries has been enhanced due to industrial collaboration in the form of production and intra-industry trade and the proliferation of free trade agreements (FTAs).

Expansion of regional free trade agreements, with ASEAN as a center, such as ASEAN plus 3, enhances the level of productive integration. As in the case of Thailand automotive industry, the process requires government intervention to correct, remedy and support industrial deepening domestically by directing scarce resources to improving dynamic competitive advantage. The Thai government had clear policies and strategies towards key industries to promote and policy makers have always been flexible and aligned with the interests of multinational firms. Japanese assemblers were crucial in bridging productive resources among countries and facilitating industrialization as bring with them capital and technology into the host economies.

Although policies that Thailand used in the past were quite similar to those of other ASEAN-4 countries, two distinct combinations in policy sets might explain Thailand's achievement in the development of automotive industry. On the one hand, the past bureaucrat-dominated governments were aggressive in raising local content at the beginning and later on took a series of gradual steps to liberalize the automotive industry at the right time. On the other hand, the government never pursues a nationalistic discrimination policy against FDI (Poapongsakorn and Techakanont 2008). The latter might be the most important factor for foreign firms to expand their operations in Thailand.

Recently, intra-regional trade in Thailand automotive vehicles and components trade within ASEAN have been rising. Japanese carmakers have selected some locations in ASEAN to be their production and export hub and Thailand has become the production base for pickup trucks. This opens the opportunity for other countries to benefit from the fragmented process. Other carmakers seem to take the same path for their pickup trucks and small car projects (Eco car).¹⁰ Therefore, Thailand autoparts industry still has potential to grow, due to an increase in demand for new products. Trade integration in ASEAN+3 should be increasing and this opens opportunities for all ASEAN member countries to develop their automotive and autoparts industries.

Industrial development seems to follow the product cycle theory, such as Vernon (1966), in which the process starts with standardized products for domestic market (through import substitution policy). At the early stage of development, most of technology of the products (vehicles and parts) produced in Thailand were standardized and belonged to MNEs. Local firms have grown with little development of their technological capabilities. Nevertheless, trade and investment liberalization, i.e., export-oriented or outward-looking policies, generated positive effects to the development process, which in turn forced local firms to move up the technological ladder gradually.

Supporting industries in Thailand have been deepening and developed. Clear evidence of this is the production and export of new models of vehicles and pickup trucks at a very high local content level and the ability to supply higher technological

¹⁰ In 2008, BOI approved seven firms (Honda, Suzuki, Siam Nissan, Auto Alliance Thailand, Mitsubishi, Toyota, and Tata) under Eco-car project investment incentive. However, in 2010, only Nissan started production. Honda will commence its Eco car in 2011 while other firms will do so in the next two to three years.

products by Thai firms. Technological upgrading can be achieved by having technological licensing agreement or taking over some leading companies. The latter strategy is a short cut but it requires huge amount of capital. In 2009, Thai Summit Autoparts spent more than 10 billion Baht to take over Ogihara Corporation, the largest independent supplier of automotive press tooling to the world's car industry (Krungthep Thurakit, March 31, 2009). This was the biggest deal in history that a Thai part supplier purchased a Japanese company. It is expected that Thai Summit will be able to win new orders for new models launched in the next three years.

Findings in this paper offer some key lessons for other developing countries. Regional development and clustering should be promoted. Efficient logistic infrastructure is crucial to link firms in the supply chain together. Lower transaction costs and service link costs will improve firms' competitiveness. Target products might be those with high domestic demand, as it will help firms to benefit from economies of scale and learning-by-doing. Nevertheless, trade protection policies are no longer applicable, under the free trade regime. Therefore, government policies should turn to providing a supportive role, with a primary focus on ensuring macroeconomic stability, smooth labor relations, human resource development, and maintaining and enhancing technological infrastructure.

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Appendix 1: List of Automotive Products and Automotive Parts SITC Rev. 3

SITC (Code)	Products
	Automotive products (vehicles)
781	Motor cars and other motor vehicles principally designed for the transport of persons
782	Motor vehicles for the transport of goods and special-purpose motor vehicles
783	Road motor vehicles, n.e.s.
785	Motor cycles (including mopeds) and cycles, motorized and non-motorized; invalid carriages
	Automotive parts
712	Steam turbines and other vapour turbines, and parts
713	Internal combustion piston engines, and parts
714	Engines and motors, non-electric parts
716	Rotating electric plant, and parts
718	Power-generating machinery, and parts
731	Machine tools working by removing metal or other material
733	Machine tools for working metal
735	Parts, n.e.s.: for mach-tools
737	Metalworking machinery and parts
742	Pumps for liquids and parts
743	Pumps, air or other gas compressors and fans, and parts

SITC (Code)	Products
744	Mechanical handling equipment, and parts
746	Ball- or roller bearings
747	Taps, cocks, valves and similar appliances for pipes
748	Transmission shafts and cranks
749	Non-electric parts and accessories of machinery
784	Parts and accessories of the motor vehicles
785	Motor cycles and cycles
812	Sanitary, plumbing and heating fixtures and fittings
813	Lighting fixtures and fittings
82112	Seats of a kind used for motor vehicles
873	Meters and counters, n.e.s.
874	Measuring, checking, analysing and controlling instruments and apparatus, n.e.s.

Source: UN Comtrade database (SITC Rev.3).