Doctoral Thesis

Regional Value Chains and the Japanese Automotive Production Network in Southeast Asia

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Regional Value Chains and the Japanese Automotive Production Network in Southeast Asia

（日本企業によるASEAN自動車生産ネットワーク構築と地域ヴァリューチェーン(RVC)の変化）

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Abstract

The study focuses on one of the leading Japanese production networks in Southeast Asia, i.e. the automotive sector/industry. It explores the country's trade and industrial relations in this particular sector with its partners in the region, i.e. these five key ASEAN (Association of Southeast Asian Nations) countries: Indonesia, Malaysia, the Philippines, Thailand and Vietnam. Typically characterized by fragmented and vertically integrated production networks led mostly by Japanese firms, the region's automotive industry has developed in parallel with the host ASEAN countries evolving foreign direct investment (FDI) and automotive industrial policy schemes.

The study is an endeavor to comprehend changes of the Japanese automotive production networks in the region as a way to enquire the sector's regional value chains (RVCs). It does so by going into backgrounds and motivations of Japanese automotive lead firms –along with their suppliers, foreign affiliates/subsidiaries and local partners— in light of localizing and upgrading their production/manufacturing activities. It aims to: (1) discover significance of Japan automotive trade relations in the region characterizing the changes; (2) examine the subsequent production shifts to the region, the country's lead firms strategy in upgrading the embedded value chains, (3) address endeavors by firms and other relevant stakeholders in envisioning the sector's RVCs and the ensuing policy responses by ASEAN host governments.

The study finds that, during the past three decades, patterns of Japan trade in automotive products with East and Southeast Asian partners and its trends in value added have indicated dynamic changes of the country's automotive production network in the region. The changes are characterized by shifting trade patterns of

Japan-ASEAN in particularly automotive parts and accessories and passenger cars. The ensuing production shifts (which follow similar patterns) and the upgrading strategy performed by firms (as represented by Toyota Group) have resulted in solid localized production and regional supply chains in Southeast Asia. Driven by the Toyota ASEAN IMV (Innovative International Multi-purpose Vehicle) Project, firms carry on measures which reflect accumulated processes of localized production and regional supply chains. The processes are spanned across the value chains and have been developed through combined activities of both green and brownfield FDIs, regional procurement and supply chains, locally grown research and development (R&D) centers and reinforced subsidiaries and local partnerships.

Technical formation and technological capability resulted from the accumulated production and supply chains activities have also led to value chains upgrading within and along Toyota production network. Key areas of upgrading include manufacturing facilities and processes, product development, R&D and design, and marketing and after-sales services. It is under those key areas that offsetting RVCs for the ASEAN automotive sector is envisioned in light of specific value chains structures which rely on lead firms hierarchical network (such as in the case of Toyota), captive networks of 1st tier suppliers (such as in the cases of Denso and Aisin Seiki), relational networks (as performed through Toyota's local partners in ASEAN), modular networks (as performed by 2nd tier and lower tier local suppliers within Toyota, Denso and Aisin Seiki groups), and market network (as performed by Denso and Aisin Seiki subsidiaries in ASEAN). It is under these specific value chains structures that the ASEAN3 host governments are to adjust their FDI promotion and industrial development policy schemes on the automotive sector.

要旨

本論文は、東南アジアにおける主要分野における生産ネットワークの深化と拡大に関し、特に自動車産業に焦点をあてて ASEAN（東南アジア諸国連合）主要国であるインドネシア、マレーシア、フィリピン、タイ、ベトナムの 5 か国間との貿易と産業関係を中心にした研究である。この地域の自動車産業は主に日本の企業による直接投資を中心として発展しており、初期においては各国別に生産が開始されたが、現在までにより統合された生産ネットワークとして一般的に特徴づけられ、各国の産業政策の進化と共に進展してきた。

本論文は、地域のバリューチェーン（RVC）の観点から地域の日本の自動車生産のネットワークの変化に焦点を当てて日本の自動車企業の地域における生産/製造活動の改善の背景や動機に関してもより考察を試みている。特に（1）日本企業による自動車貿易関係の変化の推移、(2)一連の ASEAN 地域への生産シフトにおいて当該国で比較的先進的企業における地域ヴァリュー・チェーン（RVC）の構築と付加価値の拡大に関する戦略、および（3）それらの企業および関連企業や害関係者によるセクター別の RVC を踏まえた取り組み、また ASEAN 主催国政府による政策対応等の取り組みに関して詳細に焦点を当てている。

本研究は、過去 30 年間の東アジアおよび東南アジアのパートナーとの自動車の日本貿易のパターンと付加価値の動向による地域の自動車生産ネットワークのダイナミックな変化を明らかにする。この変化は日本と ASEAN 諸国の自動車関連部品生産の生産移転が地域における自動車の貿易パターンをシフトさせた。こうした生産シフトと（トヨタに代表されるような）企業によって行われた投資対象国での技術移転の進展と生産対象の拡大する方針に基づき進められ、現在では東南アジア全体の生産と地域サプライチェーンが確立されてきた。

本論文において特に代表的な企業として採り上げているトヨタのグローバル展開戦略に基づき ASEAN IMV（Innovative International Multi-purpose Vehicle）プロジェクトの推進により、ASEAN のバリューチェーン関連企業は、地域内での生産と地域サプライチェーンのプロセスの進展に沿って拡大して

きた。バリューチェーン全体にわたり、新規投資、既存企業への投資の双方とも両者の複合的な活動を通じて進展してきた。それは、地域における調達とサプライチェーン、開発（R&D）センター、地域子会社および地方パートナーシップへの支援体制の構築に基づくものである。具体的には技術水準の向上及び蓄積に基づいた地域での生産拡大とサプライチェーン形成はトヨタの生産ネットワーク全体、さらにグローバルなトヨタ生産ネットワークに沿った技術蓄積によって地域での生産活動全体のバリューチェーンの向上に寄与している。特に製造過程や生産設備、製品開発、R&D、デザイン、マーケティング、アフターサービスのすべてにわたり急速に進展してきた。

このように本論文では ASEAN 地域における自動車産業における地域でのバリューチェーン（RVC）の進展について特に注目されるべき変化を遂げていることを明らかにした。

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List of Abbreviations

AAF	ASEAN Automotive Federation
AFTA	ASEAN Free Trade Agreement/Area
AHM	Astra Honda Motor (Indonesia)
AEC	ASEAN Economic Community
AEM	ASEAN Economic Ministers
ALG	Algeria
AMEICC	AEM-METI Economic and Industrial Cooperation Committee
ASEAN	Association of Southeast Asian Nations
ASEAN3	ASEAN three member countries under study (Indonesia, Malaysia and Thailand)
ASEAN5	ASEAN five member countries under study (Indonesia, Malaysia, the Philippines, Thailand and Vietnam)
ASEAN6	ASEAN six member countries under study (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam)
ASEAN+3	ASEAN three key partners in East Asia (China, Japan and Korea)
ASCJ	Aisin Seiki Corporation Japan
ASSB	Assembly Services Sdn Bhd (Malaysia)
ATR	Austria
AUS	Australia
BHR	Bahrain
BLG	Belgium
BOI	(Government of Thailand) Board of Investment
BOL	Bolivia
BRA	Brazil
CAN	Canada
CARS	Comprehensive Automotive Resurgence Strategy (the Philippines)
CBU	Completely Built Up
CEPT	Common External Preferential Tariff (under AFTA/AEC scheme)
CHI	Chile
CHN	China
CKD	Completely Knock Down
CSIS	Center for Strategic and International Studies (Jakarta, Indonesia)
DFD-FVA	Foreign Value Added embodied in Domestic Final Demand
DNIA	Denso Indonesia
DNJP	Denso Japan
DNMY	Denso Malaysia
DNTH	Denso Thailand
DVA	Domestic Value Added (content of export)
ECU	Ecuador
EGY	Egypt
EPA	Economic Partnership Agreement
ERIA	Economics Research Institute for ASEAN and East Asia
FDI	Foreign Direct Investment
FFD-DVA	Domestic Value Added embodied in Foreign Final Demand
FRA	France
FTAs	Free Trade Agreements

FVA	Foreign Value Added (content of export)
GCC	Global Commodity Chains
GER	Germany
GPN	Global Production Network
GPNs	Global Production Networks
GPS	Global Production Sharing
GSC	Global Supply Chains
GVC	Global Value Chain
GVCs	Global Value Chains
HGR	Hungary
HIDA	The (Japan) Overseas Human Resources and Industry Development Association
HK	Hong Kong
HMMI	Hino Motors Manufacturing Indonesia
HRD	Human Resource Development
HS	Harmonized System (of 2 to 8 digits code of traded goods used under UN Comtrade database)
IDE-JETRO	Institute of Development Economics-JETRO
IDN	Indonesia
IDR	Indonesian Rupiah
IFCs	Institutions for Collaborations
IIT	Intra-Industry Trade
IJEPA	Indonesia-Japan Economic Partnership Agreement
IMV	Innovative International Multi-purpose Vehicle (Toyota)
IRQ	Iraq
ISEAS	Institute of Southeast Asian Studies
ISI	Import-Substituting Industrialization
ITA	Italy
JADA	Japan Automobile Dealers Association
JAMA	Japan Automotive Manufacturer Association
JARI	Japan Automobile Research Institute
JETRO	Japan External Trade Office
JICA	Japan International Cooperation Agency
JJC	Jakarta Japan Club
JOR	Jordan
JPN	Japan
JPY	Japanese Yen
KIIC	Karawang International Industrial Center (Indonesia)
KNY	Kenya
KOR	Korea
KSA	Kingdom of Saudi Arabia
KWT	Kuwait
LAO	Laos
METI	(Government of Japan) Ministry of Economy, Trade and Industry
MEX	Mexico
MFN	Most Favored Nation
MHI	Mitsubishi Heavy Industry Ltd
MMC	Mitsubishi Motors Corporation
MNCs	Multinational Companies
MPV	Multi Purpose Vehicle

MYA	Myanmar
MYS	Malaysia
NAP	New Automotive Policy (Malaysia)
NEP	New Economic Policy (Malaysia)
NGR	Nigeria
NIS	National Innovation System
NLD	the Netherlands
NPD	New Product Development
NRI	Nomura Research Institute
NZ	New Zealand
ODA	(Government of Japan) Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OECF	(Government of Japan) Overseas Economic Cooperation Fund
OEMs	Original Equipment Manufacturers
OHQs	Operational Headquarters
OMN	Oman
PAN	Panama
PER	Peru
PHI	the Philippines
PIS	ASEAN Priority Integration Sectors
POLMAN	(Indonesia's Astra Group) Polytechnics of Manufacture
PTSC	PT Sugity Creatives (Indonesia)
QTR	Qatar
R&D	Research and Development
RD&D	Research, Development and Design
RPNs	Regional Production Networks
RVCs	Regional Value Chains
SA	South Africa
SCM	Supply Chain Management
SGP	Singapore
SITC	Standard International Trade Classification (used under OECD-WTO TiVA Database)
SMC	Sittipol Motor Company (Thailand)
SMEs	Small and Medium Enterprises
STM	Siam Toyota Manufacturing Co Ltd (Thailand)
SUV	Sport Utility Vehicle
SWE	Sweden
TAI	Thailand Automotive Institute
TAM	Toyota Astra Motor (Indonesia)
TAT	Toyota Autobody Thailand
TAW	Toyota Auto Works (Thailand)
T&C	Textile and Clothing
THA	Thailand
TiVA	(OECD-WTO) Trade in Value Added
TMC	Toyota Motor Corporation
TMMIN	PT Toyota Motor Manufacturing Indonesia
TMT	Toyota Motor Thailand Co. Ltd.
TNGA	Toyota New Global Architecture
TPS	Toyota Production System
UAE	United Arab Emirates

UDMI	United Development Motor Industry (Thailand)
UK	United Kingdom
UMW	United Motor Works (Malaysia)
UMWT	UMW Toyota Motor (Malaysia)
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USD	United States Dollar
VNM	Vietnam
WITS	(World Bank) World Integrated Trade Solutions
WTO	World Trade Organization
YMN	Yemen

Introduction

The study[1] endeavors to understand dynamic changes in contemporary Southeast Asian production networks, typified in the case of automotive[2] sector/industry[3], by overseeing central roles and significant contribution of Japanese automotive firms in the networks. Selected cases on Toyota, Denso and Aisin Seiki's operation in the region are presented to highlight firm's strategies in upgrading and localization of production in light of anticipating the much-aspired regional value chains (RVCs). Upon conducting such a micro/firm-level assessment, in addition to its macro-level trade setting analysis, the study offers an outlook for relevant stakeholders in their efforts to move up the value chains along the automotive sector's production networks and supply chains (both at local or national and regional levels).

In the realm of international political economy, the study is part of enduring efforts to understand how economic regionalization and trade integration processes correlate to the emergence and development of regional production network[4]. As stated earlier, it attempts to comprehend dynamic changes in East and Southeast Asian production networks which affect how trade and industrial relations have been

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[1] The study is conducted under supervisory of Professor Hideaki OHTA (as chief dissertation adviser)

[2] The study defines automotive sector/industry as an economic area covering a sector or an industry that comprises a wide range of companies or firms along with their supply chains as well as other organizations involved in the design, development, manufacturing, marketing and selling of motor vehicles. In terms of goods traded within the sector and/or industry, it is mainly categorized under the UN Comtrade HS 87 (vehicles other than railway, tramway) and the OECD-WTO SITC categorized under C34T35 (transport equipment).

[3] The study uses the terms "sector" or "sectors" and "industry" or "industries" inter-changeably, i.e. to show crosscutting terms and linkages between the two. However, sectors are mainly referred in the study's macro-level analysis (presented in Chapter 2) where categorical or sectoral classification is used, and industries are mainly used in its micro-level analysis (presented in Chapter 3 and 4) where discussions and elaborations are linked to the notion of industrial development and policy.

[4] Works such as by Borrus, Ernst and Haggard (2000), Mitsuyo and Kimura (2003, 2005 and 2007), and Kuroiwa and Heng (2008) are among examples with particular referrence to Asian or East Asian cases since waves of Japanese foreign direct investments (FDIs) swept to Southeast Asia relating to Yen sharp appreciation (the so-called *Endaka Fukyo* or 円高不況) in 1995 and 2008. We shall return for more elaborate discussion on this in Chapter 1 Background of the Study.

carried out among participating countries. Automotive sector/industry is particularly referred in this study where Japan (as the key player in the industry and home for a large amount of automotive lead firms) serve as a case in point along with the country's principal ASEAN (Association of Southeast Asian Nations) partners, i.e. Indonesia, Malaysia and Thailand (hereafter called as ASEAN3).

Beyond the 2008 global financial crisis, as regional automotive production and sales gain momentum and despite its high potential value-added to be captured in the industry, gaps and imbalanced industrial development maturity however exists among participating countries. Major concern is particularly on how value added is captured and in terms of who gains more and less within the networks. In line with a previous work by Kuroiwa and Heng (2008) which emphasized the need for increasing roles of domestic suppliers for more value added, preliminary findings of the study show that inter-regional nexus (i.e. between Japan and its key ASEAN partners) generates more value-added than the intra regional one (within ASEAN or among key ASEAN member countries)[5].

In an attempt to grasp such dynamic changes which implicate to industrial gaps and imbalances, the study offers global value chain (GVC) and global production network (GPN) frameworks that have extensively been introduced and applied in comprehending Southeast and East Asia production networks and commodity chains during the past decade (IDE JETRO and WTO 2011, UNCTAD 2013). One specific attention has been given to the manufacturing industries following achievement of the two regions' automotive and electronics sectors integration to the global networks (Humphrey and Memedovic 2003, JAMA 2013, Sturgeon and Kawakami

[5] The study further elaborate such imbalances as indicated in the trade pattern and trends in value added in Chapter 2. Based on macro-analysis, further details on the empirical evidence are presented. See also Arfani (2015: pages 105-117) and Arfani (2017: pages 88-97) for the preliminary findings and general description on the phenomena.

2010, Ueki 2013). These two sectors are considered as "success stories" given relatively significant roles of domestic suppliers and subsidiaries in value addition activities taken by Japanese lead firms (Kawakami 2008, Kuroiwa and Heng 2008). Southeast Asian countries participation in the GPNs is linked to their East Asian neighbors (i.e. the so-called ASEAN+3: China, Japan and Korea) who are home for lead firms operating mostly under the region's production networks[6].

The concerns nonetheless remain of whether the existing regional value chains and production networks (with specific reference to the automotive sector) have generated equal development processes among participating countries (as indicated by Oikawa 2008), integrated or coordinated national and regional development policy, especially in the context of advancement of the current industrial clusters (as asserted by Kuroiwa and Heng 2008) and adequate conceptual as well as practical understanding on the mechanics of contemporary international production and distribution networks (as emphasized by Kimura and Obashi 2010). Put it in the value chains governance framework, the questions refer to the relationships (or collaborations) among relevant stakeholders involved in the network (lead firms, suppliers, local partners and subsidiaries, small and medium enterprises (SMEs) and

[6] Share of East and Southeast Asia in the world manufacture trade, as a result, has increased significantly during the past 25 years. East Asia's manufacture trade export rises from 28.3% (in 1992-3) to 35.1% (in 2009-10) and its manufacture trade import rises from 21.7% (1992-3) to 25.7% (2009-10), while Southeast Asia's manufacture trade export has almost doubled, from 3.5% (1992-3) to 6.3% (2009-10), and its manufacture trade import has slightly down from 6.2% (1992-3) to 5.7% (2009-10) (Athukorala and Kohpaiboon 2013). Pioneered by Malaysia and Singapore, the region participation in GPNs dates back to the 1970s, especially in the "network products" (parts and components, and final assembly traded within production networks) which now account for almost two thirds of the merchandise exports of Singapore, Malaysia and the Philippines, almost half those of Thailand, and smaller but still significant share for Indonesia. Share of the region's parts and components export has doubled from 22.7% (1992-3) to 52.5% (2011-12), and its import has also increased from 36% (1992-3) to 47.3% (2011-12). However, in the final assembly, Southeast Asia export share has declined quite significantly from 34.1% (1992-3) to 19.5% (2011-12), and its import share has dropped slightly from 18.4% (1992-3) to 16.3% (2011-12). Growing importance of Southeast Asian countries as suppliers of parts and components to final assembly activities within China-dominated production network needs to be pointed out, especially when it is compared with corresponding data of China. Over 22% of parts and components imports (2011-12) to China originated from Southeast Asia, up from 12% (1992-3) (Athukorala 2015).

the regulatory or governmental institutions) that affect how capital, profit, labor, technology and tasks are evenly distributed across the network and undertaken efficiently by related stakeholders as to give even more incentives for them to stay put and sustained in the network.

Meanwhile, despite fortifying trends in the past decade, trade in goods relating to automotive (as indicated intra-regionally among ASEAN6, i.e. Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam, and inter-regionally between Japan and ASEAN6) reflects concerns on unequal industrial development processes/levels among participating countries, lacks of coordination and detached national and regional policy of industrial development, and inadequate comprehension among related stakeholders on the networks towards existing regional production networks (RPNs) and its functioning RVCs. Responses of relevant stakeholders in the networks beyond the lead firms (such as their 1st tier suppliers, local partners and subsidiaries, lower tier local suppliers, the ASEAN3 host governments and other supporting agencies/institutions) to the dynamic changes in the networks need to be apprehended to map out mechanics of the sector's RPNs and hence the sector's RVCs.

Considered as one of the ASEAN best practices in RVCs, automotive sector is among the association's priority integration sectors (PIS)[7]. Despite the insignificant advantage in terms of promoting intra-regional trade, overall performance and trade patterns of PIS exported-goods within ASEAN have been dynamic with surpluses on the horizon (ASEAN 2015). The automotive sector, in particular, has been the most

[7] ASEAN PIS is the association's sectoral integration initiatives concluded in 2004 through the signing of "ASEAN Framework Agreements for the Integration of Priority Sectors" accompanied by a roadmap for each identified sector. It includes the following 11 original sectors: electronics, e-ASEAN, healthcare, wood-based products, automotive, rubber-based products, textiles and apparels, agro-based products, fisheries, air travel and tourism. An additional sector, i.e. logistics services, was added as the 12th PIS in 2006 (ASEAN Integration Report 2015).

dynamic one since the beginning of 2000s with export growth averaging 29 percent a year between 2000 and 2004 worth USD10.8 billion (Wattanapruttipaisan 2008, p.71). By then, as noted by Hamzah (2012), automotive trades among ASEAN3 expanded significantly due to stiff and increasing competition in the automotive markets in the three countries. Global automotive manufacturers or OEMs (original equipment manufacturers), including especially the Japanese ones, saw the need to gain from the AFTA schemes by having more intra-firm (thus intra-regional) trade both in vehicles (passenger cars, vehicles for the transport of goods, and public type cars) and automotive parts and accessories.

Research Questions

The study aims at addressing the following three sets of questions against such a background:

1. What are major contemporary changes characterizing Japanese automotive production network in Southeast Asia? How do the country's trade relations with ASEAN countries in automotive sector highlight the changes?

2. How do production shifts and strategy of Japanese lead firms (along with their suppliers, local partners and subsidiaries) drive further local production in the host ASEAN countries and signify upgrading efforts in the region's automotive value chains?

3. How have regional value chains (RVCs) in automotive sector been envisaged by firms and other related stakeholders in the Japan-ASEAN automotive production network? How do the host ASEAN governments respond to the efforts? What are policy lessons learned for the host governments and other relevant stakeholders in the region's automotive value chains?

Objectives of the Study

The study elaborates changes in Japanese automotive firms production networks in Southeast Asia by highlighting trade patterns and trends in value added in goods relating to automotive sector, i.e. particularly between Japan and ASEAN3 countries (Indonesia, Malaysia and Thailand). It aims at identifying regional value chains and the implications that are resulted from such changes in the production network, i.e. particularly on production shifts and upgrading strategy of firms (along with their suppliers, local partners and subsidiaries). The study is also to offer an outlook on how strategies to move up the value chains should be anticipated especially by host ASEAN3 governments through their FDI promotion and industrial development policy as these countries respond to the changes.

Upgrading strategies of firms are to be elaborated to obtain updates on changes in the network for specific cases of Toyota, Denso and Aisin Seiki operation in the ASEAN3 countries. FDI promotion and industrial policies by ASEAN3 host governments that are oriented towards upgrading and localization of production are to be elucidated in order to highlight key policy issues. The study thus proposes an outlook for relevant stakeholders in their efforts to move up the value chains along the automotive sector's production networks and supply chains (both at local or national and regional levels).

In light of regional economic integration schemes endeavored under ASEAN priority integration sectors to which automotive sector is referred, the study is also an attempt in making sense of trends in the region's automotive value added as inseparable part of changes in the region's production network which have been mostly led by Japanese firms. Presentation on the cases of Toyota, Denso and Aisin Seiki signify micro-level and more detailed elaboration of actual processes of the regional automotive production network representing typical Japanese firms operation in the region. Such a micro-level elaboration is complementary to (and is useful tool for gauging) the trade activities which are important elements in the functioning of supply chains and production network.

Research Methodology and Methods of Analysis

Making an effort to correlate a specific phenomenon in the realm of international political economy (i.e. regional economic integration) with recent changes in regional production network (of particularly automotive sector), the study focuses on the following phenomena, concepts, variables, indicators/parameters to be analyzed both at the macro and micro levels of analysis. With such a methodology, the study proposes a conceptual framework to be elaborated further in Chapter 1 funneling towards the core arguments of the study. On the details of methodology and methods of analysis of the study, please refer to Table A.1 (available in Annexes-Annex 2).

Phenomena, Concepts and Variables

The first phenomenon to be addressed in the study is production networks operating at a regional level which is considered to be an essential part of regional economic integration (or economic regionalization) processes. Japanese automotive production network in Southeast Asia is selected as a case representing the leading industrial network along with its ASEAN partners. This particular phenomenon is observed through the concept of global production network (GPN) and its derived concept at regional level, i.e. regional production network (RPN). Based on these two concepts, changes in the production network are explored through trade relations between Japan and its Southeast Asian key partners in automotive-related goods. At macro-level, the analysis attempts to discover empirical evidence of the changes in network, especially in terms of trade patterns and trends in value added.

The second phenomenon relates to the localization of production that signifies upgrading efforts by Japanese automotive firms in 3 (three) key host countries in the region (i.e. the ASEAN3: Indonesia, Malaysia and Thailand). Concepts to be utilized are global value chain (GVC) and its derivative notion of regional value chain (RVC). Via these two concepts, strategy of firms (lead firms, automotive manufacturers, or OEMs/original equipment manufacturers) along with their suppliers, local partners and subsidiaries (and other relevant stakeholders) are investigated to identify efforts to upgrade along their supply chains at firm level.

The third phenomenon corresponds to the notion of automotive being as one of the ASEAN RVCs best practices. Concepts of RVC and upgrading in the value chains are utilized by offering methods of industrial cooperation and its policy implications. Assessment is made by, first of all, recapping upgrading activities at firm level, i.e. to go beyond the "smiley curve" explanation on production, marketing and sales, and technological innovation strategies. Beyond firm level, exploration on upgrading activities is conducted by assessing methods of industrial cooperation by non-firm stakeholders, i.e. how industrial collaborations (through inter-sectoral upgrading) are conducted in the ASEAN3 automotive industry and how the Japanese automotive hierarchical network affects the collaborations. And finally, the study is also to identify policy implications of value addition activities, particularly in the areas of linkages of FDI promotion and industrial policy, shared platform of HRD and RD&D schemes, and regional cooperation scheme.

Macro-Level Analysis

As previously mentioned, macro-level analysis is offered to explore the first phenomenon on the production network functioning at regional level with specific reference to the Japanese automotive production network in Southeast Asia. Three indicators are suggested, i.e. shares of East and Southeast Asia in world manufacture trade (to show overall changes in the network), significance of trade in goods relating to automotive (to highlight intra and interregional[8] trade relations/patterns), and significance of trends in value added (to feature intra and interregional value added-ness propensities). Goods to be analyzed fall under the UN (United Nations) Comtrade and the World Bank's World Integrated Trade Solution (WITS) HS[9] 87 (vehicle, other than railway and tramway) for the trade pattern and the OECD-

[8] Intraregional trade relations cover trade among ASEAN6 countries, i.e. Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam, whilst interregional trade relations cover trade between ASEAN6 and the ASEAN+3 countries (China, Japan and Korea).

[9] HS stands for Harmonized System. It is a 2 up to 8-digits code used as tariff nomenclature that is internationally standardized system of names and numbers to classify traded products. It is used in the UN Comtrade and World Bank WITS database statistics to which the study referred to and employs for the trade patterns analysis.

WTO (Organization for Economic Cooperation and Development-World Trade Organization) Trade in Value Added (TiVA) SITC[10] C34T35 (transport equipment) for the trends in value added.

Micro-Level Analysis

At the micro-level, the study centers its analysis on the exploration of transfers and movement of products within OEMs' supply chains and production network. It also explores strategic responses by firm and the host governments as they deal with the changes in the network. The analysis aims at examining value chains upgrading at firms and beyond firms levels as firms and other related stakeholders envisage for regional value chains (RVCs) in the automotive sector. The policy implications are also assessed in terms of ASEAN host governments' policy schemes on FDI promotion and automotive industrial development. In conducting micro-level analysis, in-depth interviews, documentary surveys and observatory fieldworks are employed as data collecting techniques. Series of research fieldworks had been arranged during the study[11]. The collected data are then investigated via content analysis and case studies techniques[12].

[10] SITC stands for Standard International Trade Classification. It is a classification of traded goods utilized to categorize the exports and imports of a country to enable comparing across years and different countries. It is used in the OECD-WTO TiVa Database to which the study referred.

[11] Five consecutive series were settled and co-funded under the Government of Indonesia's Ministry of Research and Higher Education *(DIKTI)* Scholarship and the Ritsumeikan University's *Kokusaiteki* Research Fund between the year of 2014 and 2017. Series include fieldworks in: (1) Indonesia (Spring and Singapore (late Fall 2015-16), and (5) Indonesia, Malaysia, Thailand and Singapore (late Fall 2016-17). For the complete lists of interviewees, documentary, observatory notes and minutes of in-depth interviews, see in Reference and Annexes.

[12] Cases selected are Toyota Motor Corporation or TMC (representing Japanese lead firms strategy), Denso Corporation or DNJP and Aisin Seiki Corporation or ASCJ (representing 1st tier supplier firms strategy).

Proposed Arguments

The following arguments[13] are offered to address the research questions previously specified. Specific patterns of trade and trends of value added in key automotive traded products between Japan and its ASEAN partners characterize changes of the Japanese automotive production network in Southeast Asia. The changes are driven mostly by intra industry trade where parts and components are procured and transferred along the supply chains of leading Japanese automotive firms which, in turn, confirm major production shifts of Japanese firms manufacturing activities to the region.

Such production shifts has resulted in deepened localization of production and upgrading activity. Production shifts and localized upgrading strategy of Japanese automotive firms (exemplified by Toyota case in Southeast Asia) have deepened localization of manufacturing at their sites located in the host Southeast Asian countries. Centered around the Toyota ASEAN IMV (Innovative International Multi-purpose Vehicle) Project, firms operated under Toyota production network and value chains in the region have managed to go through measures which reflect accumulating processes of localized production and regional supply chains.

Offsetting region-wide automotive value chains –which has long been aspired as part of ASEAN RVC best practices— is subject to upgrading attempts in the existing value chains. The Toyota case represents a value chain structure in the region's automotive production network that is characterized by typical hierarchical networks with a distinctive "skewed" smiley curve indicating both locational/spatial

[13] The proposed arguments are based on a conceptual framework (elaborated in the next Chapter 1) on regional economic integration, global value chain (GVC), global production network (GPN), GPN 1.0 and GPN 2.0, and value chains upgrading.

and distributional structures. Under such structures, ASEAN host governments are to adjust their FDI promotion and industrial development policy schemes in the sectors relating to the automotive industry. Cases from ASEAN3 governments reveal different responses and policy schemes where Indonesia presents domestically biased policies, Malaysia tends to have split vision and Thailand endeavors to immerse its policies for moving-up the value chains.

Details of the proposed arguments are presented in line with the following three broad topics of the study:

1. Changes in Production Network

Patterns of Japan trade in automotive products with its Southeast Asian partners indicate dynamic changes of the country's automotive production network in the region which are mostly driven by intra industry trade (IIT) where parts and components are procured and transferred along the supply chains of its automotive lead firms. Patterns of trade in key automotive products (i.e. automotive parts and accessories, passenger cars, vehicles for the transport of goods and public transport type motor vehicles) also reflect major shifts of Japanese lead firms' production and manufacturing facilities to the region.

Overtime (1988-2016), by focusing on Japan-ASEAN3 (Indonesia, Malaysia and Thailand) trade nexus, the study found that trade in automotive parts and accessories are valued much higher (i.e. by four times on average) than the one in passenger cars. Overall trade patterns in automotive parts and accessories reflect ASEAN3 reliance on specific products/parts of gearboxes and bodies/cabs, while at the same time ASEAN3 reliance on other varieties of parts and accessories tends to decrease. Trade value in gasoline engine type passenger cars of 1500-3000cc tends to shrink although the figure shows that overtime this type of passenger cars is the most traded one between Japan and ASEAN3. Trade pattern in passenger cars is shifted towards gasoline engine type cars of 1000-1500cc indicating increasingly importance of this specific type of cars (along with diversification of parts and components available at or adjacent to local manufacturing sites).

Overtime (1995-2011), trends in value added of Japan trade in automotive-related products with East and Southeast Asian partners are characterized by value added that is mostly created within Japan automotive domestic industry. Japan captures its value added much more domestically than internationally. It is indicated in Japan's domestic value added embodied in foreign final demand (FFD-DVA) which is much higher (i.e. by five times on average) than its foreign value added embodied in domestic final demand (DFD-FVA). Japan main source of its FFD-DVA is China, whereas within ASEAN its main sources are Thailand, Indonesia and Malaysia. Gains from value added (both in terms of DVAs and FVAs) in Japan trade in East and Southeast Asia have been captured from inter-regional nexuses, while gaps have resulted from mostly intra-ASEAN ones.

2. Production Shifts, Localization of Production and Upgrading

Referring to the empirical findings at the macro-level (as briefed in the proposed argument number 1), the study argues that production shifts and strategy of Japanese lead firms (as represented in the cases of Toyota, Denso and Aisin Seiki) have resulted in deepened localization of manufacturing at their sites located in the host Southeast Asian countries. Centered around on the so-called Toyota ASEAN IMV

(Innovative International Multi-purpose Vehicle) Project, these three firms (Toyota, Denso and Aisin Seiki) manage to go through the following measures that reflect accumulating processes of localized production at local sites (especially in ASEAN3 and more recently in the Philippines) under shared regional supply chains and production network. The processes are spanned across the value chains that have been developed through combined activities of FDIs (both green and brownfield ones), regional procurement and supply chains, locally developed R&D centers and reinforced subsidiaries and local partnerships.

Resulted from deepened localization of manufacturing processes and production shifts, those accumulating production and business activities of Toyota and Denso along with their subsidiaries and local partners in Southeast Asia have led to value chains upgrading within and along Toyota production network. Areas of upgrading include manufacturing facilities and processes, product development, research and development (R&D) and design, sales, after-sales and after-market activities. In the case of Toyota, full automation and robotics are applied in the newer plants, semi automation techniques are applied for the existing facilities and tools. Whilst in the cases of Denso and Aisin Seiki, semi automation and robotics are applied in the existing plants.

Toyota ASEAN IMV Project serves as one of global major platforms and has led to enhanced product specification and progressive vehicle design engineering at local manufacturing sites (with more locally-developed car specification and types). In line with the project, Denso manufactures module electronics automotive products/parts and components to be supplied to Toyota and other OEMs. These module products are more and more relied on standards, engineering design and specified needs being developed and manufactured by Denso, leaving rooms for product development in the hands of Denso R&D and Design team.

Toyota's R&D and Design facility has been set up adjacent to Toyota Thailand manufacturing plants and facilities, in collaboration with local institutions, and being utilized internally for information and staff exchanges among Toyota subsidiaries and partners in Southeast Asia. Denso's in-house engineering design facilities are available inside plants or manufacturing sites managed by each Denso subsidiary in ASEAN. Although post-production activities have been the areas of expertise conducted by Toyota local partners, these areas have also been subject to collaboration involving not only Toyota as a lead firm, but also its manufacturing subsidiaries, especially in Thailand and Indonesia (i.e. as they directly or indirectly involve in marketing, such as for commercial packages, merchandises, brand management, and after-sales activities, such as for educational purposes, fans clubs activities and research), particularly in the past 15 years. Denso's after-market sales which valued substantially have driven the company to conduct bold marketing activities and brand management among Denso subsidiaries in ASEAN, i.e. in collaboration with Toyota local partners as the main users/clients of after-market parts and components (often as the sole agent or dealer).

3. ASEAN Automotive RVCs and Policy Outlook

The study argues that offsetting a region-wide automotive value chains (as envisioned by ASEAN Economic Community/AEC scheme) are subject to upgrading attempts in the existing value chains. Cases of Toyota, Denso and Aisin Seiki represent a value chain structure in the region's automotive production network that is characterized by typically hierarchical networks performed by both firms. Toyota (hereafter called as Toyota Motor Corporation or TMC) serves as a lead firm in hierarchical relations towards Denso (hereafter called as Denso Corporation or DNJP), Aisin Seiki (hereafter called as Aisin Seiki Corporation or ASCJ) and other 1st tier (and some 2nd tier) suppliers and TMC subsidiaries in the region characterized by high-level complexity of intra and inter-firm transactions.

DNJP/ASCJ similarly serves as a lead firm in hierarchical networks with its subsidiaries in the region. Other types of networks[14] (captive, relational, modular and market) have also been existed where DNJP/ASCJ performs captive ones as it structurally serves as a captive supplier of TMC, and where DNJP/ASCJ subsidiaries in the region serve also as captive suppliers of TMC subsidiaries and its local partners in the region. Relational networks persist where TMC local partners serve as a local lead firm for 2nd tier and lower level suppliers (local SMEs). Modular network exists in the case of 2nd tier or lower tier suppliers subcontracting to other local suppliers (in some cases of raw/basic materials suppliers). And finally, a case on market network persists where DNJP/ASCJ subsidiaries serve as suppliers for other OEMs beside Toyota Group (for parts and components in cars manufacturing), and for Toyota local partners or other OEMs local partners in after-sales or after-market products market.

It is under such value chains structures that the ASEAN host governments are to adjust their FDI promotion and industrial development policy schemes in the sectors relating to the automotive industry. In the cases of ASEAN3, three distinct schemes are worth noticed as to how governments attempt to advance their engagement in

[14] Typology of value chains networks or governance styles (hierarchical, captive, relational, modular and market) refers to the works of Gereffi et al (2005) as quoted in Pietrobelli & Rabelloti (2011) and Poapongsakorn & Techakanont in Kuroiwa & Heng (2008). Elaboration on the typology is presented in Chapter 1.

the regional automotive production network. Indonesia presents dispersed policies that are biased towards domestically oriented car markets. Malaysia inherits import-substituting industrialization automotive policies that pose challenges of how to adjust its protectionist nature. Under its "super cluster" scheme, Thailand represents attempt to move the country's automotive industry up from the current position in the value chains.

Thesis Content Outline[15]

Keeping in mind the study's key intention, research questions, methodology and methods of analysis and proposed arguments as previously described, the following sequences are offered in presenting of the study's results as comprised in this thesis. It consists of seven chapters, i.e. Introduction (presenting intention of the study, its research questions and proposed arguments), Chapter 1 (presenting the overall background of the study), Chapter 2 (presenting the macro-level/trade setting of the Japanese automotive production network in Southeast Asia), Chapter 3 (presenting the micro/firm-level assessment on formation of the Japanese automotive production network in Southeast Asia), Chapter 4 (presenting the micro/firm-level assessment on the Japanese automotive value chains in Southeast Asia), Chapter 5 (presenting policy outlook anticipating automotive RVCs in Southeast Asia) and Conclusion.

The introductory chapter presents general setting of the study more elaborately. Three sets of research questions (RQs) are formulated, i.e. by focusing on changes in the production network and its trade setting (RQs #1), production shifts, strategic

[15] Overall scope of the research –on which this study is based— is diagrammatically described and recapped in Diagram IN-2 Research Scope explaining conceptual correlations among variables utilized in the study (see Annex 2 in Annexes). Additionally Diagram IN-3 Structure of the Thesis outlines flow and organization of the thesis (see also Annex 2 in Annexes).

responses of firms on upgrading (RQs #2), and regional value chains and its policy lessons (RQs #3). Specific objectives of the study are offered to emphasize its theoretical as well as practical dimensions. The remaining sections explicate methodology and methods of analysis utilized in the study, its proposed arguments, and structure of its presentation in this thesis.

In Chapter 1, an overall background of the study is presented. It begins with a historical account and current condition of Japanese automotive firms and also FDI in Southeast Asia and its contribution to the region's industrial development in manufacturing and automotive sectors during the past two decades. It is then followed by conceptual framework and literature surveys escorting how the RQs are addressed and proposed arguments of the study are presented in the remaining parts of the thesis. Theoretical surveys and review on past studies or literature surveys on regional economic integration, global value chain (GVC) and global production network (GPN), GPN 1.0 and GPN 2.0, and value chains upgrading are outlined as the proposed framework. Lastly, a statement of originality and novelty of the study is conveyed.

In Chapter 2, a trade setting is presented to expose macro-empirical context of Japan automotive production network in Southeast Asia during the past 3 decades. The presentation aims at comprehending changes in trade patterns and trends in value added encircling the production network. Albeit its limitation to capture details of the changes, overall trade context (during the 1990s, 2000s and 2010s) is attained through macro data analysis in manufacture trade (network products trade), trade in goods relating to automotive, i.e. under HS 87 and SITC C34T35 categories. The chapter presents macro-level assessment on Japan trade with its East and Southeast Asian partners, particularly the ASEAN3 (Indonesia, Malaysia and Thailand) and

ASEAN6 (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam). The observed years are 1988-2016 (for the trade pattern) and 1995-2011 (for the trends in value added). A thorough analysis is conducted on 4 key automotive products (parts and components, passenger cars, vehicles for the transport of goods and public type vehicles).

In Chapter 3, a micro context of the Japanese automotive production network in Southeast Asia is presented. This firm-level assessment is conducted through cases on Toyota, Denso and Aisin Seiki manufacturing and business operations in the region. The chapter comprises four sections. The first section presents the setting of overall Japanese automotive firms operation in Southeast Asia in which two ASEAN countries (Thailand and Indonesia) are selected to highlight its local production setting). The second section offers assessment on the production shifts resulted from those manufacturing and business operations by elaborating the cases of Toyota, Denso and Aisin Seiki in the region. In the third section, the Toyota ASEAN IMV Project is highlighted as two key automotive products (i.e. automotive parts and components and passenger cars) are selected for deepened analysis on the accumulation of local production capacity and localized production processes. In the last section, a recap on production shifts and localization of production undertaken by Toyota in Southeast Asia is presented exemplifying and summarizing overall formation of Japanese automotive production network in the region.

Chapter 4 offers an assessment aimed at outlining engagements of firms and other relevant stakeholders in endeavoring regional value chains for the automotive sector in ASEAN. Three sections are offered of which the first section assesses the current automotive value chains as exemplified in the case of Japanese firms, i.e. by taking Toyota value chains in Southeast Asia as a leading reference. The assessment is carried out beyond the "smiley curve" value creation model suggesting three different value chains structures based on original sources, geographical or locational and distributional aspects of the value added captured within the network. The second section assesses the envisioned value chains in the areas of upgrading and localization of production as exemplified by Toyota business operation, production and manufacturing activities in Southeast Asia. The final section examines the Toyota value chains in the region in specified areas of technical formation and accumulation at local sites. It is conducted by offering developmental manufacturing achievement of "Kijang" in Indonesia and a comparative case of Hilux in Thailand.

Chapter 5 elucidates policy outlook and lessons for ASEAN host governments as a specific contextual setting of the anticipated RVCs in automotive sector. It consists of three sections. The first section illustrates general relevant policy setting in the ASEAN3 countries in which existing schemes on FDI promotion and industrial development related to automotive sector are examined. The second section addresses local backward linkages as exemplified by the case of Toyota and Denso operation in ASEAN. Backward linkages of leading automotive firms such as Toyota and Denso are assumed to be the significant part in developing automotive sector and industry in the host countries. The last section explores the need for a common policy platform of automotive R&D, HRD and vocational training applicable to regional level. It also envisions a regional scheme for industrial cooperation which includes illumination on the current ASEAN proposal and initiatives, and RVCs best practices applied in the ASEAN automotive sector.

Chapter I

Background of the Study

This chapter offers a backgrounder of the study comprising five main sections. The first section traces Japanese foreign direct investment (FDI) and firms activities in automotive-related manufacturing industry in Southeast Asia. As the presentation shall show, such activities have been the major driver of the country's automotive production shifts to the region during the past two decades. Subsequent expansion of the industry has in turn responded by the ASEAN host governments' industrial policy and eventually transformed the region's automotive sector. The second section elucidates further how the production shifts contribute to Southeast Asia's integration to the Japan-led automotive industry which has paved the way to the formation of the region's automotive production networks. To comprehend such a phenomenon, the third section proposes a conceptual framework elaborating key related concepts, i.e. regional economic integration, global production network (GPN) and global value chain (GVC).

Theoretical assessment on these three concepts is elemental to comprehend how the region's automotive networks –as part of the wider global production networks (GPNs) and global value chains (GVCs) phenomena— have been embedded in the existing regional economic integration. The framework hence puts forward theoretical understanding on current ASEAN regional economic integration as seen from GPN and GVC concepts[16]. By echoing Yeung and Coe (2015), it proposes the latest theoretical development of GPNs as being evolved from the so-

[16] The study applies the terms of global value chain (GVC) and global production network (GPN) as concepts, while the terms of global value chains (GVCs) and global production networks (GPNs) as phenomena.

called GPN 1.0 framework (which emphasizes on organizational arrangement and competitive dynamics of GPNs) to GPN 2.0 framework (which emphasizes on the micro-level, firms-level or actors specific strategies and competitive dynamics in organizing GPNs) [17].

The next section of the chapter (the fourth section) therefore presents a literature review which further clarifies those evolving GPN 1.0 and GPN 2.0 frameworks, i.e. particularly on micro-level strategies and competitive dynamics among specific actors in manufacturing and automotive related GPNs. In spite of varied GPNs final products which suggests the distinctiveness of the automotive sector if compared to other sectors, the review aims to offer uniqueness of the study by assessing past relevant works on firm-level strategy on value chains upgrading. By going beyond the conventional value chains "smiley curve" model, the review focuses on firm-level upgrading strategy that leads particularly to production shifts, localization of production, technical capacity building and human resource development (HRD). Since Toyota is the study's key case study (as indicated earlier in the Introductory chapter), a review on past works on this company is presented to specify strategies which are contextual to the study's main intention. The study also reviews past works on regional value chains (RVCs) and host governments FDI and industrial policy assuming that RVCs and domestic industrial policies are both instrumental in economic regionalization processes that are driven by the automotive sector.

Discussion on how the proposed framework is applied in the study is presented in the next section of the chapter (the fifth section). It is suggested that, while

[17] This theoretical evolution that lead to the GPN 2.0 framework has been observed and developed by Yeung and Coe (2015) in an attempt to grasp dynamic changes in GPNs practices in the past decade involving micro-level analysis of firms.

performing a hierarchical value chains structure, the GPNs of automotive sector in Southeast Asia keep on the following patterns. Being at the center of the network, the Japanese lead firms channel upgrading strategies through and in collaboration with local partners/subsidiaries. The 1st-tier suppliers are then followed suit to the next layers of suppliers and in certain cases, such as Denso and Aisin Seiki, they conduct upgrading strategies through and in collaboration with local affiliate suppliers. The local partners/subsidiaries are consigned for upgrading strategies that are aimed at "localization" of production/manufacturing processes, e.g. to meet local content requirement and local market preferences (in car design and auxiliary car accessories).

The last section discusses aspects on originality and novelty of the study. Intention to utilize contemporary GPN 1.0/GPN 2.0 frameworks is distinctive in explaining how GPNs precisely work at firm level and how firms (and other stakeholders) upgrading strategies fit to dynamic changes in certain GPNs such as automotive sector. In this particular sector, the strategies (which are undertaken by lead firms or commonly-known as original equipment manufacturers (OEMs) along with their suppliers and local partners and/or subsidiaries) resemble actual operation of production networks and value chains at regional level (which signifies actual work of regional economic integration). The study suggests that RVCs practices in the automotive sector in Southeast Asia –operated mainly under Japan-led regional production networks— are taken as part of the region's "sectoral" economic integration.

1.1. Japan and Southeast Asian Automotive Industry

This section presents an overview of historical context and current situation of the Japanese foreign direct investment (FDI) and production activities in manufacturing and automotive-related sectors in East and Southeast Asia. The presentation aims to describe how the activities expanded and paved the way towards regional automotive production network, how they contribute to the emergence and development of automotive industry in the region, and finally how they affect the ASEAN host governments industrial policy in this specific sector.

1.1.1. Historical Context

The years between 1994 and 1997 marked an era in which Japanese FDI in East Asia has reached its record high[18]. As noted by Yun (2005), the performance has resulted in a strong footing of the country's leading firms operated in the region, especially those relate to the manufacturing FDI. In terms of number of projects, the region captured more than 50% of total manufacturing FDIs during the 1990s in which the share is more than 70% in 1994 and 1995 (Yun 2005). If seen from Japanese firms overseas subsidiaries operating in the region, manufacturing were predominant sectors in the 1990s where manufacturing subsidiaries account for 61.1% of total regional affiliates or equivalent to 57.1% of total manufacturing

[18] Share of Japanese FDI in East Asia reached more than 20% of the overall Japanese FDI in the world by the years of 1994 (22.6%), 1995 (23.1%), 1996 (22.9%) and 1997 (20.6%). Cumulatively, the region has absorbed 15.7% of the total Japanese FDIs between 1980 and 2002 (Yun 2005). The region consists of the NIEs (New Industrialized Economies, i.e. Hong Kong, South Korea, Singapore and Taiwan), the ASEAN4 (Indonesia, Malaysia, the Philippines and Thailand) and China. Between 1980 and 2002, ASEAN4 in particular is the most important host holding 44% of Japanese FDI stock in the region, followed by NIEs (40.4%) and China (15.6%) (Yun 2005 p. 2 quoting data from Government of Japan's Ministry of Finance).

overseas affiliates all over the world (Yun 2005 quoting METI's *Dai 31-kai Wagakuni Kigyo no Kaigai Jigyo Katsudo*-the 31st Basic Survey of Overseas Business Activities 2003).

By the year of 2000, in terms of geographical concentration of Japanese manufacturing affiliates, East Asia plays the focal roles as an off shore production site. The region accounts for 34% of Japanese overseas production. It represents the 2nd largest share of Japanese overseas production, following North America with the share of 41.6%. Within East Asia, the breakdown of the share is NIEs (15.1%), ASEAN4 (13.8%) and China (5.1%). However, in terms of sales performance, ASEAN4 denotes the largest production site in the region. Japanese affiliates locating in ASEAN4 account for 40.5% of total sales by its manufacturing subsidiaries in the region, while the shares in NIEs-3 (Korea, Taiwan and Singapore) and China are 32.9% and 26.6% respectively (Yun 2005).

By the same year, according to Yun (2005), Japanese firms production activity has significant impacts on value added creation on the East Asian host economies. They created a total manufacturing value added (through their overseas affiliates in the region) of 43,340 million USD. The value is equal to 5.8% of the regional economy's overall manufacturing value added of 748,803 million USD). The percentage for ASEAN4 is even much higher, i.e. reaching to 14.7% where machinery and transport equipment are the most preeminent sectors. It is in these two sectors that the value added creation is mostly (53.2%) produced by Japanese manufacturing subsidiaries (Yun (2005) as estimated based on data from World Bank, World Development Indicators 2003; ADB, Key Indicators; METI 2003).

With transport equipment accounts for more than 30% of domestic sales in ASEAN4, Japanese automotive firms found that, in East Asia, ASEAN4 is the most significant location to expand and agglomerate in. Beyond the year of 2000, ASEAN4 sales contribute to 55% of the total sales of Japanese firms automotive affiliates in East Asia. By 1999, there were already 27 overseas assembling sites of Japanese carmakers located in ASEAN4 (out of 44 sites in East Asia). By the same year, there are about 28% of overseas production sites of Japanese suppliers agglomerated in ASEAN4 that accounts for 55% of those in East Asia. With such a strong footing, as a result, Japanese automotive firms and its major suppliers have been influential in ASEAN4 with market shares of more than 90% except for Malaysia (Yun 2005).

Along with such an expansion in sales and assembling/manufacturing sites of Japanese automotive firms in ASEAN4, vertical intra-industry trade (IIT) among them also showed a rapid increase (Ito and Umemoto 2004). Investigating trends and patterns of intra-regional trade among ASEAN4 countries in the automotive sector and focusing on the automobile and automobile parts industries in these countries, Ito and Umemoto (2004) nonetheless found that horizontal IIT remained at a very low level. Thailand was the largest exporter and importer of automobile parts and that engines and engine parts were the major components traded among the ASEAN4 countries. Most IIT in ASEAN4 –where subsequently Japanese automotive firms contributed major roles and portions in the supply chains and production network— was concentrated in miscellaneous automobile parts (Ito and Umemoto 2004)[19].

In a study prepared for the European Commission's Notre Europe and JETRO, Dieter (2007) –quoted Dicken (2005: 15)— confirmed supremacy of car production

[19] However, changes in the production network during the past decade –which have transformed Thailand as the major regional automotive production hub— have resulted in increasing horizontal IIT among ASEAN countries implying an expansion of horizontal integration in the region's automotive sector. This particular observation is of the study's major concern and shall be one of the areas to be explored further.

in Asia by Japanese producers with South Korean companies trailing behind. A handful of production sites are practically controlled by Japanese firms, particularly in Southeast Asia (Staples 2006: 6 as quoted by Dieter 2007). These firms established networks of assembly plants and joint ventures with domestic firms in Thailand, Malaysia, the Philippines and Indonesia (Yoshimatsu 1999: 495 as quoted by Dieter 2007). Thailand in particular is a pivotal case where automotive market share of Japanese producers reaches over 90%[20]. This study concludes that the process of regional concentration of automotive production in Thailand and its development is not limited to final manufacturing, but also includes suppliers[21].

Following the Asian financial crises of 1997/1998, Thailand FDI and industrial policies in automotive sector have earnestly been revised, i.e. particularly by reconsidering the local content requirements, as the country (along with other ASEAN members) began to speed up the ASEAN Free Trade Agreement (AFTA). Meanwhile the idea of having national or indigenous automakers has no longer been envisaged in most ASEAN countries (except in Malaysia). With such a policy revision and the nature of ASEAN car markets continued to be individual national market and are heavily protected against imports (Dieter 2007), attraction for Japanese car manufacturers/automakers to set up assembly plants (especially in Thailand) has been the case in 2000s onward.

A more recent study by Hamzah (2012) signifies intra-regionalization among ASEAN countries in the automotive industry that have been led by Japanese manufacturers. While suggesting that the AFTA schemes offered insufficient

[20] Thailand then became the third largest exporter of automotive products in Asia (after Japan and South Korea) and turned to be the Southeast Asian export hub for Japanese, American and European due to its export-oriented FDI (Yoshimatsu 1999: 495 as quoted by Dieter 2007).

[21] Dieter (2007) confirmed that previous study by Shimokawa (2004: 154) reached the same conclusion.

incentives for intra-ASEAN trade (as the margin difference between its preferential tariffs and MFN (Most Favored Nation) tariffs are small), the study argues that intra-regional cooperation schemes (especially among ASEAN3 countries) in the automotive industry have been possible as a result of firm roles of Japanese automakers in the utilization of impacts of Japan's economic partnership agreement (EPA) with these ASEAN3 countries (especially in the uses of technical cooperation schemes) and of AFTA's tariff liberalization.

By comparing the automotive industrial policies among ASEAN3 countries, the study by Hamzah (2012) recapitulates the following findings. Thailand has put forward an example of a host country benefiting from large scale of automotive production shifts of Japanese manufacturers. While at the same time, the country has been able to advance its local production/manufacturing capacity through utilization of technical cooperation offered jointly by the manufacturers and their home government under EPA schemes. These findings affirm a completion stage of a full-scale automotive production network led by Thailand where –since mid 1990s—Japanese automotive lead firms comfortably made it as production and industrial hub, serving other parts of the region.

Dieter (2007) furthermore suggests that the development of production networks in Asia by Japanese manufacturers has not been purely a market-led one. He maintains that host governments have had a decisive influence through high levels of import protection that have encouraged Japanese car manufacturers to produce locally. Meanwhile the Japanese government has also actively encouraged the relocation of manufacturing out of Japan. Utilizing substantial funds under the overseas development assistance programs (especially through JICA, including the then OECF/Overseas Economic Cooperation Fund scheme), the home government has helped to establish the infrastructure necessary for FDI (Yoshimatsu 1999: 497 as quoted by Dieter 2007). As previously indicated, since the 1980s, such a production shift has been a response to changes in international and external conditions, especially exchange rate fluctuations. Japanese firms as a result have systematically created production networks via accelerated FDI. These changes have not only improved the competitiveness of Japanese firms, but have also contributed to the "de facto" integration processes in Asia and to the regionalization of production (Yun 2005: 1 as quoted by Dieter 2007)[22].

Considering that roles of the government –both at host and home countries— in the advancement of a production network are instrumental, an overview of past works on industrial development policy is to be presented as follows. As previously described, initial Japanese firms relocation and its production shifts to Southeast Asia in 1980s/1990s were carried out in relations to the Japanese FDI activities in several key ASEAN host countries and its impacts on local industrial development. The works to be reviewed include a seminal study during the early years of Japan-ASEAN industrial relations by Chng and Hirono (1984), then in its heyday era of early to mid 1990s period by Ohta (1994) and Ohta, Tokuno and Takeuchi (1995) and a more recent remark by Hirono (2003) and a report by METI (2012).

[22] In the case of Southeast Asia, despite its global feature (i.e. in terms of firms strategy and market outreach), Japanese automotive production network represents a compelling regional feature with a long historical outlook. It started initially in Thailand (in 1962, by Toyota) for sales and marketing only, emulated similarly in Malaysia (in 1968, by Toyota) and Indonesia (in 1970, by Toyota). Only as early as of late 1970s that it began to go beyond sales, marketing, distribution and after-sales, i.e. after local assembly lines for completely knock down (CKD) products are introduced in the early and mid of 1970s. Later in the 2000s, in terms of value chain's primary and support activities, the regionalization processes have developed value chains network which encompasses activities not only for inbound logistics, operations, outbound logistics, marketing and sales, services, but also for advancement in infrastructure, human resource management, technology development and procurement in this specific sector (as suggested among others by Kuroiwa and Heng 2008). Japanese regional automotive value chain and production network in Southeast Asia represents a governance structure (as described by Gereffi, Humphrey and Sturgeon 2005) consisting of multifaceted transactions, codified transactions and supply-base which in turn determine how the chains are governed. An elaborate conceptualization on such a phenomena is offered in the next section (1.3. Conceptual Framework).

Focusing on the assessment and prospect of Japan-ASEAN industrial cooperation, the work of Chng and Hirono (1984) pioneered a scholarly policy debate over Japan's FDI activities in ASEAN countries (Indonesia, Malaysia, the Philippines, Singapore and Thailand) in terms particularly of benefitting from rapid growth in the manufacturing industries that characterize Japan-ASEAN economic relations entering the 1980s. Seeking to promote outward-oriented industrialization policies in East Asia, including in those 5 ASEAN countries, Japan has focused its official development assistance (ODA) on development of economic infrastructure and thus contributed significantly to the modernization of the productive capacity of ASEAN countries.

A decade later as noted in a study of NRI-ISEAS (Ohta, Tokuno and Takeuchi 1995), combined with even massive production shifts of Japanese firms, particularly in electronics and electrical machinery[23], efforts towards modernizing ASEAN productive capacity have resulted in the actual application of "flying geese" theory and so-called "billiard ball" effects in the Asian economies industrialization, including particularly in the five key ASEAN economies (Indonesia, Malaysia, the Philippines, Singapore and Thailand). At firm level, this flying geese development pattern was performed through a billiard-ball shift pattern. Within ASEAN, lower-priced products were transferred from Singapore and Malaysia to Indonesia and the Philippines, while at the same time production facilities of middle-priced products (that were by then manufactured in Japan) were relocated to Singapore and Malaysia (Ohta 1994).

[23] Pioneering initial integration of ASEAN countries –especially in the cases of Malaysia and Singapore— to the GPNs, electronics and electrical machinery sectors served as the backward linkage of automotive electronics parts and components, i.e. by utilizing and channeling its existing manufacturing facilities and technical capacity to the then emerging automotive parts and components suppliers/industries in several key ASEAN countries.

Entering the 2000s, despite slowdown of economic growth due to 1997 Asian monetary crisis and 2008 financial crisis, pattern of such production shifts of Japanese firms to ASEAN endures with bolder commitment for industrial development by the Japanese government and its supporting agencies. As Japan economic cooperation policy toward ASEAN has become more multilateral in approach (Hirono 2003), the ASEAN-Japan 10-Year Strategic Economic Cooperation Road Map (2012-2022) puts "strengthening industrial cooperation towards more advanced industrial structures" as one of its three reinforcing pillars. The roadmap hence targets "promoting advanced industrial development" as one of its four priority areas to be focused on (METI 2012)[24].

A tangible and concrete follow up of such an initiative is conjoining activities under AMEICC (AEM-METI Economic and Industrial Cooperation Committee)[25] aimed at developing further industrial cooperation between Japan and ASEAN member states through HIDA (Japan Overseas Human Resources and Industry

[24] The roadmap was initiated in the ASEAN Economic Ministers (AEM)-Japanese Government Ministry of Economics, Trade and Industry (METI) Meeting in Manado (Indonesia) on August 13th 2011 in which the ministers endorsed the concept note of the 10-year Strategic Economic Cooperation Roadmap with a view to further strengthening and deepening ASEAN-Japan trade and investment relations. The ministers then tasked Senior Economic Officials and the ASEAN and AMEICC Secretariat to engage other relevant organizations such as the Economic Research Institute for ASEAN and East Asia (ERIA), Asia Competitiveness Institute of the Lee Kuan Yew School of Public Policy, ADB Institute and other research institutions, JETRO and JICA in developing the roadmap which was targeted for completion by the 18th AEM-METI Consultations in 2012. The roadmap consists of three mutually reinforcing pillars, i.e. integration of markets in ASEAN and the East Asian region in a mutually beneficial manner, strengthening industrial cooperation towards more advanced industrial structures, and improving economic growth and standard of living. Activities under the roadmap focus on four priority areas, i.e. trade and investment facilitation, promotion and liberalization; improvement of logistics and distribution networks; promoting advanced industrial development; and narrowing development gaps. The following link offers details of outline and content of the roadmap, and its downloadable full draft:
http://www.meti.go.jp/policy/trade_policy/east_asia/dl/AJ_10year_SEC_Roadmap.pdf.

[25] AMEICC was established in 1998 based on the endorsement of ASEAN-Japan Summit Meeting held in Kuala Lumpur (Malaysia) in December 1997. It is a body for policy consultations to discuss enhanced industrial cooperation, improvement of ASEAN's competitiveness and development cooperation assistance to ASEAN member countries. The first meeting of the AMEICC was held in November 1998 in Bangkok. Since then the meeting is held annually.

Development Association)[26]. One of current activities organized under the AMEICC secretariat at HIDA Bangkok office include setting up a working group on automobile industry (WG-AI) alongside with working groups on the SMEs (SME-WG), chemical industry (WG-CI) and West-East Corridor Development (WEC-WG). Past working groups cover areas of consumer electronics industry (WG-CEI), human resource development (HRD-WG), statistics (WGS), textile and garment industry (WG-TGI) and information technology (WG-IT).

1.1.2. Current Situation

Japan's export and import activities in commodities related to automotive sector (UN Comtrade HS 87) show vibrant relations with its partners in East and Southeast Asia. The country's export to and import from the region accounts for 17% and 35% of its overall export and import respectively (2016). As shown in the following Table 1.1, ASEAN region alone accounts for 8% and 12% of Japan's overall export and import of the commodities respectively which is comparable to the Chinese shares (of 8% and 19%). The following Table 1.1 presents details of export and import values and percentage of overall Japan's export and import values in HS 87 (for selected East and Southeast Asian partner countries).

As of end of fiscal year (FY) 2014, figures of Japanese overseas affiliates in manufacturing industries[27] are 10,592 which accounts for 44.1% of the total number

[26] HIDA is a Japanese organization for human resources development in developing countries that aims to promote technical cooperation through training, experts' dispatch and other programs seeking to contribute to economic growth of both developing countries and Japan. Originally established as Japan Overseas Development Corporation (JODC) on August 10th 1959, HIDA was created a merger of JODC and the Association for Overseas Technical Scholarship (AOTS) on March 30th 2012.
[27] Based on Summary of the 45th Basic Survey on Overseas Business Activities (conducted in July 2015) (METI 2015), transportation equipment is included in manufacturing industries. Other sectors

(24,011) (METI 2015). The country's overseas affiliates in transportation equipment are totaled as 2,201 which accounts for 20.8% of overall number of overseas affiliates. Referring to regional distribution of Japanese overseas affiliates, Asia accounts for 66.5% of the total number (as of FY 2014) with the breakdown is as follows: China (31.7%), ASEAN4 (17.5%), NIEs3 (11.3%) and other Asian countries (6%)[28].

Table 1.1. Japan Export to and Import from East Asian and ASEAN Partners: Trade in Goods related to Automotive (HS 87) (2016)

	Export (USD)	% of World	Import (USD)	% of World
World	1.41799E+11	100	20,893,783,834	100
East Asia and ASEAN	24,146,667,645	17	7,214,415,782	35
East Asia	12,577,509,856	9	4,793,944,417	23
China	11,221,154,609	8	3,986,803,157	19
Korea	1,356,355,247	1	807,141,260	3.9
ASEAN	11,569,157,789	8	2,420,471,365	12
Thailand	3,157,651,973	2.2	1,123,279,512	5.4
Indonesia	1,674,409,928	1.2	498,522,258	2.4
Philippines	1,824,335,819	1.3	204,876,042	1
Malaysia	1,811,338,364	1.3	88,034,220	0.4
Singapore	1,367,645,480	1	10,467,506	0.1
Vietnam	863,458,120	0.6	491,551,462	2.4
Myanmar	690,640,906	0.5	84,705	0
Cambodia	61,471,706	0	3,655,660	0
Laos	68,782,585	0	0	0
Brunei Darussalam	49,422,908	0	0	0

Source: UN Comtrade Database

As shown in Table 1.1 and the METI statistics on Japanese overseas affiliates, the figures represent significant status of Asia, particularly of East Asian countries (China and Korea) and Southeast Asian countries, in the activity of Japanese manufacturing

included in manufacturing industries are food; textiles; lumber, wood, paper, and pulp; chemicals; petroleum and coal; ceramic, stone, and clay products; iron and steel; non-ferrous metals; metal products; general-purpose machinery; production machinery; business oriented machinery; electrical machinery; information and communication electronics equipment and miscellaneous manufacturing industries.

[28] ASEAN4 comprises Indonesia, Malaysia, Thailand and the Philippines, and NIEs3 (The three New Emerging Economies) includes Hong Kong, Taiwan and Singapore (METI 2015).

and automotive business and industry. Recent data from Ito quoted in JETRO (2016), shows that as of 2014 there were 55 Japanese automobile manufacturers/lead firms that have production plants operating in ASEAN alone which accounts for 29.9% (of overall number in the world) or 51.4% (of the total number in Asia). Meanwhile figures of Japanese automotive parts makers (mainly 1st tier suppliers) that have production plants in ASEAN are 24 (2014) which accounts for 37.5% (of the world figure) or 58.5% (of the Asian figure).

Within ASEAN, Thailand and Indonesia have been the leading countries to be located by Japanese manufacturers for both automobile and auto parts and components production. In automobile production plants, there were 14 and 12 Japanese manufacturers locating in Thailand and Indonesia (2014) which accounts for 25.5% and 21.8% respectively of the total numbers for ASEAN. In auto parts and components production plants, there were 8 Japanese manufacturers locating in each of Thailand and Indonesia (2014) which accounts for 33.3% of the total numbers for ASEAN. Table 1.2 presents detailed figures of Japanese overseas production plants in automotive-related industries (2014).

Table 1.2. Japanese Overseas Automotive Production Plants in Selected Regions and Countries (2014)

Region/Country	Automobile	% of Asia	% of ASEAN	Motorcycle	Auto Parts & Components	% of Asia	% of ASEAN
Asia	107	100	-	36	41	100	-
ASEAN	55	29.9	100	19	24	58.5	100
Thailand	14	13.1	25.5	4	8	19.5	33.3
Indonesia	12	11.2	21.8	4	8	19.5	33.3
Malaysia	13	12.1	23.6	3	3	7.3	12.5
The Philippines	7	6.5	12.7	4	4	9.8	16.7
Vietnam	8	7.5	14.5	1	1	2.4	4.2
China	23	21.5	-	8	16	-	-
India	11	10.3	-	4	1	-	-
Others	18	-	-	5	-	-	-
Europe	19	-	-	2	6	-	-
Africa	16	-	-	2	-	-	-
North America	17	-	-	1	14	-	-
Latin America	20	-	-	11	2	-	-
Middle East	1	-	-	-	-	-	-
Oceania	1	-	-	-	1	-	-
World Total	184	-	-	52	64	-	-

Source: adapted from Ito in JETRO (2016)

1.2. Southeast Asia and the GPNs in Automotive Sector

Southeast Asian participation in the global production networks (GPNs) dates back to the 1960s-1970s following the emergence of East Asian production network as a result of establishment of units by mostly United States (US) multinational companies (MNCs) for their labor intensive activities. Local affiliates were then established in parallel to such a scheme, i.e. by performing various tasks and producing a range of components or sub-systems defined by the MNCs. Expansion of the East Asian production network to the Southeast Asian one was due to several factors such as geographic proximity and availability of skilled manpower (Kuroiwa and Heng 2008). Entering the 1980s, devalued currencies and trade policies of most countries in the region (including especially Thailand, Malaysia, Indonesia and the Philippines) which affected to competitiveness of manufacturing industries and facilitated further inward foreign direct investment (FDI) in export-oriented business have pushed further expansion of the network (Ando and Kimura 2003 in Kuroiwa and Heng 2008).

Three sectors are frequently cited as examples of expansion of production network in the region, i.e. textile and clothing (T&C), electronics and automotive (Kuroiwa and Heng 2008). T&C was the pioneer representing the relocation of segments of entire production processes that began as early as of the 1950s. T&C typical shifts in production network set off with the move from North America and Western Europe to Japan then followed by a switch to Hong Kong, Taiwan and Republic of Korea in 1970s. Then the bulk of world T&C production was shifted to main land China, Indonesia, Thailand, Malaysia and the Philippines in the 1980s. Two significant factors behind such a shift are the industry's low capital and relatively high labor intensity that made sense for the industry to relocate to newly industrialized economies from the developed ones (Kuroiwa and Heng 2008). Further fragmentation of the production of electronic products and then eventually of automotive ones have become a key feature of production network expansion in the region entering the 1990s. In agreement to such an argument, the study therefore aims to comprehend significance of one of these two leading sectors (i.e. the automotive) as inseparable part of Southeast Asian deepening participation in the global production networks (GPNs).

Since the 1990s, the automotive industry/sector have gained attention among scholars and policy makers in the region due to its deeper, more fragmented and systemic nature of the production network. Kuroiwa and Heng (2008) elaborate their observation on this as follows. Product fragmentation[29] has become a strong element in the advancement of automotive production network in the region since the 1990s. Production blocks of automotive industry have been more and more fragmented throughout Southeast Asia[30]. They have developed different features and

[29] Soejachmoen (2016) offers a comprehensive literature review on "product fragmentation" as an embedded phenomenon of production network and global production network (GPN). Summary of the review is as follows. Quoting Henderson et al. (2002), a production network is a nexus of inter-connected functions and operations through which goods and services are produced, distributed, and consumed. Thus, according to the author, a GPN (or global production network) takes place when an industry can fragment its production process into smaller segments, enabling components of production or assemblies to be relocated in several countries with a vertically integrated production process. Global production networks, as mentioned by the author, are also known as "international production sharing" (quoting Ng and Yeats 2001), "distributed manufacturing", or "dispersed manufacturing" (quoting Cheng and Kierzkowski 2001).

[30] At the initial stage, all production processes were conducted in one place as a single integrated production block. Technology developments, accompanied by innovations in telecommunications and transportation, promoted the development of a fragmented production process that consists of more than one production block. It is then connected through service links such as transportation, design, quality control, insurance, R&D, telecommunications and other services. There are several patterns of interdependence between production blocks and service links, i.e. the output of one production block can become an input for another block or simultaneous operation of several production blocks where the output of each of these is assembled in the last production block. With regards to this, the degree of fragmentation can therefore be measured by the number of stages or production blocks. As the

specialization (especially in terms production and manufacturing of intermediate products) from country to country. Different firms have also different strategies with regards to this.

Expansion of automotive production network in the region has commenced and proliferated industrial clusters as part of the growing organizational structures of the industries. The automotive sector, as shown for instance in a research by Poapongsakorn and Techakanont (Kuroiwa and Heng 2008), develops an industrial cluster typified by evolution of global production network which benefits both the country's economy and the firms' productivity. Hence automotive sector (along with electronics sector[31]) is principal industrial sector that drive ASEAN economies integration to global production and distribution networks (Kuroiwa and Heng, 2008). Simultaneously with machinery sectors' export and import and supply chain management activities, the sector has further contributed to the shift of market-based arms' length relationship to vertical integration type of global supply chains (GSCs) in the region (Kimura, 2006; Ando and Kimura, 2009; Nicita et al, 2013).

In terms of policy implication at the regional and national levels, the phenomenon has generated discussion on how industrial clustering and agglomeration within the developing countries affect the following 3 (three) main factors in the chain shifts (Nicita et al, 2013). Firstly, how it shapes the chain geographical and spatial structures of linkages between tasks in the chain. Secondly,

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degree of fragmentation increases, so does the importance of service links for connecting the different production blocks (Soejachmoen 2016).

[31] If compared to automotive, electronics sector/industry is a much more complex one. A wide range of products is to be covered and categorized under the term of "electronics." In its scientific term, electronics itself refer to electrical circuits that involve active electrical components, such as vacuum tubes, transistors, diodes and integrated circuits, and associated passive electrical components and interconnection technologies. Commonly, electronic devices contain circuitry consisting primarily or exclusively of active semiconductors supplemented with passive elements; such a circuit, and is described as an electronic circuit. Hence, at macro-level analysis, the article delineate electronics as mainly referring to products traded under HS Commodity Code number 85 (Electrical, electronic equipment) and/or SITC categorized under Electrical and Optical Equipment.

how it contributes to the distribution of power among lead firms and other actors/stakeholders in the chain. And finally, how it influences the role of government institutions and policies, especially in structuring their business relationships and decision-making of industrial allocation. The first two factors indicate functioning governance in the ASEAN automotive sector's regional value chains that in turn should be taken into account by policy makers if they are to determine particular institutional relationships with the industry. Policies over industrial allocation are eventually determined by types of supply and value chain governance in the sector.

As suggested by Kimura (2009) and Nicita et al (2013), Southeast Asian production and distribution network along with its global/regional supply chains are characterized both by vertical integration linkages as well as market-bases arms' length relationships. The vertical integration has been largely driven by lead firms global business strategy to maintain their competitiveness seeking for delocalization of their production and manufacturing activities. In so doing, however, lead firms are to keep their arms' length relationships with their overseas subsidiaries and affiliates who are also actively create much more complex networks and transactions among themselves in parts and components manufacturing, delivery, logistic and other service-links activities.

Based on its individual home country, stakeholders in the automotive sector/industry take their roles in the linkages that are defined as: (1) lead firms (i.e. Japanese firms or multinational corporations such as Toyota) who directly or indirectly own suppliers, retain brand names, inquire high-tech requirement and design specification and dictate the sector economies of scale and scope); (2) overseas affiliates in participating countries or economies, i.e. in Thailand and

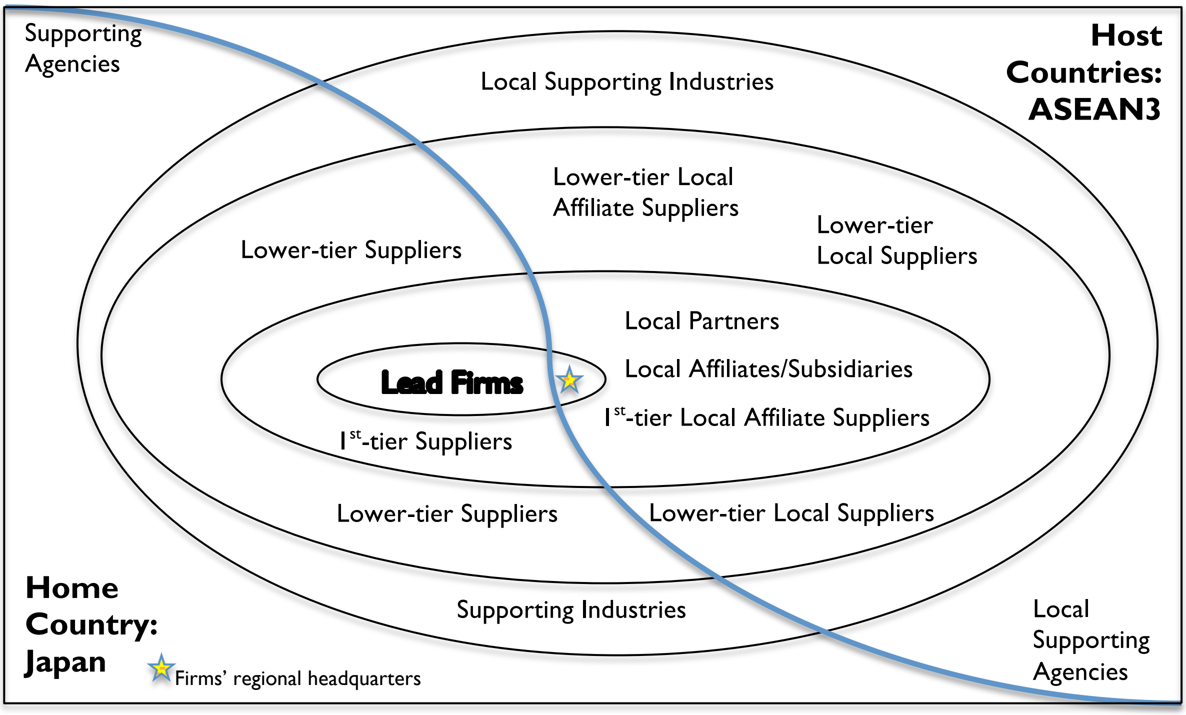
Indonesia (where automotive industrial clusters and production networks are generally located although the two countries are not completely comparable), Thailand and Singapore (where regional headquarters are set up), Indonesia and Malaysia (where manufacturing and assembly activities are currently located and developed, especially in the face of Indonesia's large market size).

To further map out relevant stakeholders within the automotive linkages, assessment is offered as follows. Typical organizational structures of a production network consist of global flagships (played by mostly multinational lead firms which are at the heart of a network) and suppliers (which are characteristically featured based on their higher tier and lower tier positions in a network). Higher tier suppliers serve intermediary role between lead firms and local suppliers. They usually have direct access to lead firms for negotiation and decisions over production-related activities. Lower tier suppliers are employed as 'price breakers' and 'capacity buffers' (which could be dropped at short notice) with no direct access to lead firms (Kuroiwa and Heng 2008).

The following Diagram 1.1 Spatial Linkages in Typical Automotive Production Network: Japan and ASEAN3 offers a visual explanation to spatial linkages in typical automotive production network where lead firms are located at the center of the network and serve as its global flagship. Layers of 1st–tier suppliers, lower-tier ones and supporting industries are encircled the lead firms, both at their sites in home country and host countries. In the host countries (ASEAN3), lead firms have immediate linkages to their local partners and subsidiaries or affiliates, the same way as they build direct linkages with 1st–tier suppliers and affiliates in the home country

(Japan). Supporting agencies, both in the home and host countries, have vital roles in the areas of inter-firm coordination R&D, public outreach, policy consultation[32].

Diagram 1.1. Spatial Linkages in Typical Automotive Production Network: Japan and ASEAN3



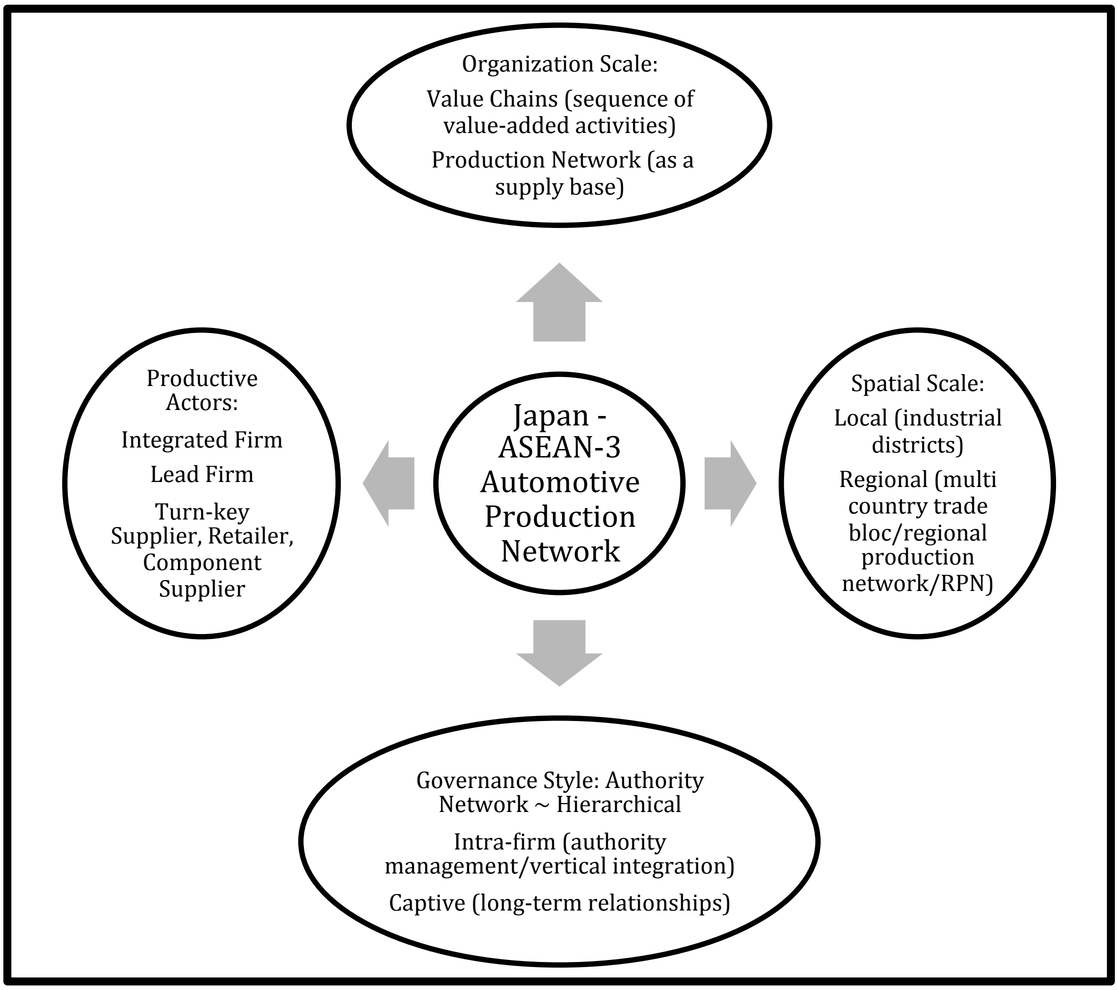
Source: author's assessment on the Japan-ASEAN3 automotive production networks and supply chains (referring conceptually to Kuroiwa and Heng 2008)

In addition to such spatial linkages, a production network is recognized through its organizational scale, governance styles and productive actors[33]. The study regards Japan-ASEAN3 automotive production network as having the following basic features as presented in the following Diagram 1.2 Basic Features of Japan-ASEAN3 Automotive.

[32] Examples of supporting agencies include national/local automakers and industry association and various semi-governmental research institutions dedicated to the automotive industry.

[33] Conceptual description of the organizational scales, spatial scales, governance styles and productive actors in a production network are offered by Poapongsakorn and Techakanont in Kuroiwa and Heng (2008) and the details are presented in Table A.3. Scales, Styles and Actors in Production Network (see in Annex 3 Conceptual Framework in Annexes).

Diagram 1.2. Basic Features of Japan-ASEAN3 Production Network in Automotive Sector



Source: author's assessment referring to Poapongsakorn and Techakanont in Kuroiwa and Heng (2008).

1.3. Conceptual Framework

The study focuses on the Japan-ASEAN3 automotive production network in an effort to address best practices of regional value chains (RVCs) in the context of East and Southeast Asian economic integration. A closer look at mechanics and functions of production network is essential to explain how firms, host governments and other relevant stakeholders respond contemporary changes in the network. Details of their respective tasks in the network denote types of contribution, roles and positions of firms, host governments and other related stakeholders in the value addition activities.

Diagram 1.3. Conceptual Framework

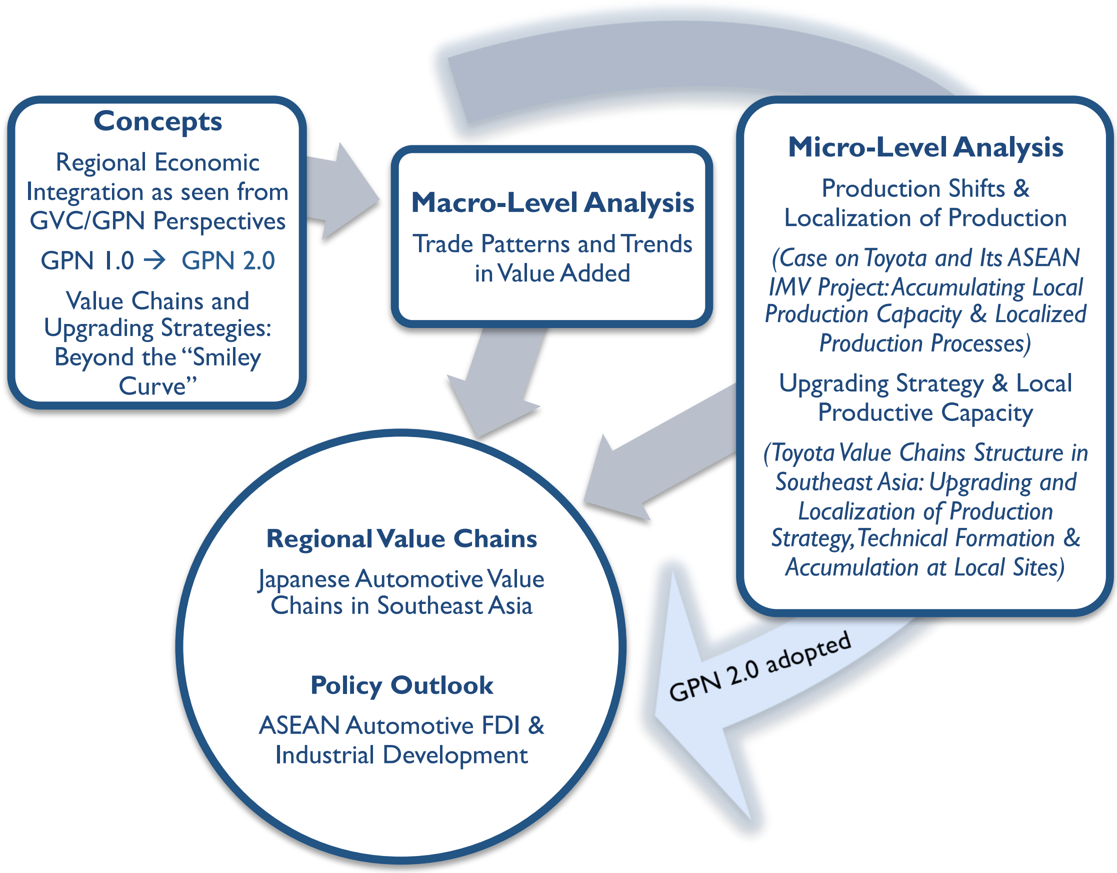


Diagram 1.3 Conceptual Framework illustrates major elements of the proposed conceptual framework utilized in the study, i.e. particularly at its micro-level, on how the much-anticipated RVCs would be operated dependently on firms (along with their supply chains), host governments and other relevant stakeholders responses to the dynamic changes of the network. The following three sub-sections discuss key concepts to be utilized in the study, i.e. regional economic integration, GVC and GPN, and value addition. The final sub-section offers an overview of past works relating to the micro-level analytical framework of the study, i.e. strategic responses by firms and other stakeholders, regional value chains (RVCs) and its policy dimensions.

1.3.1. Regional Economic Integration

Late regionalization processes, including the one emerged in East and Southeast Asian regions, follow the typical European Union (EU) prototype[34]. Two contending approaches are often cited by scholars[35] in the field of international political economy

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[34] Emerged initially in the context of 1951 Treaty of Paris that was officially inaugurated the European Coal and Steel Community (ECSC), EU (through its leaders) drafted a constitution concluding its fully-fledged process of regionalization in October 2004. The 1957 Treaties of Rome embarked the installment of EEC (European Economic Community), Euratom and Common Market marking an era of much more fully-fledged regional integration among its members. In 1967, the three were merged to observe the establishment of the so-called EC (European Community) that in 1973 saw its first enlargement, then further enlargement since the 1980s onward. The 1992 Treaty of Maastricht eventually escorted the formation of European Union (EU) paving the way to even much more integrated social, economic, legal and political regional arrangement of the greater Europe. As of January 1st 1999, a common currency –Euro— was officially adopted in major parts of EU countries commencing the so-called Eurozone.

[35] Early theorization and conceptualization of regional economic integration processes (that is empirically referred to European experience) could be traced back to the works of Ernst B. Haas (1958) *The Uniting of Europe: Political, Social and Economic Forces (1950-57)* (Stanford: Stanford Univ. Press) and Bela Balassa (1961) *Theory of Economic Integration* (Homewood, IL: RD Irwin). The works sparked the long-standing debate between the neo-functionalist theories (which are typically in line with Haas and Balassa) versus the inter-governmentalist theories (which offer counter-explanation to the phenomenon with Stanley Hoffman as the major figure). The neo-functionalist argues that "spill-

with regards to the prototype: "neo-functionalism"[36] and "inter-governmentalism."[37] East and Southeast Asian regionalization offers an interesting case where it involves a large body of governmental involvement in the process but also seen as copycatting the functionalist European model. Observation on the actual sectoral processes of regional integration –such as in the automotive sector— indicates dynamic regional integration processes where firms, industries, business practitioners and other key economic and industrial supporting agencies are deliberately attached during various official talks. The consequence of such processes would bring about pressures (but also opportunities) among government officials in the two regions on how decisions should be made, on whose benefits and costs, and finally how political mechanism eventually negotiates the process[38].

An alternative approach to those existing theorizations is offered to capture how transformation of East and Southeast Asian integration efforts. In this particular case,

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over effects" of functional activities among countries involved in such processes would eventually generate integration of various economic and political activities. See section on "Conceptual Frameworks" for further discussion on this.

[36] Referred mainly to the works of Haas (1958) and Balassa (1961), neo-functionalism is a novel synthesis of Mitrany's theory of functionalism [David Mitrany (1943/1966) *A Working Peace System* (London and Chicago: RII/Quadrangle Books)] and Jean Monnet's pragmatic strategy of European integration. Jean Monnet's works (as the Secretary General of ECSC among others) contribute to the establishment and actual operation of the modest association of ECSC. Begun in the ECSC era onward, the neo-functionalist considers that integration of various economic and political activities among member states has signified the roles of non-state actors: interest associations, social movement, and secretariat of the organization.

[37] Arguing against the "spill-over effects" explanation of neo-functionalism, inter-governmentalist theories –under their major figure of Stanley Hoffman— developed the approach in the mid of 1960s. Building on realist premises, it rejects the idea of neo-functionalism of loosely designed and developed integration. Rather, it proposes the idea that integration is a convergence of national interests. Thus the focus of regionalization is more on its major sets of inter-state bargains (especially inter-governmental conferences) and on the decision-making of the Councils of Ministers, rather than on the roles of the Commission, European Parliament, or societal actors.

[38] Political economic explanations on this are diverse. Hurrell (1995) identify 3 (three) different clusters of this specific category of study: (1) the systemic theories, which emphasize the importance of the broader political and economic structures within which regionalist schemes are embedded, (2) the interdependent theories, which consist of neo-functionalism and neo-liberal institutionalism, and (3) the domestic-level theories, which highlight interest-group politics and societal pressures over foreign economic policy. The study considers that this three-level categorization is an essential foundation to comprehend the dynamics of ASEAN+3 regional integration processes.

the nature of regionalization is neither fully functional nor fully inter-governmental. Rather, it has been deeply influenced by market forces as well as inter-governmental decisions designed mainly in the milieu of trade and changes in its corresponding production networks as well as economic liberalization. It is therefore crucial to apprehend nature of those political economic relations –both at domestic and international levels— in acquiring the two regions integration processes.

At this point, Global Value Chain (GVC) framework[39] is applied to comprehend economic integration by focusing on the production networks and commodity chains operated in the two regions. As indicated earlier (see Introduction), special attention has then been given to the region manufacturing industries following success of its automotive sector integration to the global networks. Having relatively significant roles of domestic suppliers and subsidiaries in the value chains activities taken by Japanese lead firms, the two regions gradual integration to the GPNs eventually began in the 1980s that has paved the way to the development of Southeast Asian economic growth zones serving as a catalyst for this particular sector[40].

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[39] GVC analysis has emerged since the early 1990s as a novel methodological tool for understanding the dynamics of economic globalization and international trade. It is based on the analysis of discrete 'value chains' where input supply, production, trade and consumption or disposal are explicitly and (at least to some extent) coherently linked. GVC discussion has revolved around two analytical issues: how GVCs are governed (in the context of a larger institutional framework) and how upgrading or downgrading takes place along GVCs. GVC institutional framework identifies how local, national and international conditions and policies shape the globalization in each stage of the value chain (Gereffi and Fernandez-Stark 2011).

[40] While the concept of GVC explores vertical and linear sequences of events along the chains, the concept of global production network –featured mostly by complex yet systemic relationships and interrelations between firms— deals with complex network structures in which there are intricate links (horizontal, diagonal as well as vertical) forming multi-dimensional, multi-layered structures of economic activities (Kuroiwa and Heng 2008). Typical organizational structures of a production network consist of global flagships (played by mostly multinational lead firms which are at the heart of a network) and local suppliers (which are characteristically featured based on their higher tier and lower tier positions in a network). Higher tier suppliers serve an intermediary role between lead firms and local suppliers. They usually have direct access to lead firms for negotiation and decisions over production-related activities. Lower tier suppliers are employed as 'price breakers' and 'capacity buffers' (which could be dropped at short notice) with no direct access to lead firms (Kuroiwa and Heng 2008).

The year of 1994 marked Southeast Asian countries crucial move toward deeper integration by kick-offing the ASEAN Free Trade Area (AFTA) agreement which was then followed by series of inter-regional free trade agreements (FTAs) with the region's major trading partners including particularly of China, Japan and Korea as a *finale* for the automotive industry incorporation to the GVC/GPN. Contemporary GVC and GPN practices are originated from and hence a part of long-debated concept on "economic regionalism." The debate refers to the effects of trade agreements among countries on their larger economic context, i.e. whether such agreements would create or divert economic benefits towards its member and non-member countries[41]. Emphasize is thus put more on the "zero-sum" nature of regional economic integration where participating and non-participating countries alike are struggling to pursue "limited" economic benefits of trade agreements.

1.3.2. Global Value Chain (GVC) and Global Production Network (GPN)

Introduction of GVC and GPN concepts –which immediately followed the concept of Global Commodity Chains (GCCs), discussed initially by Hopkins and Wallerstein (1986, 1994), and then elaborated thoroughly in the wake of massive economic globalization in 1990s by Gereffi (1994, 1995, 1996)— has redirected the debate on economic regionalism beyond traditional "state-centric" approach which relies on country-to-country trade performance. GVCs and GPNs practices –which are mostly operated under lasting (regional) trade agreements— have shifted the

[41]Viner (1950) coined the terms of "trade creation" and "trade diversion" to describe those effects of the formation of free trade agreement. Referring to recent phenomenon of regional trade agreements (RTAs), Baldwin (2004) recapped the debate in its more contemporary trade context as of whether RTAs are stepping stones or stumbling blocks of the multilateral trading system.

debate over whether developing a "positive-sum" scheme among participating parties in an integrated economic region should be the main concern. It thus broadens focus of the debate by encompassing non-state parties (particularly those of lead firms and their supply chains network) which are proposed in the later studies on GVCs and GPNs practices, such as indicated in Humphrey and Schmitz (2000), Gereffi and Fernandez-Stark (2001), Schmitz (2003), and Sturgeon (2008)[42].

Theoretical strands resulted from those early GVC and GPN conceptualization are focused on the analysis of value chain governance structures (Gereffi 1994, Gereffi et al 2005 and Sturgeon 2009), relational network configurations (Dicken at al 2001, Henderson et al 2002, and Yeung 2005), and industrial upgrading and the strategic coupling of clusters and regions (Humphrey and Schmitz et al 2002, Smith et al 2002, Coe at al 2004, Yeung 2009 and MacKinnon 2012). Nevertheless, as suggested by Yeung and Coe (2015), conceptual framework in the GVC research has been characterized by its dyadic and static conception of industrial governance, its relative neglect of territorial organization, and its failure to theorize competitive dynamics and evolutionary processes of "multi-commodity" and "multi-industry" production networks. It is in response to such limitation of GVC research framework that the so-called GPN 1.0 framework was then proposed.

Developed chiefly under the studies of economic geography and international political economy, GPN 1.0 emphasizes the complex firm networks and territorial institutions involved in all economic activity, and how these are structured both

[42] GVC and GPN are conceptually developed mainly in the studies of economic geography, economic sociology, development studies, regional studies, international economics and international business. Gereffi (1994) and Humphrey (1995) are among the pioneer works of GVC conceptualization, which then followed by works of Bair and Gereffi (2001), Gibbon (2001), Humphrey and Schmitz (2002), Sturgeon (2002), and Gereffi, Humphrey and Sturgeon (2005). The so-called Manchester School of Economic Geographers, meanwhile, began conceptualizing GPN as early as of 2000s. They consist of, among others, Dicken et al (2001), Henderson et al (2002), Coe et al (2004, 2008), and Yeung (2009).

organizationally and geographically (Yeung and Coe 2015). Development of GPN 1.0 framework aims at providing a more generally applicable conceptualization of the GPNs (Henderson et al 1999, 2002). Gaining influential role as a heuristic framework in economic geography research and the wider social sciences (Hess and Yeung 2006b, Coe, Hess and Dicken 2008, Coe 2009, 2012, and Neilson, Pritchard and Yeung 2014), GPN 1.0 proposed a theoretical claim that reframes previous GVC-GPN debates, i.e. away from industry-level generalizations, towards a more dynamic theory of GPN by focusing on the structural competitive dynamics and actor-specific strategies shaping the network and their organizational configuration within and across different industries and localities[43].

Much more dynamic changes in GPNs practices, especially during the past decade, has made GPN 1.0 obsolete in terms of how firms and other actors or stakeholders in a production network survive and sustain despite uncertain market conditions (re: since particularly the global financial turmoil of 2007-8 and it prolonged global market slumps). GPN 2.0 framework was then suggested as a more ambitious round of theoretical innovation that seeks to break signify new conceptual ground and to inform subsequent rounds of empirical research (Yeung and Coe 2015). In so doing, conceptualization on three competitive dynamics is offered, i.e. cost-capability ratio, sustaining market development, and working with financial discipline.

Theoretically it needs to be seen how those competitive dynamics –considered as the independent variables (IV) where their existence varies geographically— interact

[43] Under the GPN 1.0 framework, GPN is defined as an organizational arrangement comprising interconnected economic and non-economic actors coordinated by a global lead firm and producing goods or services across multiple geographic locations for worldwide markets. It therefore specifies "actors" as different types of firms as well as non-firms ones (such as the state, international organizations, labor groups, consumers, civil society organizations) in diverse localities. Thus GPN 1.0 analytical focus is: (1) actors; (2) their organizational relationships (that constitute GPN in different industries, with a lead firm being a central, necessary prerequisite); and (3) those multiple locations that are bound together by economic relations between these actors (Yeung and Coe 2015).

with firms and non-firms actors in generating actor-specific or firms-level strategies (considered as the dependent variables (DV) with their geographically specific manifestation). GPN 2.0 framework foresees the following four different firms-level or actor-specific strategies in organizing GPN: (1) intra-firm coordination, (2) inter-firm control; (3) inter-firm partnerships, and (4) extra-firm bargaining (Yeung and Coe 2015). With such a framework, GPN 2.0 would extend beyond the industry approach commonly found in the existing framework of value chain governance to the micro-level analysis of actors or stakeholders seeking for industrial upgrading and local development, i.e. to include efforts to capture value added generated in the network.

1.3.3. Adopting GPN 2.0 Framework

The micro-level analysis, which is also employed in this study in addition to the macro-level one, would catch specific responses of geographically situated firms and other stakeholders that are likely to adopt and pursue different strategies even within the same global industry, regional or national economy. The study therefore keens to further explore those firms-level/actor-specific strategies by purposely focusing on how they capture value added by taking the cases on Toyota, Denso and Aisin Seiki operated within ASEAN3-Japan automotive production network.

GPN 2.0 framework complements existing GVC analysis in inter-firm governance structures by identifying firms-level or actors-specific strategies in value addition activities at network formation stage and its industrial/territorial outcomes at the later capital accumulation stage. By so doing, it complements existing GVC analysis (such as on complexity and "codifiability" of inter-firm transactions and technology and knowledge capabilities within the supply chains) by offering causal explanation of the surrounding competitive dynamics and firms-level/actor-specific strategies[44].

Empirical research brought about by GPN 2.0 framework would need to go deeper into cases at firms-level value chains and upgrading strategies, industry-level structures, and other stakeholders (such as particularly host governments) specific strategies and policies for FDI promotion and industrial development. GPN 2.0 goes beyond the narrow focus of existing inter-firm governance structures in typical GVC typology. The framework offers a crucial backward step in developing a dynamic theory of (production) network formation and a forward move in analyzing more effectively the diverse industrial outcomes and territorial outcomes of such processes in the formation of (production) network (Yeung and Coe 2015).

Adopting such a framework, firms –such as in the cases of Toyota, Denso and Aisin Seiki— would need to cope with typical value chains which are depended on efforts in upgrading (adding values) of their production or manufacturing processes, range of products, product variety, differentiation, mix of activities and application of skills and/or knowledge in a variety of functions[45]. In so doing, firms typically will go through all the way from their upstream business activities to the downstream sides by introducing series of efficiency, cost-cutting efforts and at the same time acquiring

[44] In the case of Japanese automotive firms, which in this study is represented by Toyota, Denso and Aisin Seiki, the significance of adopting GPN 2.0 framework lay on these firms distinct apprehension in addressing competitive environment, i.e. by the utilization of a production system which is embedded in the overall company's business strategy). Theoretical development of GPN 2.0 is oriented towards such an apprehension, making cases on these three companies pretty much in line with the framework.

[45] Firms are typically adhere to typical value chains upgrading (process, product, functional and inter-chains), specific transaction features and value chains structures (hierarchical, captive, modular, relational and market). Diagrammatic elaboration depicting the application of such conceptual value chains upgrading and structures into the cases of Toyota, Denso and Aisin Seiki in ASEAN countries are offered in Diagrams A.4, A.5 and A.6 (see Annex 3 Conceptual Framework in Annexes).

added values in their production sites/facilities, product development, organization of their supply chains, and technological development[46].

Elaboration on how such a conceptualization is applied in the study (i.e. towards the adoption of GPN 2.0 framework) requires the following hypothetical steps. The first step is to adopt GVC/GPN (and its derivative RVC/RPN) concepts as alternative perspectives to comprehend East and Southeast Asian economic regional integration. The adoption stipulates a comprehension that regional economic integration is a sectoral phenomenon such as in the case of automotive production network. A comprehension that spans beyond conventional GVC/GPN theorization would capture: (1) nature of contemporary production network that features competitive dynamics and evolutionary processes of "multi-commodity" and "multi-industry" networks (under GPN 1.0 framework), and (2) much stiffer competition and more dynamic changes in the networks (following 2007/2008 global financial crisis and 2008-2012 global economic recession) requiring firms-level/actor-specific strategies for organizing the networks via intra-firm coordination, inter-firm control, inter-firm partnerships, and extra-firm bargaining (under GPN 2.0 framework).

The second step relates specifically to how stipulation under GPN 2.0 is essentially taken by firms and other relevant stakeholders, i.e. in capturing value added within the network. The study offers the following assertion. Postured as performing a hierarchical value chains structure, firm-level upgrading of GPN in automotive sector (including the case of Japanese automotive production network in

[46] In the cases of ASEAN3 and Japan GPNs in automotive sector, the study is to showcase Toyota, Denso and Aisin Seiki as prime illustration of lead firms endeavoring upgrading strategies.

Southeast Asia) follows an integrated-firm pattern where three-layers value chains are existed[47]:

(1) The lead firms are positioned at the center of value addition activities (which typically channel such activities through and in collaboration with their local partners/subsidiaries);

(2) The 1st-tier suppliers are then followed suit in the next layer (and in certain cases, like the lead firms, they conduct value addition activities through and in collaboration with their local affiliate suppliers);

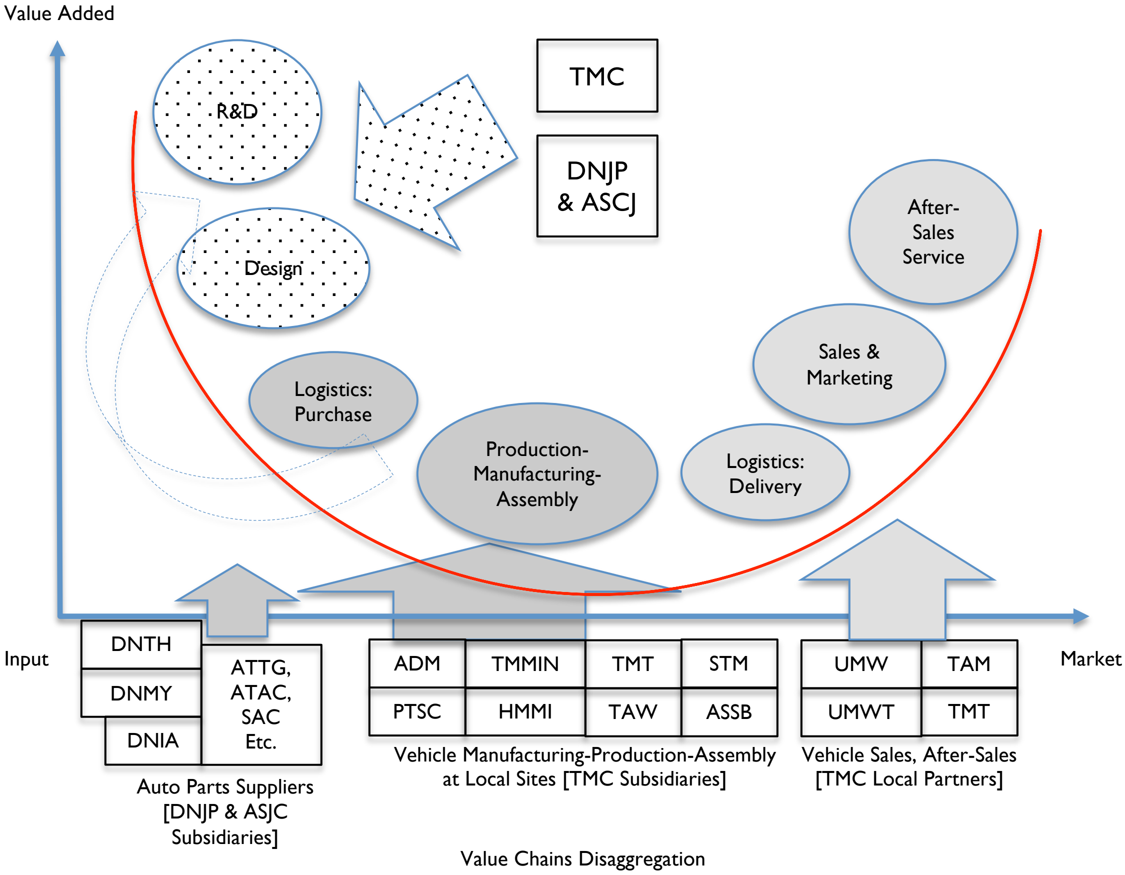
(3) The local partners/subsidiaries are consigned for value addition activities that are aimed at "localization" of production/manufacturing processes, e.g. to meet local content requirement and local market preferences (in car design and auxiliary car accessories).

In the third step, firm-level assessment under GPN 2.0 framework would yet require adoption of the original/conventional "smiley curve" of value creation, i.e. to depict value added as a function of value chains disaggregation that ranges from its input to market sides. The following Diagram 1.4 presents adopted original version of "smiley curve" of value creation for the case of Japan-ASEAN automotive production network with specific reference to Toyota, Denso and Aisin-Seiki. As shown in the diagram, the curve is a little skewed to the left, i.e. to hypothetically indicate that

[47] These three layers of value chains upgrading at firm level are applied in the case of Japanese automotive production network in ASEAN3 in which Toyota and Denso are selected as the working cases highlighting distinct strategy undertaken by the two companies as it differs from other leading OEMs or manufacturers in Japan (such as in the cases of Mazda, Honda or Nissan groups). The two companies operations cover collaborations with local partners/subsidiaries. Diagrammatic illustration is offered in Diagram A.3 (see Annex 3 Conceptual Framework in Annexes).

value added for downstream activities (of the market side) is smaller than the ones for the upstream (of the input side).

Diagram 1.4. Japan-ASEAN Automotive Value Chains: Cases on Toyota, Denso & Aisin-Seiki (Modeled After the Original "Smiley Curve")



Source: adapted from Shih (1996), Gereffi (2005, 2016), Mudambi (2008), Rabellotti (2014)

As shown in the above Diagram 1.4, value added at the downstream side is supposedly captured mainly through activities of TMC local partners in ASEAN3 (for vehicle sales, marketing and after-sales services). Value added at the upstream side is assumed to be the main portion of TMC and DNJP (for R&D and design). Manufacturing or production activities at the midstream side (which also include logistics activities) are taken by TMC and DNJP subsidiaries in ASEAN3. These subsidiaries cover auto part suppliers (of DNJP), vehicle manufacturers/assemblers (of TMC), vehicle sale agents and after-market service providers (which are also TMC local partners). Toyota subsidiaries operate mainly at midstream activities and its local partners operate fully only at downstream activities, with exception in the case of TMT and TMMIN/TAM which also conduct limited upstream (R&D and Design) activities; Denso subsidiaries operate at midstream and in certain cases (DNMY) also in upstream (R&D) activities for parts design development.

And finally, in line with GPN 2.0 framework, the study applies the value chains upgrading conceptualization that goes beyond firm level, i.e. to identify activities conducted by other relevant stakeholders in the network in their efforts for value addition. Examination is focused particularly on the host governments FDI and industrial development policies in a hierarchical value chains structure of the automotive industry[48].

1.4. Literature Surveys

This section reviews past works on relevant literatures as the study needs to go deeper into micro-level/firm-level/actor-specific value chains upgrading strategies. The following Table 1.3 illustrates major elements of the reviews, i.e. to include topics on value chains upgrading (i.e. typical upgrading activities in the value chains) by going beyond original model of "smiley curve" of value creation, firms strategy, regional value chains and host government FDI and industrial development policies. At firm-level strategy, review on past literatures on Toyota is also presented.

[48] Diagrammatic depiction of such conceptual endeavor to go beyond firm level (case on ASEAN3) is offered in Diagram A.7 (see Annex 3 Conceptual Framework in Annexes).

As presented in Table 1.3, on the topic of value chains upgrading, the study intends to redefine the original model of "smiley curve" value creation by offering a spatial dimension covering not only intra-firm level production chains, but also inter-firm ones which transcends/crosses national borders via regional production network as proposed in the works of Koopman et al (2010) on how to trace value added in global production chains, Banga (2013) on how to measure global value chains/GVCs and Ye, Meng & Wei (2015) on how to measure smiley curves in GVCs. With regards to strategy, the works by Watanabe (2014) on low fixed cost and factor price, Mariel & Minner (2015) on strategic capacity planning, and Aoki et al (2014) on *monozukuri* capability for product variety, Thome et al (2014) on supply chain flexibility, and Pietrobelli & Rabellotti (2011) on intra and inter-firm networks in the governance of GVC for international knowledge and innovation exchanges are discussed to explore past and latest theoretical development on common firm's strategic moves in light of production shifts and firms upgrading, hence gauging the position of this study within such a development.

On the topic of Toyota case, the works by Cusumano (1985) on Toyota Motor Company's manufacturing strategy, implementation and performance, and production management, Liker (2004) and Liker & Hoseus (2008) on Toyota Way and Toyota Production System (TPS), Ahmadjian & Lincoln (2000) on *keiretsu* and the Japanese automotive industry, and Schaede (2009) on reorganization of Japan's auto parts industry has indicated that theoretical development and scholarly discussion on Toyota production has been confined to "management-style" orientation and placed production activity (i.e. mostly in terms of TPS/Toyota Production System) merely as a function of management (under Toyota Way jargon).

Table 1.3. Classification on Past Works Reviewed

Topics	Literatures Reviewed	Discussions, Remarks
Value Chains Upgrading	Gereffi & Fernandez-Stark (2011), Gereffi et al (2005), Gereffi (2016), Pietrobelli & Rabelloti (2011), and Rabelloti (2014) on the concepts and methodologies of GVC, value chains, upgrading, and value chains structure	▪ Value chains (economic) upgrading as a particular concept and methodology in GVC to be utilized at firms-level, i.e. to comprehend transactions feature among firms/suppliers • Types of upgrading: process, product, functional, and inter-sectoral/inter-chains • Levels of transactions: complexity, codification and competence • Typical value chains structures: market, modular, relational, captive, hierarchical ▪ Automotive value chains as a hierarchical structure
	Shih (1996) on the original model of smiley curve of value creation; Gereffi (2016), Rabellotti (2014), Banga (2013), Koopman et al (2010), Mudambi (2008), Ye, Meng & Wei (2015), and Escaith (2013) on measuring GVCs and tracing value added in GPNs, measuring "smiley curve" and redefining the model	▪ Original "smiley curve": typical value chains upgrading at firm-level depicting differences between firms in the 1970s and the 2000s in the rate of the value added created ▪ Beyond "smiley curve": newly-introduced measurement of GVCs and new tracing methods of value added in GPNs, new methods to measure smiley curves in GVCs (DVA/FVA structure), locating value chains disaggregation (locational structure), and identifying values/benefit gains and distributional value added rate (distributional structure)
Firms Strategy		
Production Shifts & Upgrading Strategy	Watanabe (2014) on low fixed cost and factor price, Mariel & Minner (2015) on strategic capacity planning, and Aoki et al (2014) on *monozukuri* capability for product variety, Thome et al (2014) on supply chain flexibility, and Pietrobelli & Rabellotti (2011) on intra and inter-firm networks in the governance of GVC for international knowledge and innovation exchanges	▪ Productions shifts and other changes in the production network are observed to have impacts on firms' decision to fixed cost and factor price (Watanabe 2014) and to their strategic capacity planning (Mariel & Minner 2015) ▪ The decisions are ensued by firms' strategy to engage in value chains upgrading and capture value added which relies on their capability for product variety (Aoki et al 2014), flexibility on supply chains management (Thome et al 2014) and useful intra and inter-firm networks for international knowledge and innovation exchanges (Pietrobelli & Rabellotti 2011)
Technical Capacity Building & HRD	Wells & Nieuwenhuis (2012) on organizational endurance in technological transition, and Rabellotti (2014) on exchange of knowledge in GVC	▪ Important element of firms' successful strategy (i.e. to respond the changes and capture value added) deals with the notion of technical capacity building and human resource development (HRD) which relies on their organizational endurance in technological transition (Wells & Nieuwenhuis 2012) and their capacity to exchange knowledge in the GVC (Rabellotti 2014)

		▪ In hierarchical network structure (such as performed by the lead firms and their 1st tier suppliers and local affiliates/subsidiaries and partners), learning mechanisms include: • Imitation • Turnover of skilled managers and workers • Training by foreign leaders/managers and knowledge spillovers ▪ In modular, relational and captive network structures (such as performed by 2nd and lower tiers suppliers and sometimes also by local partners), learning mechanisms involve: • Learning through pressure to accomplish international standards • Transfer of knowledge embodied in standards, codes, technical definitions (in modular case) • Mutual learning from face to face interactions (in relational case) • Learning through deliberate knowledge transfer from lead firms that is confined to a narrow range of tasks (in captive case)
Case on Toyota	Cusumano (1985) on Toyota Motor Company's manufacturing strategy, implementation and performance, and production management, Liker (2004) and Liker & Hoseus (2008) on Toyota Way and Toyota Production System (TPS), Ahmadjian & Lincoln (2000) on *keiretsu* and the Japanese automotive industry, and Schaede (2009) on reorganization of Japan's auto parts industry	▪ Manufacturing productivity-cost differentials: vertical integration (sub-contracting), product mix, worker output and compensation, fixed assets, and productivity-cost advantage to which Toyota (and also Nissan) gained modernization and expansion by applying facilities rationalization, having new generation of manufacturing plants, applying automation and robotics (Cusumano 1985) • Toyota as a centralized and integrated system emphasizes on relations with subsidiaries and suppliers (that adopt decision against vertical integration) and engagement in development of component industry (which overall in contrast to Nissan Group strategy) • Toyota Production System (TPS) as a production management: large variety in small (or large) volumes, small-lot production, eliminating waste and idle time, just-in-time (JIT) pull system, lot size and rapid equipment setup, *Kanban* (manual control over the process flow), rejection of computer controls, rapid inventory turnover, impact on labor (which also in general different from Nissan Group strategy) ▪ TPS and Toyota Way as a management system (Liker 2004, Liker & Hoseus 2008) • Work on shop floor through trial and error *(genchi genbutsu)* • Waste elimination (positioning the component on the chassis, placing the bolts in the component, tightening the bolts to the chassis with the power tool) • Lean improvement, using pull system and avoiding over-production • Continuous improvement culture *(kaizen)* where engineers, managers and line workers collaborate continually to systematize production tasks and identify incremental changes to make work go more smoothly ▪ Transformation of business model and strategy in automotive industry since early 2000s: Toyota and other Japanese leading manufacturers application of "modulization" and a switch to global

		best sourcing for standard parts which has made 1st tier suppliers (Such as Denso) becoming even closer partners to large assemblers (such as Toyota) (Schaede 2009) ▪ Redefined *keiretsu* system in Japanese automotive industry (Ahmadjian & Lincoln 2000)
Regional Value Chains (RVCs)		Theoretical understanding on how to function RVCs which conveys the following policy dimensional setting
Lessons Learnt at Firm Level Setting	Nurcahyo & Wibowo (2015) on manufacturing capability & strategy, and Hasan et al (2014) on integrated supply chain management and new product development	▪ Learning mechanism of how upgrading is acquired at firm level, i.e. in terms of manufacturing capability and strategy (Nurcahyo & Wibowo 2015) and of integrating supply management and new product development (Hasan et al 2014)
Lessons Learnt Beyond Firm Level Setting	Saliola & Zanfei (2009) on knowledge transfer via value chains relationships, and Thoma & O'Sullivan (2011) on low cost innovation versus system innovation	▪ Policy mechanism of how business and innovation systems are developed beyond firms, i.e. in terms of knowledge transfer value chains relationships (Saliola & Zanfei 2009) and of selecting between low cost innovation versus system innovation (Thoma & O'Sullivan 2011)
Host Government Policy		Beyond firms-level: host governments' responses
FDI Promotion	F-Stark, Bamber & Gereffi (2012) on policy typologies: early reactive, on-going proactive & future-oriented interventions, Levy (2008) on GPN as contested field, and Rizzi et al (2014) on convergence of multi-sectoral investments	▪ FDI promotion is conceptually nested under policy typologies of whether it is an early reactive, on-going proactive or future-oriented intervention (F-Stark, Bamber & Gereffi 2012) ▪ Under current dynamic changes in the production network, efforts by host governments to successfully implement FDI promotion are subject to their responses to the GPN as a contested field (Levy 2008) and to the changing nature of contemporary FDI as a convergence of multi-sectoral investments (Rizzi et al 2014)
Industrial Development	Giuliani, Pietrobelli & Rabellotti (2005) on sectoral specificities in industrial clusters upgrading	▪ Concomitant to FDI promotion scheme, host governments' policy on industrial development needs to consider sectoral specificities in industrial clusters upgrading (Giuliani, Pietrobelli & Rabellotti 2005)
Linkages to Local Supporting Industries/SMEs	OECD (2008) and Fujita (2013) on suppliers SME participation in the value chains and suppliers learning trajectories	▪ In longer term, both FDI promotion and industrial development policy schemes entail linkages to local supporting industries and SMEs (small and medium enterprises) to endure domestic suppliers participation and their learning trajectories in the value chains (Fujita 2013)

1.4.1. Value Chains Upgrading: Going Beyond "Smiley Curve"

The study intends to go beyond original/conventional "smiley curve" model of value creation which emphasizes the differences of firms operated prior to the economic globalization (i.e. during the 1970s) and those operated after the era (i.e. in the 2000s) [49]. It instead endeavors to extend the concepts of value chains and upgrading at firms level. Typical value chains encompass process, product, functional and inter-sectoral/inter-chains upgrading (Gereffi and Fernandez-Stark 2011) [50]. Upgrading in the value chains is commonly apparent in the form of transactions among firms and suppliers in the GVCs/GPNs (Gereffi et al 2005, as also quoted in Pietrobelli & Rabelloti 2011)[51]. Typical value chains structure resulted from such transactions are defined based on their explicit coordination and power asymmetry levels. The higher they are, the more hierarchical, and the lower they are, the less hierarchical. Coordination among firms/suppliers and related stakeholders is

[49] Originated from early GVC/GPN theoretical framework, the model is originally proposed by Shih (1996), then adopted and developed by among others Gereffi (2005, 2016), Mudambi (2008), Rabelloti (2014). It maintains the idea that firms in the 2000s tend to be more efficient both in upstream and downstream activities making them to create more value added in the areas of R&D, design (upstream) and of marketing and services (downstream), while at the same time they tend to create less value added in midstream activities (especially in the areas of production and logistics). Firms in the 1970s therefore are considered as having less value added both in upstream and downstream activities, and tend to be dominated by production and logistics activities which make them less efficient in creating added value.

[50] A process upgrading commonly involves automation or any improvement of production techniques at manufacturing sites. A product upgrading covers areas of product differentiation and variation. A functional upgrading engages in mixture of upgrading activities where new skill functions are acquired by a firm. And finally, an inter-sectoral or inter-chains upgrading applies skills in a function (including the newly acquired ones) into a variety of functions.

[51] Transactions are conducted in line with the levels of its complexity (Cx-T) and codification (Cd-T), and of the competence of its major suppliers (SC). Cx-T represents complexity of transactions conducted by related players in the value chain, Cd-T denotes the level of codification of the transactions made by related players, and SC signifies the level of major suppliers competence in order to complete the transactions. Five types of transactions are typically identified: (1) market where Cx-T is usually low level, but Cd-T and SC are high levels, (2) modular where Cx-T, Cd-T and SC are all high levels, (3) relational where Cx-T and SC are high levels and Cd-T is low level, (4) captive where Cx-T and Cd-T are both high levels, but SC is low level, and finally (5) hierarchical where Cx-T is high level, but both Cd-T and SC are low levels.

conducted more explicitly in hierarchical value chains structure type rather than the market one. Relations among them hence tend to be more asymmetrical when they are in hierarchical type than the one in market type[52].

In terms of value chains structure, the study is therefore to redefine the original "smiley curve" model by offering a spatial dimension covering not only intra-firm level production chains, but also inter-firm ones which transcends/crosses national borders via regional production network. Works from Koopman et al (2010) on how to trace value added in global production chains, Banga (2013) on how to measure global value chains/GVCs and Ye, Meng & Wei (2015) on how to measure smiley curves in GVCs are to be reviewed and adopted in the study.

Referring to Ye, Meng & Wei (2015), positions of home and host countries in the GVCs (i.e. in terms of backward and forward linkages of the chains) affects how values are distributed and how the smiley curves are shaped overtime[53]. Changing positions of key industrial sectors linking to automotive production network are depended upon the following three features: industrial value added rate, distance to consumer and benefit gain. Such changing positions are then measured and illustrated in two-dimensional figures (as shown in the following Fig. 1.1, 1.2, 1.3 and 1.4) encompassing those three features.

The Y-axis represents the industrial value added rate, i.e. value-added gained by producing one unit US$ output. The X-axis embodies the distance, measured by the

[52] A hierarchical structure therefore is common within integrated firms where explicit coordination is of its core feature. A captive structure takes place where lead firms have direct control over their captive suppliers. A relational structure indicates the presence of relational suppliers who serve mainly as intermediaries between the lead firm and its component and material suppliers. A modular structure likewise suggests the emergence of turnkey suppliers who have managed, at certain stage, to convert their roles and position from mere component and material suppliers. A market structure eventually represents symmetric relations between suppliers and lead firms, especially in terms of the use of market price as the sole mechanism.

[53] Japanese automotive value chains in Southeast Asia and its smiley curve are assumed as shaped in line with the changing positions of backward and forward linkages of key industries/industrial sectors in both home (Japan) and host (ASEAN) countries automotive production network.

value-added propagation length, between a specific industry that is a participant in the corresponding value chain and the world consumers. Features of benefit gain are indicated by the size of circles representing the absolute value-added gained by joining the corresponding value chain (unit: million US$ at constant prices). Additionally, a smooth line is fitted by local polynomial regression smoothing weighted by their value-added gained, and shadowed area shows the confidence interval around the smoothed line.

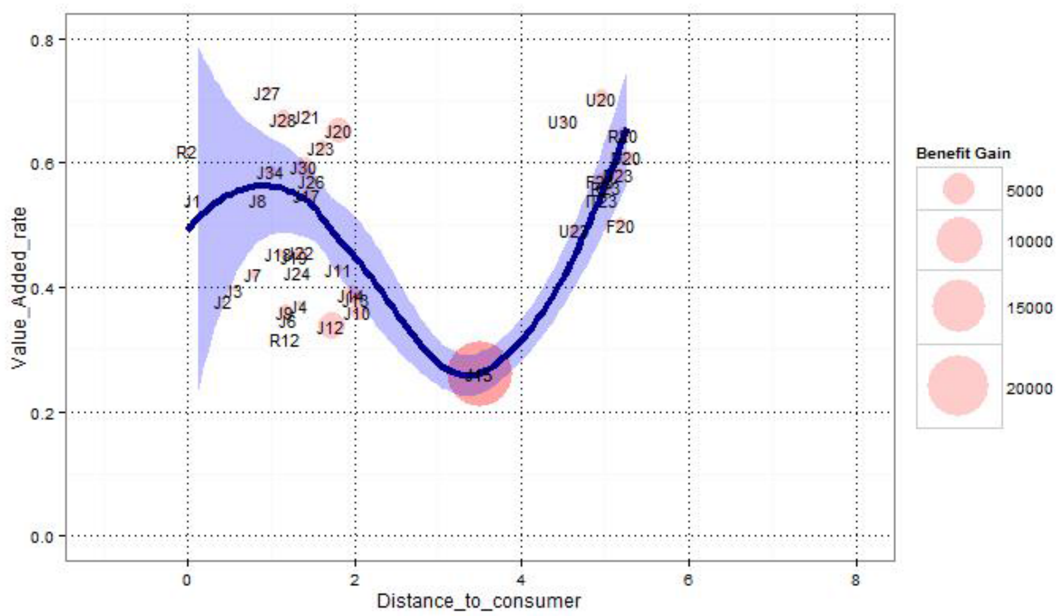
Referring to macro-empirical/statistical regression analytical works conducted by Ye, Meng & Wei (2015), the V-shape smiley curves have been identified in the two cases of value chains for Japanese automotive exports and foreign participants in the Japanese automotive value chains. In the assessment, a number of countries (coded by letters) participating in the chains, and product and service categories (coded by numbers) relating to automotive are covered. Key participating countries include Japan, China, Korea, USA, India, Russia, Germany, France and Australia. Key product categories include transport equipment, basic metals and fabricated metals, rubber and plastics, and electrical and optical equipment. Service categories include wholesale and commission trade, retail trade, and inland transport)[54].

In the first case (i.e. of Japanese automotive exports value chains), the following Fig. 1.1 and Fig. 1.2 illustrates changes in the chains smiley curves for the year 2005

[54] Notes for abbreviations (for country or group of countries classification) and code numbers (for WIOD industrial sectors classification) in the above Fig.1.1, 1.2, 1.3 and 1.4: (1) on country names: AU (Australia), BR (Brazil), C (China), D (Germany), F (France), IN (India), J (Japan), K (Korea), R (Rest of the World), RU (Russia), U (USA); (2) on product/service categories: 2 (Mining and Quarrying), 9 (Chemicals and Chemical Products), 10 (Rubber and Plastics), 11 (Other Non-Metallic Minerals), 12 (Basic Metals and Fabricated Metals), 13 (Machinery, not elsewhere classified/nec), 14 (Electrical and Optical Equipment), 15 (transport equipment), 16 (Manufacturing, nec and Recycling), 19 (Sale, Maintenance and Repair of Motor Vehicles and Motorcycles, Retail Sale of Fuel), 20 (Wholesale Trade and Commission Trade, except of Motor Vehicles and Motorcycles), 21 (Retail Trade, except of Motor Vehicles and Motorcycles), 23 (Inland Transport), 26 (Other Supporting and Auxiliary Transport Activities, Activities of Travel Agencies), 28 (Financial Intermediation), 30 (Renting of Machinery and Equipment and Other Business Activities).

and 2011 respectively (Ye, Meng & Wei 2015). In 2005, as shown in Fig. 1.1, the Japanese automotive export value added rate was varied across product/service categories with J15 (transport equipment) captured the largest benefit gain with a value added rate that was below all other product/service categories which were mostly located at the upstream activities (i.e. longer distance to consumer).

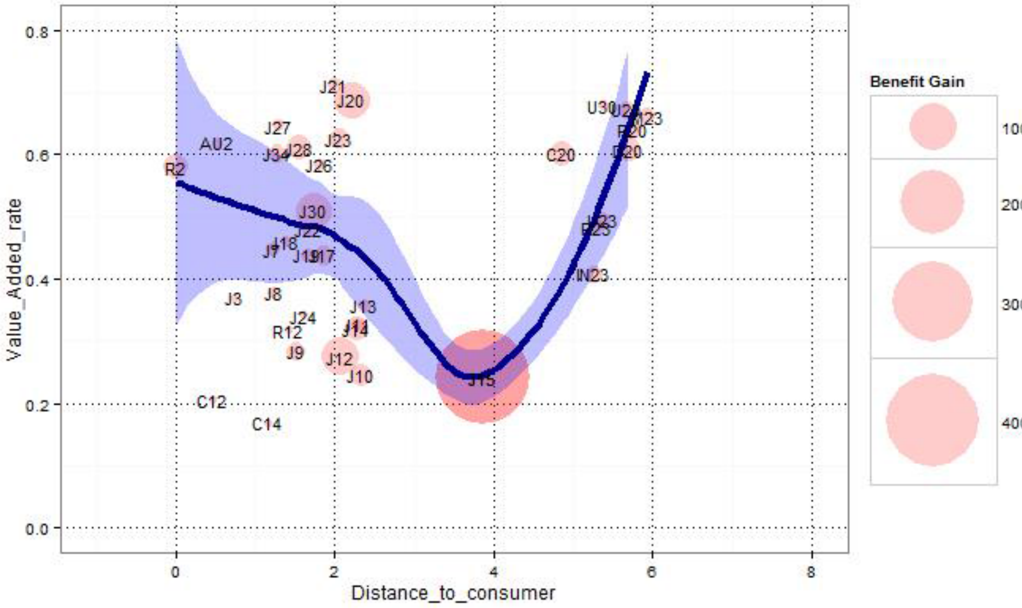
Fig. 1.1. Value Chains for Japanese Auto Exports (2005)



Source: Ye, Meng & Wei (2015)

As also suggested in Fig. 1.1 (represented in both smoothed line and shadowed area), the Japanese automotive export value chains are segregated into two large groups, i.e. (1) products closely linked to manufacturing activities (e.g. J12/basic metals and fabricated metals, J10/rubber and plastics, and J14/electrical and optical equipment) with averagely lower value added rate, (2) services supporting exportation activities (e.g. J20/wholesale trade and commission trade, except of motor vehicles and motorcycles, J21/retail trade, except of motor vehicles and motorcycles, and J23/inland transport) with averagely higher value added rate.

Fig.1.2. Value Chains for Japanese Auto Exports (2011)



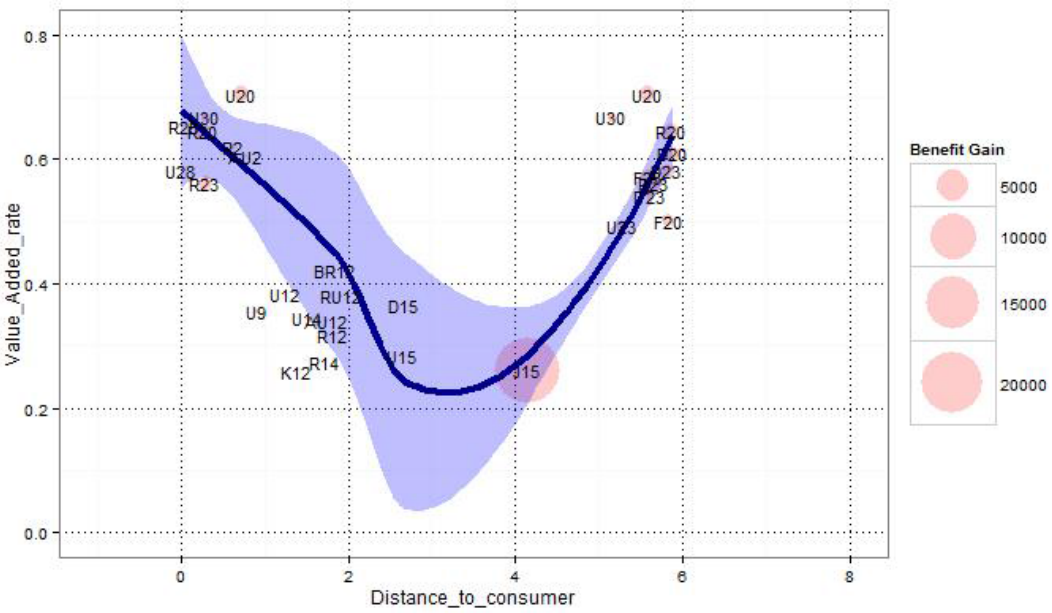
Source: Ye, Meng & Wei (2015)

In 2011, the overall trends were resembled to that of the 2005. However, as shown in Fig. 1.2, the 2011 V-shape smiley curve looks much deeper and wider than that of 2005 indicating that value chain for cars produced in Japan and consumed abroad has more production stages on average than the pre or post-production ones. The figures also suggested that more intermediary (including imported) inputs are required than primary ones in the process of producing a unit of car. Overtime (2005 to 2011), Japanese large automotive firms or OEMs (original equipment manufacturers) have expanded their benefit gains for approximately twice as much (as shown in Japanese Transport Equipment (J15) benefit gains for both years)[55].

[55] Japanese domestic industries were the most benefitting participants in the pre-fabrication (pre-production) stages of the value chain for both years (2005 and 2011), especially for J9, J10, J12, J20, J21 and J30. However, differences in value added rates across domestic industries increased remarkably as the value added rate for most domestic manufacturing industries decreased between 2005 and 2011. The most likely reason of such changes, according to Ye, Meng & Wei (2915), was the competitive pressure from foreign participants in the pre-fabrication stage of this value chains, e.g. (as shown in Fig. 1.2 for 2011) China's chemical (C12) and electrical and optical equipment (C14) industries have involved in the Japan auto value chains with a relatively low value added rate, making them more competitive than equivalent industries in Japan should the price of intermediate inputs and technology is the same for both China and Japan chemical and electrical and optical equipment.

In the second case (i.e. of foreign participants in the Japanese automotive value chains), the following Fig. 1.3 and Fig. 1.4 illustrate changes in the chains smiley curves for the year 2005 and 2011 respectively (Ye, Meng & Wei 2015). In 2005, as shown in Fig. 1.3, among the participating countries Japan captured the major benefit gain in products under category of transport equipment (J15) with lower value added rate compared to other countries in varied product/service categories. However, the value added gained trough transport equipment by Japan is located closer to the consumer indicating that more manufacturing activities have been conducted closer to the final market destination.

Fig. 1.3. Foreign Participants in the Japanese Auto Value Chains (2005)

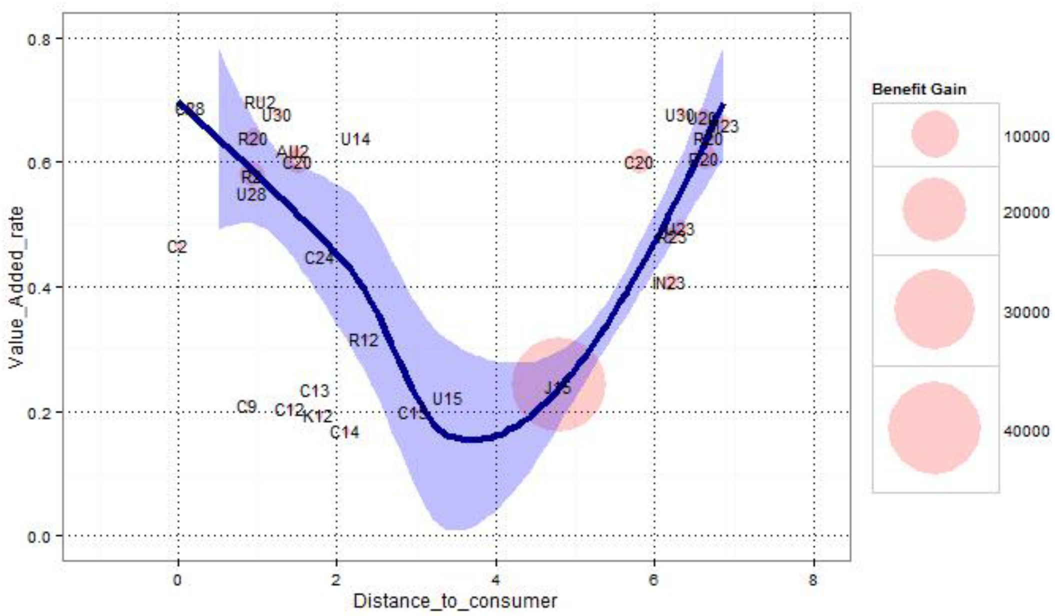


Source: Ye et al (2015)

As also suggested in Fig. 1.3, all other participating countries except Germany (D15) and USA (U15) captured value added in product categories other than transport equipment. This suggests that a full-scale automotive manufacturing has not yet generated value added larger than or as large as the one generated in Japan, Germany and USA. However, as indicated in both smoothed line and shadowed area in Fig. 1.3, trends in value added rate for participating countries outside those three principal countries have been located both in upstream activities (such as in the cases of RU2, AU2, C2 in mining and quarrying, and C12, K12, RU12 in basic metals and fabricated metals) and downstream activities (such as in the cases of R20, F20, C20 in wholesale trade and commission trade, and IN23 and C23 in inland transport).

In 2011, as shown in Fig. 1.4, the V-shape smiley curve looks even much deeper and wider than those curves of the value chains for Japanese auto exports. Such a deeper and wider smiley curve (as measured since 2005 to 2011) also shows the notable appearance of China participation in the Japanese auto value chains (see especially in cases of the following industries: C2, C13, C9, C12, C14 and C15 in the 2011 figure). China has also captured value added from basic metals and fabricated metals (C13). This specific product category for China was not appeared in the 2005 figure (as indicated in Fig. 1.3).

Fig. 1.4. Foreign Participants in the Japanese Auto Value Chains (2011)



Source: Ye et al (2015)

Based on those macro-empirical measurements on smiley curve of Japanese automotive export value chains and of foreign participants in the Japanese automotive value chains (Ye, Meng & Wei 2015), the following highlights are noted in light of redefining the smiley curve at intra and inter-firm levels in a spatially defined regional production network, i.e. in particular for the adoption of case on Toyota value chains in Southeast Asia:

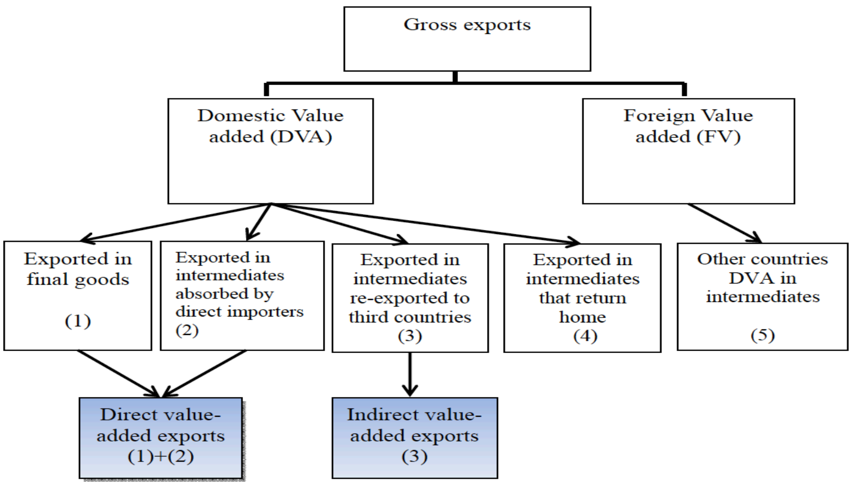
1. Home and host countries asymmetrical participation in the GVCs (i.e. in terms of share in total value added created by GVCs) (Banga 2013) where (as of 2013):
   - Japan captured 4.5% (with share in forward linkage reached to 6.1% and share in backward linkage is only up to 2.8%)
   - Thailand, Indonesia, Malaysia, Singapore and the Philippines captured less than 1% each
2. Home and host countries differing shares of low tech manufacturing in total foreign value added (FVA) in gross exports where (based on Banga 2013):
   - Japan's share was approximately 2%, while average share of ASEAN countries was 20%
   - Japan's share of medium and high tech manufacturing in total FVA therefore was up to around 98%, and its ASEAN partners had around 80% on average
3. Decomposition of gross exports for both home and host countries in which (based on Koopman et al 2010):
   - Gross exports are conceptually decomposed into domestic value added (DVA) and foreign value added (FVA)[56];

[56] DVA is domestic value added embodied in foreign final demand (FFD-DVA) and FVA is foreign value added embodied in domestic final demand (DFD-FVA). See Chapter 2 for more elaboration and description on these two types of value added, i.e. when adopted in the case of Japan-ASEAN automotive trade.

- DVA is then decomposed as: exported in final goods (1), intermediate goods absorbed by direct importers (2), intermediate goods re-exported to third countries (3), and intermediate goods that return home (4)
- FVA is decomposed and become other countries DVA in intermediates (5)
  - (1) + (2) is direct value added of exports, whilst (3) is indirect value added of exports
  - Trends of DVA (1+2), DVA (3) and FVA (5) of Japanese automotive trade with key Southeast Asia partners (presented in details in Chapter 2) affirm those decomposed features of Japanese firms intra and inter-firm trade in its exportation for parts and components transfer/procurement among lead firms/principal OEMs, 1st–tier suppliers and their local subsidiaries and partners[57].

The following Diagram 1.5 illustrates conceptual decomposition of gross exports as previously explained:

Diagram 1.5. Decomposition of Gross Exports: Concepts

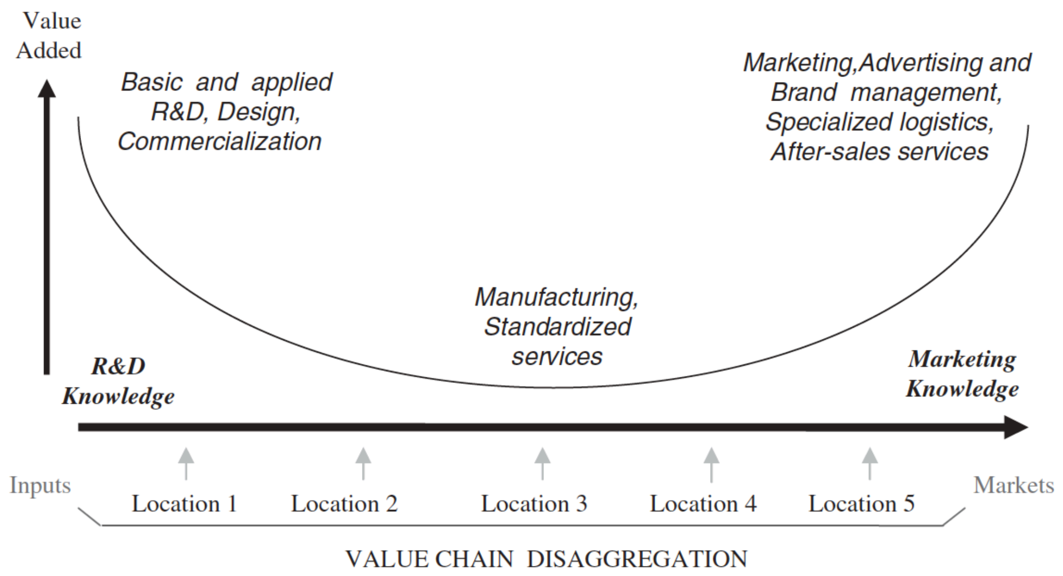


Source: Koopman et al (2010)

[57] Numbers in brackets refer to Diagram 1.5.

Additional method on how to redefine the original model of smiley curve is also proposed in terms of its spatial dimension/locational structure (Mudambi 2008). The following Diagram 1.6 depicts such a method:

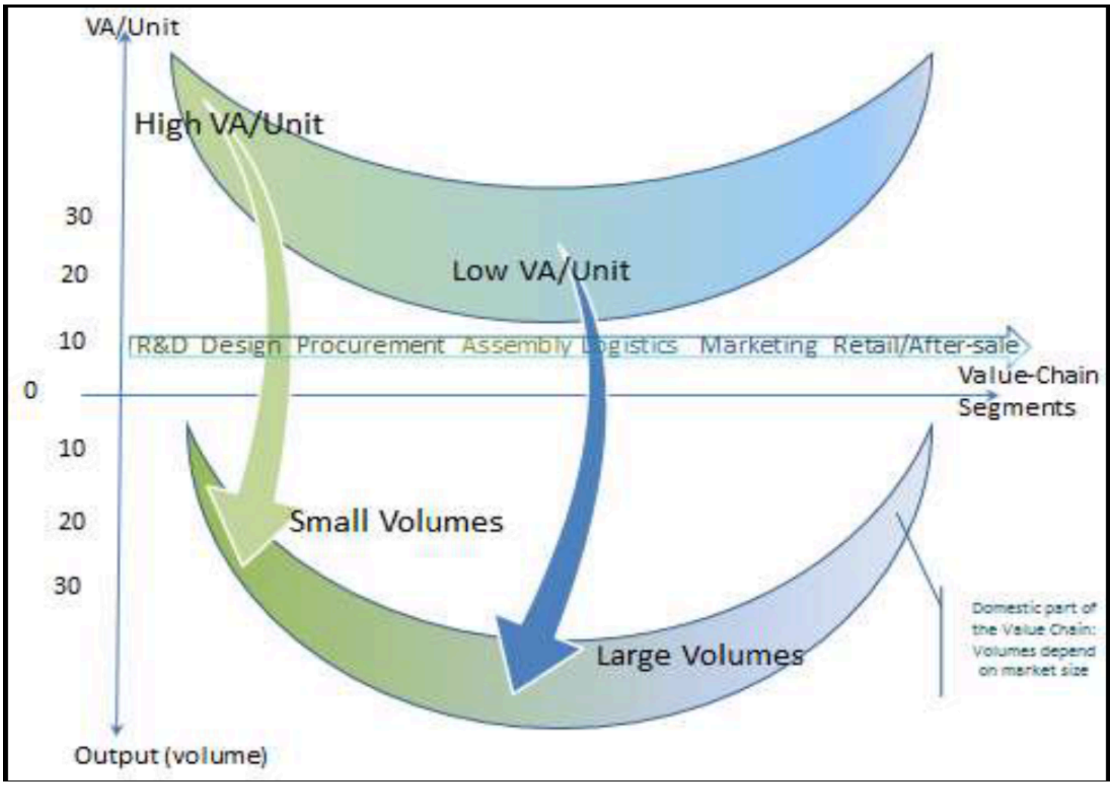
Diagram 1.6. Smiley Curve of Value Creation based on Location



Source: Mudambi (2008)

Last but not least, Escaith (2013) proposes a method that is based on benefit gains and distributional value added rates which he called as "double smiley curve" of value creation. The double smiley curve offers understanding of value chains as having two dimensional value added rates, i.e. the value added per unit (VA/unit) and the output (i.e. in terms of volume) itself. With such an understanding, firms capture or create high or low value added rates that are based on their VA/unit and small or Large volume of value added based on overall output. Such a comprehension also implies that high VA/unit results in small volumes of value added output and low VA/unit results in large volumes of value added output. The following Diagram 1.7 depicts the model:

Diagram 1.7. The Double Smiley Curve



Source: Escaith (2013)

1.4.2. Firms Strategy

"Low fixed cost and factor price" strategy (Watanabe 2014) and strategic capacity planning (Mariel and Minner 2015) are applied in response to production shifts and changes in the production network. The low fixed cost and factor price strategy is offered in cases where firms are engaged in the so-called "vertical disintegration" which lowers entry cost and induces vigorous entry[58]. On the other

[58] Based on a qualitative research on the Chinese industrialization, Watanabe (2014) –who suggested the strategy— collected a wide range of studies covering automobiles, motorcycles, electronics, agriculture, finance, pharmaceutical, and coal and energy industries in which firms engage in a combined strategy for low fixed cost and factor price in light of vigorous entry and slow exit.

hand, strategic capacity planning is preferably utilized by firms with solid "vertical integration" feature such as in the automotive industry[59].

In terms of upgrading strategy, automotive firms typically take *monozukuri* capability[60] for product variety, especially in the case of Japanese firms (Aoki et al 2014), supply chain flexibility (Thome et al 2014), and intra and inter-firm networks in the value chains (Pietrobelli & Rabellotti 2011). As highlighted by Aoki et al (2014), *monozukuri* capability confirms a new understanding of Japanese manufacturing model that is based on an integrative perspective between production, sales and purchasing activities. Flexible supply chains contribute to ease inter-organizational manufacturing activities in multi-tier OEMs such as in the automotive industry (Thome et al 2014). Intra and inter-firm networks hence are essential if firms are to acquire impacts of international knowledge and innovation exchanges within the GVC as part of strategy for value added (Pietrobelli & Rabellotti 2011).

Efforts to capture value added have been linked to technical capacity building and HRD. The efforts are engaged in the context of technological transition where organizational endurance of firms is its main feature (Wells & Nieuwenhuis 2012) and of knowledge exchanges among firms (Rabellotti 2014). Wells & Nieuwenhuis (2012) suggest that technological transition is a process where various existing practices and structures are retained more or less intact rather than entirely replaced by new practices and structures. The authors maintain that automotive

[59] Mariel and Minner (2015) maintain that firms in the automotive industry employ strategic capacity decisions when facing with impacts of duties and drawbacks by designing production networks while capitalizing on economies of scale through the central production of components.

[60] In its recent context, the often-cited definition of *monozukuri* is introduced by Takahiro Fujimoto (in "*Nihon no Monozukuri tetsugaku*-Japanese Philosophy of Manufacturing", *Nihon Keizai Shinbunsha*, Tokyo, 2004) in which he defines it as "the duplication of design data into a material." Capability as defined by Kim Warren (in *Competitive Strategy Dynamics,* Wiley, England, 2002) is strategic resources to perform the business. Fujimoto (2004) thenceforth defines 3 (three) levels of capability, i.e. static capability, improvement capability and evolutionary capability (Fukushima and Yamaguchi 2009).

industrial technological change is an incremental process requiring long-term technical capacity building and HRD strategy.

In addition to that, Wells & Nieuwenhuis (2012) suggest the following key features underpinning continuity in technological transition which are related to the role of vehicle manufactures as pivotal organizations and to their wider socio-economic setting. Initial combination of product technology, process technology and organizational design to create a universally powerful business model that is able to displace alternative technologies and business practices, and continues to act by providing significant barriers to entry. This initial advantage was reinforced by the scope for continuous improvement in product technology (e.g. in terms of safety, fuel economy, comfort, ease of use, and performance) and process technology (e.g. in terms of automation, productivity gains, and reduced pollution).

The industry as a whole had a development path that allowed profitability to be restored through organizational improvement measures such as purchasing strategies, mergers, acquisitions, and platform strategies. Organizational isomorphism and internal resistance to change that may act to prevent dominant organizations from making adjustments (in which encountering business-to-business relations that are external to the dominant organization is needed). The industry as a whole and the vehicle manufacturers in particular have been able to absorb and control change, through acquisitions and alliances with potentially destabilizing entities in a process of niche capture.

The increasing scale and significance of the industry over a period of decades allowed the embedding of the automotive industry as economically critical, thereby providing the leverage to enjoy a privileged status in policy terms, such that more recent incremental technology improvements (e.g. hybrids) provided resilience in the face of exogenous changes such as higher oil prices or increasingly stringent regulation on CO2 emissions. And, finally, the cultural status of the car (and of mobility) as currently defined, and the spatial structures and social practices built around car ownership and use, are largely predicated on existing vehicle technologies that have been reinforced by adept and powerful lobbying and advertising.

It is in such long-term strategy that the automotive industry performs exchanges of knowledge where predominant learning mechanisms existed in its value chains network structures as suggested by Rabelloti (2014). In its hierarchical network structure (such as performed by the lead firms and their 1st tier suppliers and local affiliates/subsidiaries and partners), prevalent learning mechanisms include imitation, turnover of skilled managers and workers, training by foreign leaders/managers and knowledge spillovers. In its modular, relational and captive network structures (such as performed by 2nd and lower tiers suppliers and sometimes also by local partners), leading learning mechanisms involve learning through pressure to accomplish international standards; transfer of knowledge embodied in standards, codes and technical definitions (in modular case); mutual learning from face to face interactions (in relational case); learning through deliberate knowledge transfer from lead firms that is confined to a narrow range of tasks (in captive case).

1.4.3. Case on Toyota

The case on Toyota production strategy feature predominantly generic and general understanding on the company's renowned Toyota Production System (TPS) such as offered in the classic work of Ohno (1988) and his earlier original work in

Japanese, *Toyota seisan hoshiki* (1978). The work was soon followed by such scholars as Cusumano (1985) who compares Toyota and Nissan production systems, Womack, Jones, & Roos (1990) who equates and explore TPS as a lean production, Monden (2012) who takes in detailed description of TPS as a just-in-time (JIT) production process and management, Liker (2004) and Liker & Hoseus (2008) who illuminate TPS derivative management concept and practices of Toyota Way[61].

As noted by Cusumano (1985), Toyota (and also Nissan) gained modernization and expansion, relatively more progressive to other manufacturers in Europe and the US, by applying facilities rationalization, having new generation of manufacturing plants, applying automation and robotics. The strategy is in parallel with decent manufacturing productivity-cost calculation where vertical integration (sub-contracting), product mix, worker output and compensation, fixed assets, productivity-cost advantage (scale economies, suppliers, levels of investment, utilization rates and labor policies) have continually been applied since 1980s onward.

Based on such a strategy, according to Cusumano (1985), Toyota has applied a centralized and integrated production system which emphasizes on relations with subsidiaries and suppliers (adopting decision that is against vertical integration) and on engagement to development of component industry. Its Toyota Production System (TPS) is adopted as a production management where the company applies the following production principles: large variety in small (or large) volumes, small-lot production, eliminating waste and idle time, just-in-time (JIT) pull system, lot size and rapid equipment setup, *Kanban* (manual control over the process flow), rejection of

[61] Such a basic understanding on TPS offer a conceptual framework to the actual operation of Toyota-led RVCs which is in turn essential in assessing contribution of Toyota and other typical automotive OEMs in regional economic integration. Analysis on the Toyota-led RVCs is presented in Chapter 4.

computer controls, rapid inventory turnover, impact specifications on labor. TPS application has made Toyota strategy is in contrast to the Nissan Group one.

TPS and Toyota Way as a management system (such as suggested by Liker 2004, Liker & Hoseus 2008) has been applied on shop floor as a trial and error mechanism *(genchi genbutsu)*. It is also considered as waste elimination, i.e. by positioning the component on the chassis, placing the bolts in the component, tightening the bolts to the chassis with the power tool. TPS is overall a lean improvement (using pull system and avoiding over-production) system and a continuous improvement culture *(kaizen)* where engineers, managers and line workers collaborate continually to systematize production tasks and identify incremental changes to make work go more smoothly.

Transformation of business model and strategy in automotive industry since early 2000s, however, has made Toyota and other Japanese leading manufacturers or OEM (original equipment manufacturers) to apply "modulization" and switch to global best sourcing for standard parts (Schaede 2009). The move has further made the 1st tier suppliers (such as Denso) becoming even closer partners to large assemblers (such as Toyota). In parallel with changes in *keiretsu* practices in Japanese automotive industry (Ahmadjian & Lincoln 2000), as early as of 2000s, lead manufacturers/OEMs (including especially Toyota) have observed a qualitative shift in sub-contracting towards a more strategic identification of main (1st tier) suppliers of particularly electronics parts and components (which in the case of Toyota is mainly served by Denso). It is through "modulization" strategy that 1st-tier suppliers such as Denso have exclusive relations with OEMs such as Toyota, thank is to their superior technological and production capacity for procurement of modules in electronics parts and components.

1.4.4. Regional Value Chains (RVCs)

In terms of RVCs policy dimensions, lessons to be learnt are both at firm and beyond firm levels, i.e. how firms learn mechanics to upgrade and how other policy stakeholders learn in advancing business and innovation systems. At firm level, two areas of learning mechanism are addressed, i.e. manufacturing capability and strategy (Nurcahyo & Wibowo 2015) and integrated supply chain management (SCM) and new product development (NPD) (Hasan et al 2014). Beyond firm level, policy mechanisms are developed through knowledge transfer via value chains relationships (Saliola & Zanfei 2009) and through efforts to benefitting from both low cost and system innovations (Thoma & O'Sullivan 2011)[62].

Referring to the case on automotive component manufacturers in Indonesia, Nurcahyo and Wibowo (2015) asserts that manufacturing capability serves as the spearhead in manufacturing strategy as it directly links to product quality[63]. Both in turn affect the company's overall manufacturing performance. Manufacturing firms, especially in automotive-related products as asserted by Hasan et al (2014), need to develop SCM incorporated with NPD. Analyzing the AS-IS situation in automotive business process model, the authors suggest that integrated SCM-NPD allows OEMs and suppliers to upgrade in the value chains. Value chains coordination encourages knowledge transfer among firms and suppliers (Saliola & Zanfei 2009) and, in much longer term, leads to innovations (Thoma & O'Sullivan 2011).

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[62] Low cost innovation refers to the Chinese automotive industry which succeeds through disruptive innovation pattern (e.g. electric vehicle/EV technology leapfrogs), while system innovation refers to the European (especially German) automotive industry which succeeds through system integration (e.g. premium cars and perfection in technology integration) (Thoma & O'Sullivan 2011).

[63] Manufacturing capability includes operators' skills and knowledge, whereas manufacturing strategy covers areas such as delivery, quality and cost strategies (Nurcahyo and Wibowo 2015).

1.4.5. Host Government Policy

Under GVC/GPN framework, strategic responses of the host governments for value chains upgrading (including those of relating to the automotive industry) are categorized under three areas, i.e. FDI promotion, industrial development and linkages to local supporting industries. In the area of FDI promotion, policies have specific characteristics that are based on the nature of responses as they are implemented and are typically categorized as early reactive, on-going proactive & future-oriented interventions (F-Stark, Bamber & Gereffi 2012). Policy formulation and its subsequent decision making processes are therefore linked to the GPN as a contested field among competing sectoral interests (Levy 2008). Albeit this contested nature, GPN-oriented policies are prone to convergence of multi-sectoral investments which in turn make way for deepened participation in the GPN (Rizzi et al 2014).

In the area of industrial development, adoption of industrial clusters strategy that relies on "sectoral specificities" for value chains upgrading is preferred by host governments (Giuliani, Pietrobelli & Rabellotti 2005)[64]. The strategy aims at linking industrial clustering, GVCs, upgrading and sectoral pattern of innovation in order to help local firms and suppliers (particularly SMEs) successfully participate in the global markets. Successful engagement by local suppliers and SMEs in the global markets relies on their participation in the value chains and upon their assignation to learn for upgrading, i.e. how they (along with lead firms and other stakeholders) develop

[64] In the case of East and Southeast Asia, Taiwanese and Malaysian governments adopted such strategy in order to link local suppliers and SMEs to the GPNs in electronics and electrical appliances sectors since end of the 1970s onward.

learning trajectories that are changing and self-sustained over time, as suggested in the cases of India and South African automotive SMEs (OECD 2008) and Vietnamese motorcycle SMEs (Fujita 2013)[65].

1.5. Originality and Novelty

As part of an endeavor in International Relations/International Political Economy (IR/IPE) study to understand phenomenon of economic regionalization/integration, introduction of GVC and GPN concepts puts forward alternate explanation to the long-debated contending approaches on economic regionalism/integration in IR/IPE, i.e. the neo-functionalism and inter-governmentalism camps. Concept on value chains upgrading that moves beyond original GVC/GPN analysis –which emphasizes the value chain governance structures, the relational network configurations of industrial upgrading and the strategic coupling of clusters and regions— has further shifted the debates. The shift contributes to the IR/IPE understanding on the roles taken by relevant GPN stakeholders in the value addition activities.

Contemporary analysis of GPN 1.0 that is followed by GPN 2.0 helps to explain how the automotive sector stakeholders (particularly firms, their suppliers and local partners and/or subsidiaries) respond strategically in spite of dynamic changes in

[65] The Vietnamese case offers much less complexity of manufacturing and production networks of the motorcycle industry than the automotive ones. However, in the context of learning trajectories, the case worth noticed particularly in terms of the technical know-how is accumulated. Based on firm-level data collected through extensive fieldwork and a deep historical analysis on local Vietnamese suppliers of motorcycle components, Fujita (2013) made an assessment on types of value chains developed by two groups of leading manufacturing firms in the country (i.e. the Japanese and the Vietnamese-Chinese chains) for accumulating strategic know-how. The author suggests that suppliers' learning trajectories have evolved over time resulting in a learning performance divergence extending across suppliers. High-performing suppliers in the later stage of industrial development accumulated basic innovative expertise, constituting solid foundation of the industry. This diverging performance is attributable to lead firms as they induce and facilitate supplier learning. The suppliers in turn mobilize their own sources of knowledge and made it viable for the learning process to be self-sustained.

contemporary GPNs. GPN 1.0 is an effort to respond early GVC/GPN analysis that is characterized by its dyadic and static conception of industrial governance, its relative neglect of territorial organization, and its failure to theorize competitive dynamics and evolutionary processes of "multi-commodity" and "multi-industry" production networks. GPN 2.0 meanwhile is a response to much more dynamic changes in GVC/GPN practices during the past decade, i.e. in terms of how firms and other actors or stakeholders in a production network survive and sustain despite uncertain market conditions.

The case of Japan-ASEAN automotive production network offers empirical research ground that brought about by the GPN 2.0 framework. The case suggest an in-depth analysis that goes deeper into cases at firms-level strategies, industry-level structures, and other stakeholders (such as particularly the hosting governments) specific strategies for investment promotion and industrial development. By doing so, the study endeavors to outline key policy issues that are necessary in further functioning RVCs of the automotive sector/industry.

Chapter 2

Patterns and Trends in Value Added of Japan Automotive Trade in Southeast Asia

This chapter presents the macro-level setting of Japan automotive production network in Southeast Asia since the 1990s. It aims to comprehend changes in the trade patterns and trends in value added overlaying Japanese automotive production network in the region. Overall trade context, i.e. in the 1990s, 2000s and 2010s, is obtained through macro data analysis on trade in goods related to automotive (based on the UN Comtrade Harmonized System/HS 87-vehicles other than railway, tramway), and trends in value added of goods related to automotive (based on the OECD-WTO Trade in Value Added/TiVA Standard International Trade Classification/SITC C34T35-transport equipment).

Limitation of such an analysis, however, lies in its core feature that is not offering much detailed description on goods being transferred by and among firms and their partners/subsidiaries and suppliers which enable to assess its actual value added-ness. The analysis instead offers general patterns of exchanges of goods under UN Comtrade HS 87 (up to four and six digits level) and general trends in value added of goods exchanges under TiVA SITC C34T35 (for the foreign and domestic value added content of exported goods). Thus, with such a limitation, feature which indicate more specific feature of automotive parts and components shifted among or between countries in the production network is not apprehended. The study hence advances micro-level or firm-level analysis in the next Chapter 3 to apprehend more empirical phenomena of the production shifts.

Taking into accounts such a limitation and in order to meet the purpose outlined previously, this chapter –consisting of five sections— is structured as follows. In the first section, essential features of East and Southeast Asia participation in world manufacture trade are presented to showcase the regions' deepening integration into the global production networks (GPNs) in which automotive is one of its primary sectors. In the second section, the two regions trade activities in automotive sector are presented with reference to its general and detailed pattern (designating particularly to Japan-ASEAN nexus).

In the third section, a focused case in point on Japan-ASEAN3 (Indonesia, Malaysia and Thailand) automotive trade is presented to highlight its overall trade performance (in HS 87), Japan and ASEAN3 trade in four key automotive products categories (in 4-digits level HS 87), and its detailed trade patterns (in 6-digits level HS 8703/passenger cars and HS 8708/parts and accessories). In the fourth section, value added trends of Japan automotive trade is presented with specific reference to the country's domestic value added embodied in foreign final demand (FFD-DVA) and foreign value added in domestic final demand (DFD-FVA) in East and Southeast Asia. trade patterns and trends in value added of automotive sector's intra-regional and inter-regional trade are presented respectively. Inter-regional trade includes Japan and ASEAN6 (i.e. Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam), and ASEAN5 and ASEAN+3 (i.e. China, Japan and Korea), whereas intra-regional trade covers trade among ASEAN5 countries. In the final section, some key findings and observations on this macro-level assessment are discussed in light of offering notes for further micro-level assessment to be presented in the subsequent chapters of the study.

2.1. East Asia in the GPNs and Southeast Asia Regional Production Networks[66]

Participation of countries in East and Southeast Asia in the world manufacture trade suggests the two regions' dynamic trade activities in the GPNs that are based particularly on the network products trade[67]. Share of both regions to the world manufacture trade has increased significantly since the 1990s. East Asia has been positioned as one of the major players in the world manufacture sector by taking more than a third of world manufacture trade export and approximately a fourth of world manufacture trade import[68]. Southeast Asia meanwhile has shifted roles and positions as it grows significantly as a major hub for parts and components trade[69].

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[66] Basic features presented in this section are complementary to the trade patterns and trends in value added which will be presented subsequently in the next sections. The presentation is partly originated from the works of Athukorala (2015) and Athukorala and Kohpaiboon (2013) on the so-called "global production sharing" or GPS (defined as cross-border dispersion of different stages of the production processes within vertically integrated global industries) which is considered as a key structural change in the global economy in recent decades.

[67] Network products trade is defined as trade characterized by and operated mainly within global or regional production sharing activity that could be disaggregated into trade in parts and components and final assembly (Athukorala and Kohpaiboon 2013).

[68] East Asia contributed 28.3% and 35.1% of the world total manufacture trade export in 1992-3 and 2009-10 respectively, and 21.7% (1992-3) and 25.7% (2009-10) of the world total manufacture trade import. East Asia consists of China (People's Republic of), Hong Kong (China), Japan, Korea (Republic of) and Taiwan. The two key countries in the region, Japan and China, reverse their roles in parts and component and final assembly trade in manufacture sector. Japan's share of parts and components export has declined from 15.2% in 1992-3 to 8.3% in 2009-10, and its share of final assembly export has even shrunk more than a half of its 20.8% level in 1992-3 to a mere 8.2% in 2009-10. Japan total manufacture trade export has also fallen from 12.3% in 1992-3 to 7.2% in 2009-10 of the world manufacture trade export. On the opposite side, China's share of parts and components export has increased dramatically from a mere 1.7% in 1992-3 to 14.4% in 2009-10, and its share of final assembly export has also expanded sharply from 2.4% in 1992-3 to 18.9% in 2009-10. China's position in the world manufacture trade hence has changed drastically as shown in the changes of its share of only 4.5% in its export and 2.9% in its import (in 1992-3) to 14.7% of its export and 9.1% of its import (in 2009-10) (Athukorala and Kohpaiboon 2013).

[69] Southeast Asia partook 3.5% and 6.3% of the world total manufacture trade export in 1992-3 and 2009-10 respectively, and 6.2% (1992-3) and 5.7% (2009-10) of the world total manufacture trade import. Both figures in export and import show significant increase of the region's share to the world manufacture trade. Southeast Asia's share of parts and components trade export has substantially increased. The share increased from 22.7% (1992-3) to 59.2% (2009-10). In line with that, its share of final assembly export has conversely vaulted from 34.1% (1992-3) to only 10.1% (2009-10). Likewise its share of parts and components trade import rose from 36% (1992-3) to 47.8% (2009-10) and its share of final assembly trade import contracted from 18.4% (1992-3) to 16.2% (2009-10). However in terms of final assembly trade export, Southeast Asia's share slightly declined from 5.8% in 1992-3 to 3.3% in 2009-10 (Athukorala & Kohpaiboon 2013).

Inter-regional strong growth between these two regions in network products of manufacture trade has become a particular feature. Both regions have persistently maintained substantial share of total network products in manufacturing trade during the past two decades (Athukorala and Kohpaiboon 2013). Deepening of trade in manufactured goods has been behind contemporary changes in the production network as major relocation of East Asian firms (particularly of Japan) production facilities to Southeast Asia which is considered on its completion stage during this period[70]. Intra-firm, intra-industry, arms-length and inter-industry trade have further moved towards a global production sharing and a global trade network that have placed Southeast and East Asian countries as significant players in the world manufacturing trade[71].

Composition of network exports (i.e. the export side of trade in network products[72]) represents a country or region's manufacturing activity in which, for both cases of East and Southeast Asia, automotive sector contributes a significant share. By 2011-12, composition of network exports in East and Southeast Asia reflect dynamic changes in manufacture trade activities of the two regions in which

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[70] Leading factors behind such a shift are fluctuations in international currency exchange rates (Menon 2013), especially in terms of Japanese yen appreciation against the USD (Pomfret and Sourdin 2014), domestic policy of FDIs both in the home and host countries and its impacts on regional FDIs (InEIM 2013), manufacturing and industrialization (Akita and Shiohara 2012). Following the US financial turmoil in 2008 that dragged the Lehman Brothers failure to all-related financial markets, including that of Japan (the so-called Lehman shock), Japanese yen appreciation against the US dollar has once again lurked Japanese firms competitiveness. *Endaka* (円高) is nonetheless cyclical episodes typifying the reverse roles of Japan and the US in the global economy where the former has began to replace the roles of the later as *the* global economic powerhouse since the early of 1980s (Gilpin 2001). The episodes were subsequently recurrent, first in 1978, then in 1985 (Plaza Accord), then in 1986-88 and finally 1995 (surge in all time peak of Japanese yen to JPY 79 per USD 1 or the so-called *endaka fukyo* or 円高不況).

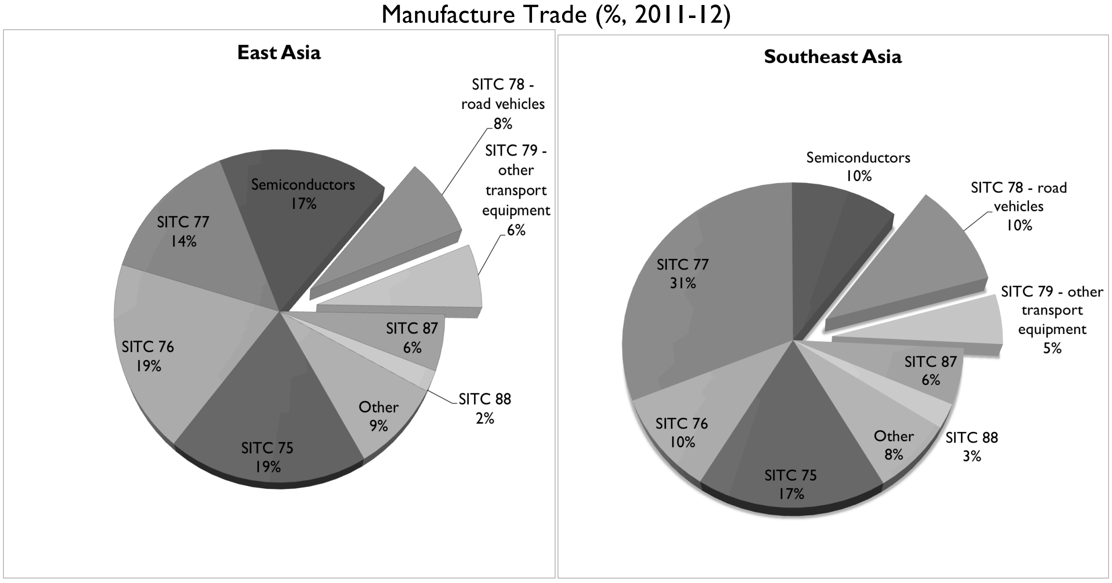
[71] Bonturi & Fukasaku (1993) distinguish 4 (four) types of international trade: (1) intra-industry, intra-firm trade; (2) intra-industry, arm's-length trade; (3) inter-industry, intra-firm trade; and (4) inter-industry, arm's-length trade to which intra-firm trade is defined as the mutual exchange of similar goods within the same product category and intra-industry trade is generally a function of product differentiation and may or may not involve intra-firm trade.

[72] Trade in network products is trade that is characterized by and operated mainly within global or regional production sharing activity. Products traded under this category/label are typically –directly or indirectly— linked to manufacturing sectors. See also footnote number 68.

automotive related trade (i.e. in SITC 78-road vehicles and SITC 79-other transport equipment) contributes significant portions (i.e. at 14% and 15% respectively) among other manufacture sectors.

The following Fig. 2.1 presents detailed composition of the manufacture network exports in the two regions. In the case of East Asia, 14% share of export in automotive-related network products was contributed by sectors directly linked to the industry (SITC 78) (for 8%) and backward linkage sectors/supporting industries of automotive (SITC 79) (for 6%). In the case of Southeast Asia, the contribution of sectors directly linked to the automotive industry (SITC 78) to total share of export in automotive-related network products (15%) was 10% (i.e. 2% higher than that of East Asia). However, contribution of Southeast Asia's backward linkage sectors that support automotive industries (SITC 79) is just 5% (i.e. 1% lower than that of East Asia). This indicates that Southeast Asian backward linkage automotive industries have lower local content in the exportation of network products in automotive sector.

Fig. 2.1: Share of Automotive-related (SITC 78 & 79) Network Exports in East and Southeast Asia's Manufacture Trade (%, 2011-12)



Source: adapted from Athukorala (2015)

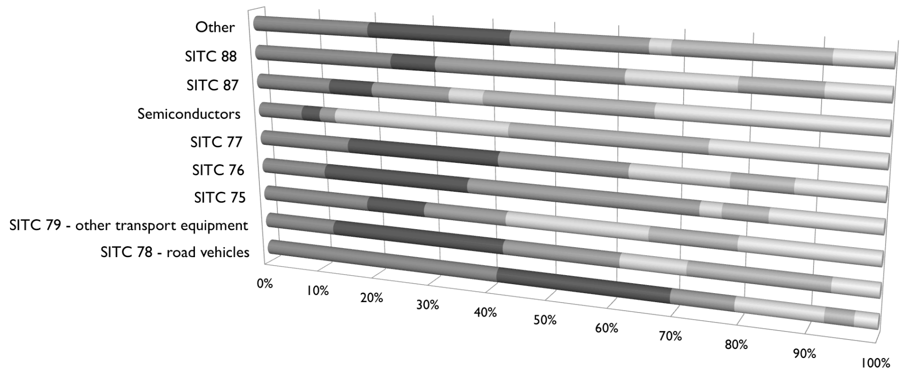
Notes on SITC codes: 75-office machines and automatic data processing machines, 76-telecom and sound recording equipment, 77-electrical machinery excluding semiconductors, 87-professional and scientific equipment, 88-photographic apparatus and optical goods, watches and clocks.

As also indicated in Fig. 2.1, Southeast Asian network exports in SITC 78 (road vehicles) in 2011-12 which account for 10% have surpassed East Asian ones which account for 8% during the same period. This confirms the upward trend of Southeast Asia (particularly in the case of Thailand) becoming one of the major hubs of global automotive production. However, as stated earlier, for SITC 79 (other transport equipment) which principally cover automotive parts and components, Southeast Asian network export share (5%) is slightly lower than the East Asian one (6%). This also indicates that Southeast Asia has not reached production capacity level in automotive parts and components that is equal to East Asia.

Meanwhile the succeeding Fig. 2.2 displays corresponding compositions in the ASEAN6 countries, namely Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. Among ASEAN6 countries, Thailand and Indonesia retain the largest portions of network exports in automotive related traded goods (SITC 78 and 79), i.e. by 25.2% and 21.8% respectively in 2011-12. The figures represent the two countries central posture in the region's trade in automotive-related products. Thailand's figure in SITC 78 (road vehicles) confirms its position as the leading exporter of passenger cars among ASEAN6 countries. Indonesia's figure in SITC 79 (other transport equipment) reflects the country's growing importance as automotive parts and components exporter among ASEAN6 countries.

Vietnam and the Philippines figures (for traded products directly linked to automotive industry, i.e. SITC 78), if compared to Singapore and Malaysia ones, denote the existence of automotive parts and components industries despite their struggles to maintain and keep its local manufacturing activities. Singapore figure for traded products in automotive supporting sectors/industries, i.e. SITC 79) was higher than those of Thailand, Malaysia and the Philippines. This indicates that in the case of Singapore (which also applies to Indonesia and Vietnam), local manufacturing and services for automotive supporting industries have significantly been contributive to its network exports.

Fig. 2.2: Share of Automotive-related (SITC 78 & 79) Network Exports in ASEAN6 Countries Manufacture Trade (%, 2011-12)



	SITC 78 - road vehicles	SITC 79 - other transport equipment	SITC 75	SITC 76	SITC 77	Semiconductors	SITC 87	SITC 88	Other
Thailand	22.4	2.8	21.4	10.5	15.1	11.4	2.1	3.2	11.2
Indonesia	15.2	6.6	11.3	22.7	24.3	4.7	1.2	1	13
Vietnam	5.3	4.2	15.6	33.4	19.6	4	2.1	4	11.8
The Philippines	7.1	2.3	25.7	3	14.3	42.7	0.9	2.2	1.8
Singapore	2.3	4.7	15.1	6.2	8.7	44.6	4.3	1.6	12.5
Malaysia	1.8	1.5	23	14.6	11.9	36.2	5.3	1.2	4.5

Source: adapted from Athukorala (2015)
Notes on SITC codes: 75-office machines and automatic data processing machines, 76-telecom and sound recording equipment, 77-electrical machinery excluding semiconductors, 87-professional and scientific equipment, 88-photographic apparatus and optical goods, watches and clocks.

2.2. East and Southeast Asian Automotive Trade

In order to detailing the two regions trade activities in automotive-related goods or products as indicated in the previous section, this section features trade activities of East and Southeast Asian countries. It consists of two sub-sections, i.e. first of all, on the general pattern of automotive trade (i.e. in HS 87-vehicles, other than railway or tramway rolling stock, and parts and accessories thereof) between the two regions, and secondly on detailed patterns presenting major products traded (up to four and six digits under HS 87) between the two regions' major trade nexus, i.e. Japan and three key ASEAN countries (Indonesia, Malaysia and Thailand, hereafter called as ASEAN3).

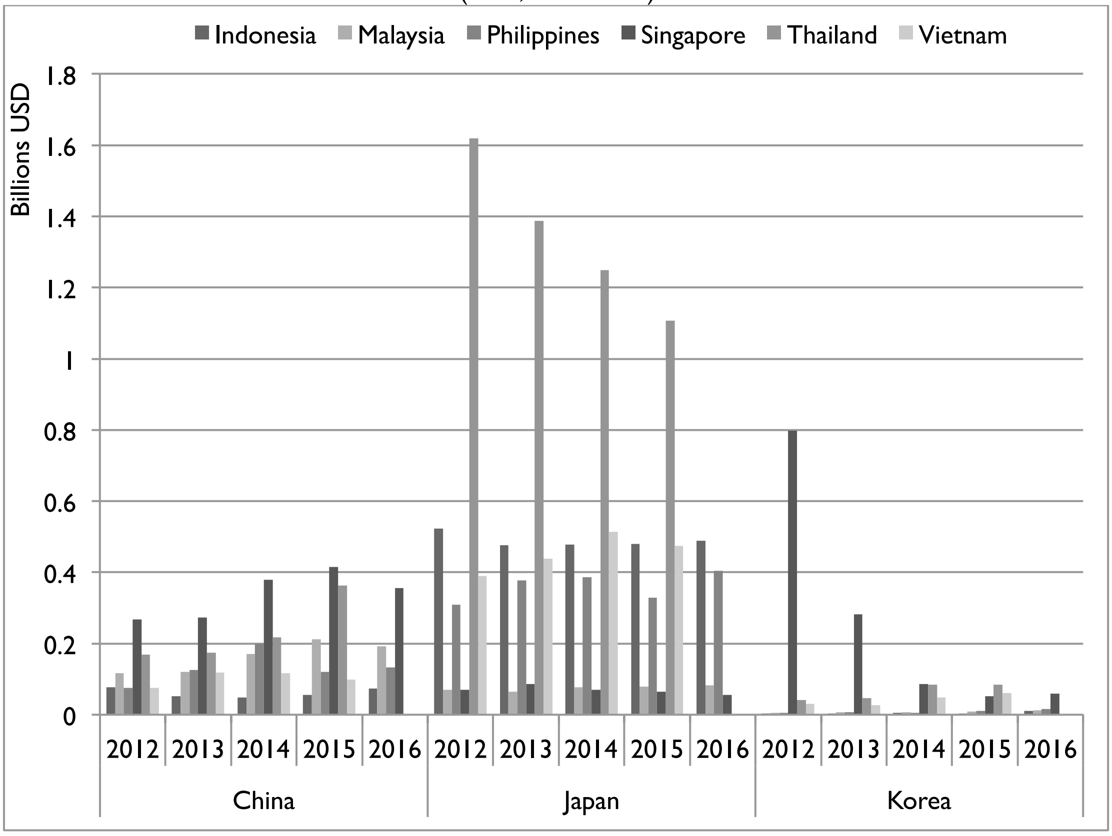
2.2.1. General Pattern

This sub-section presents overall trade pattern between East Asian countries (China, Japan and Korea) and six Southeast Asian countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam or ASEAN6) in the automotive-related products/goods (under HS 87) of the UN Comtrade database during the past five years (2012-16). The patterns are presented both in terms of export and import activities of ASEAN6 to and from East Asian countries. Japan drives substantially for both export and import of ASEAN6 resulting in key trade nexuses between the two regions despite decreasing trend in trade values during the past 5 years.

The following Fig. 2.3 and Table 2.1 present the export side. Among the ASEAN6, Thailand is the leading exporter of automotive products with its lion share of export values primarily go to Japan worth more than 1 billions USD annually in average during the past 5 years. The country's export values to Japan were USD 1,620,126,626 (in 2012) and USD 1,106,283,166 (in 2015). In the cases of China and Korea as main export destinations, Singapore is the major player among the ASEAN6 countries. Despite much substantially lower export value (if compared to

Thailand export value to Japan), Singapore automotive products exports to Korea are much larger than other ASEAN6 countries, including that of Thailand.

Fig. 2.3: ASEAN6 Export to East Asian Countries in Vehicles, other than Railway, Tramway (HS 87) (USD, 2012-2016)



Source: UN Comtrade Database
Note: Figures for Thailand and Vietnam in 2016 is not available *(n.a.)*

Table 2.1: ASEAN6 Export to East Asian Countries in Vehicles, other than Railway, Tramway (HS 87) (USD, 2012-2016)

		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
China	2012	76,709,121	116,187,228	75,104,739	267,629,917	168,288,009	75,636,528
	2013	51,872,239	119,855,022	126,487,396	273,373,546	173,668,545	118,890,761
	2014	48,267,293	169,930,010	199,054,796	379,697,521	216,512,477	116,393,311
	2015	55,665,088	212,290,012	120,543,286	415,482,633	362,598,107	99,592,876
	2016	74,171,302	192,415,036	133,177,965	355,291,358	*n.a.*	*n.a.*
Japan	2012	522,512,869	70,082,807	309,530,651	69,599,588	1,620,126,626	390,329,594
	2013	475,680,256	63,885,979	376,525,948	85,800,789	1,386,664,088	437,912,058
	2014	477,502,366	77,547,287	386,096,013	69,974,321	1,248,502,942	513,232,809
	2015	479,668,146	79,487,820	328,810,101	65,055,276	1,106,283,166	474,859,714
	2016	488,539,142	82,210,144	404,968,158	55,293,134	*n.a.*	*n.a.*
Korea	2012	4,131,617	6,107,454	5,585,607	797,183,581	41,655,403	31,297,416
	2013	4,322,151	6,371,277	7,002,275	281,761,082	46,550,950	27,653,847
	2014	5,012,427	6,455,104	5,853,017	86,926,374	84,462,585	48,982,540
	2015	3,820,032	9,519,320	10,754,883	51,174,375	85,134,574	61,277,737
	2016	10,637,250	11,688,295	16,706,593	59,266,845	*n.a.*	*n.a.*

Source: UN Comtrade Database

The ensuing Fig. 2.4 and Table 2.2 present the import side. Among the ASEAN6, Indonesia is the leading importer of automotive products with its substantial share of imports primarily from Japan worth nearly 2 billions USD annually in average during the past 5 years. The country's import values from Japan were USD 2,847,908,627 (in 2012) and USD 1,612,190,530 (in 2016). In the cases of China and Korea as major import origins, no major players are existed among the ASEAN6 countries, except Vietnam quite substantial import from China (in 2015) which worth USD 1,842,892,631 (comparable to its import value from Japan of USD 1,842,892,631 in the same year). Despite its relatively low values of automotive import from China, Thailand import values of automotive products from China are relatively higher than other ASEAN6 countries.

Fig. 2.4: ASEAN6 Import from East Asian Countries in HS 87 (USD, 2012-2016)

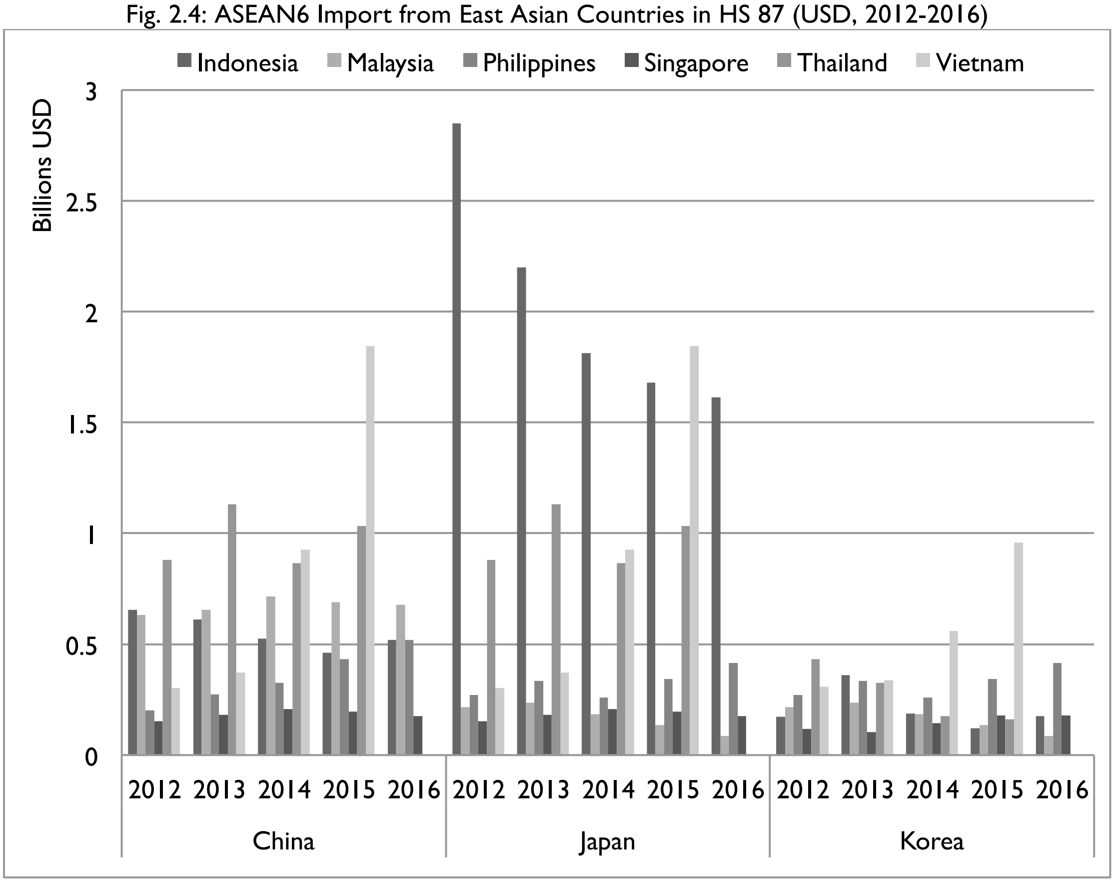


Table 2.2: ASEAN6 Import from East Asian Countries in HS 87 (USD, 2012-2016)

		Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
China	2012	654,004,225	633,004,667	202,058,201	152,592,612	881,385,678	303,227,410
	2013	611,251,794	655,922,736	275,231,112	180,843,250	1,131,552,609	371,893,496
	2014	526,253,943	714,573,736	325,049,444	206,305,239	865,816,513	926,484,377
	2015	460,351,009	689,494,334	431,659,961	195,097,979	1,034,500,359	1,842,892,631
	2016	517,905,599	678,438,671	519,807,851	175,220,504	*n.a.*	*n.a.*
Japan	2012	2,847,908,627	215,699,199	272,150,241	152,592,612	881,385,678	303,227,410
	2013	2,199,197,993	237,460,977	333,613,156	180,843,250	1,131,552,609	371,893,496
	2014	1,811,248,378	183,233,354	258,157,892	206,305,239	865,816,513	926,484,377
	2015	1,679,625,704	135,143,612	344,239,645	195,097,979	1,034,500,359	1,842,892,631
	2016	1,612,190,530	85,446,381	416,332,571	175,220,504	*n.a.*	*n.a.*
Korea	2012	173,479,019	215,699,199	272,150,241	117,634,513	433,864,804	308,392,637
	2013	361,541,619	237,460,977	333,613,156	103,279,502	326,017,062	338,772,193
	2014	186,082,526	183,233,354	258,157,892	143,678,680	176,783,570	558,982,699
	2015	121,386,777	135,143,612	344,239,645	179,644,090	161,770,767	957,729,838
	2016	175,926,793	85,446,381	416,332,571	177,270,741	*n.a.*	*n.a.*

Source: UN Comtrade Database
Note: Figures for Thailand and Vietnam in 2016 is not available *(n.a.)*

Since 2012, based on the above-presented charts on the export and import activities between the East and Southeast Asian countries in products/goods related to automotive (under HS 87), major trade nexus is observed in the case of Japan and three key Southeast Asian countries (Indonesia, Malaysia and Thailand, hereafter called as ASEAN3) in terms of both their export and import activities[73]. In 2015, total value of ASEAN3 exports to Japan in HS 87 was USD 1,665,439,132 and its total value of imports from Japan in HS 87 was USD 2,849,269,675. Japan and ASEAN3 trade establishes a major trade nexus in products/goods under HS 87. The ASEAN3 countries have been major trading partners of Japan, particularly in parts and components.

[73] The remaining Southeast Asian countries (i.e. the Philippines, Singapore and Vietnam) are essentially within the Japanese automotive trade nexus as these three countries trade values (both in terms of export and import), especially of the Philippines and Vietnam, are higher than the Malaysia ones. Since the study at its micro level focused on Indonesia, Malaysia and Thailand (ASEAN3), assessment in this sub-section onward will be concentrating on detailed trade pattern of the trade nexus of Japan and ASEAN3, i.e. in products/goods of up to four and six digits level HS 87.

2.2.2. Detailed Pattern: Japan-ASEAN3 Nexus

This sub-section presents detailed pattern in automotive-related products/goods (categorized under the four and six digits levels HS 87) in the trade nexus of Japan and ASEAN3. Total trade value (2015) for HS 87 between Japan (as reporter) and ASEAN3 (as partners) was US $ 8,121,376,798[74] –doubled that of China and ASEAN3 total trade value for HS 87 in 2015 (US $ 4,080,945,878). ASEAN3 trade with Japan in the automotive sector is steadily intensifying in which Japan main export commodities are parts and accessories for motor vehicles (HS 8708) and its top destinations are Thailand and Indonesia. Its export of trucks (HS 8704) and passenger cars (HS 8703) is still substantial to Indonesia and Malaysia respectively. Japan imports passenger cars and parts and accessories for motor vehicles quite substantially from Thailand.

In terms of major products/goods traded, the following Table 2.1 outlines trade patterns for Japan (as reporter) and ASEAN3 in automotive-related products traded (up to four and six digits level under HS 87) in 2011-2015:

Table 2.3: Top Products Traded and Major Destinations/Origins,
Japan as Reporter and ASEAN3 as Partners (HS 87, 2011-2015)[75]

Top Export Products [Major Destination]	Top Import Products [Major Origin]
1. Parts and accessories for motor vehicles (HS 8708)* [Thailand and Indonesia] 2. Trucks (HS 8704) and passenger cars (HS 8703) [Indonesia and Malaysia]	1. Passenger cars (HS 8703) [Thailand] 2. Parts and accessories for motor vehicles (HS 8708) [Thailand]

Source: UN Comtrade Database

[74] This figure is down from the total trade value of products under HS 87 (in 2013) traded between Japan (as reporter) and ASEAN3 plus Singapore (as partners), i.e. USD 13,079,062,700. Whereas the 2013 value is an 81% increase of 2009 value (USD 7,239,629,411), these figures however show stable, vigorous trade relations in this particular trade nexus.

[75] Japan trade (2013) with Thailand and Indonesia in HS 8708 is particularly in transmissions for motor vehicles (HS 870840), i.e. export to Thailand at the value of US $ 1,423,495,776 and Indonesia at the value of US $ 577,167,074, and motor vehicles parts, nes./not elsewhere specified (HS 870899), i.e. export to Thailand at the value of US $ 717,883,874 and Indonesia at the value of US $ 455,638,641.

The Japan-ASEAN3 trade nexus is pretty well noticed in terms of major export destinations and import origins (as shown in the following Table 2.2). Shifting position within East Asian countries, particularly of Japan and China, has become apparent. Despite Japan dominant position (that is chiefly performed with its traditional partners of Indonesia and Thailand), China's increasing role as major export destination is noticeable for Malaysia and Singapore, while Vietnam also imports more and more from China and Korea in products/goods under HS 87.

Table 2.4: Southeast Asian Export to and Import from East Asia (HS 87, 2011-2015)

	Major Export Destination	*Major Import Origin*
Indonesia	Japan	Japan
Malaysia	China*	Japan
Singapore	Korea and China**	Japan
Thailand	Japan	Japan
Vietnam	Japan	China and Korea

*The trade value is increasing quite substantially over the years;
**The trade value is increasing lately (particularly in the last two years)
Source: UN Comtrade Database

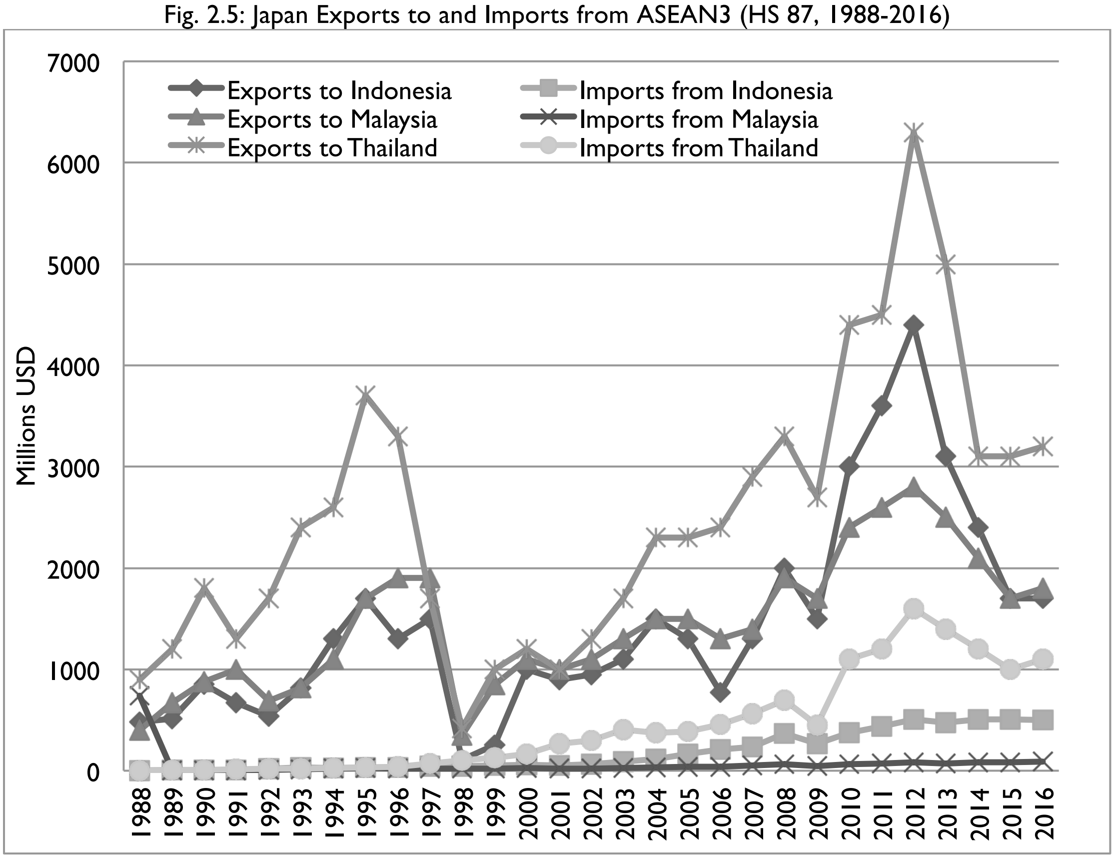
2.3. Japan and ASEAN3 Automotive Trade (HS 87)

This section offers more detailed assessment on the automotive trade nexus of Japan and ASEAN3. The following Chart 2.5 presents Japan's export and import values to and from ASEAN3 in HS 87 products/goods since 1988. The succeeding Tables 2.3 presents detailed Japan's export and import activities (since 1988) to and from ASEAN3. It contains information on trade (export-import) values, percentage of total export and import, rank as Japanese trade partners and trade balance for each successive year since 1988.

2.3.1. Overall Trade Performance (1988-2016)

As shown in Diagram 2.5, there are 3 episodes in the Japan automotive trade with ASEAN3 during the past 25 years or so, i.e. the 1990s, 2000s and 2010s. These episodes have been characterized by two major crises which significantly affected the trade performance. The 1990s impressive performance was severely hit by the 1997 Asian monetary crises. It was only by the mid of 2000s that full recovery in the trade performance was once again hit by the 2008 global financial crises. Coming into the 2010s, however, a full scale of yet another impressive trade performance was at sight and peaked in 2012 which soon followed by a declining trend onward to 2015. The year of 2016 once again witnessed a seemingly increasing trend.

Fig. 2.5: Japan Exports to and Imports from ASEAN3 (HS 87, 1988-2016)



Source: UN Comtrade Database (as recapped by the Dept. of Business Innovation and Skills UK)

As previously indicated, the following Table 2.3 offers details of Japanese trade performance with ASEAN3 in HS 87 products.

Table 2.5: Details of Japan Exports to and Imports from ASEAN3 (HS 87, 1988-2016)

ASEAN3 Country	Year	Export Value (millions USD)	% of Japan Total Exports	Rank	Import Value (millions USD)	% of Japan Total Imports	Rank	Trade Balance (millions USD)
IDN	1988	481	0.8	19	2.7	0.1	18	478.2
	1989	512.1	0.8	21	4.7	0.1	16	507.5
	1990	856.8	1.3	15	5.5	0.1	18	851.4
	1991	673.1	0.9	16	9	0.1	19	664.2
	1992	540.5	0.7	26	19.8	0.3	15	520.7
	1993	817.4	1	14	30.6	0.4	14	786.8
	1994	1300	1.6	10	25.2	0.3	17	1300
	1995	1700	2.2	9	32.9	0.3	15	1700
	1996	1300	1.8	9	35.2	0.3	19	1300
	1997	1500	1.9	9	42.9	0.4	18	1400
	1998	107.3	0.1	63	42.4	0.5	17	64.9
	1999	256.1	0.3	41	50.3	0.6	19	205.8
	2000	1000	1.1	15	58.3	0.6	20	945.9
	2001	899.8	1.1	15	51.8	0.5	19	848
	2002	946.6	1	15	64.4	0.6	20	882.3
	2003	1100	1.1	16	91	0.8	17	1000
	2004	1500	1.2	17	116.8	0.9	16	1300
	2005	1300	1.1	19	166.9	1.2	14	1200
	2006	772	0.5	26	207.8	1.5	12	564.3
	2007	1300	0.8	22	234.8	1.5	13	1100
	2008	2000	1.2	17	369.8	2.3	11	1600
	2009	1500	1.4	18	265.9	2.4	10	1200
	2010	3000	2	11	376.6	2.6	11	2600
	2011	3600	2.5	8	435.2	2.4	11	3200
	2012	4400	2.7	9	509.1	2.4	9	3900
	2013	3100	2.1	9	476.9	2.3	11	2700
	2014	2400	1.7	13	503.8	2.3	10	1900
	2015	1700	1.2	16	507.4	2.7	12	1200
	2016	1700	1.2	18	498.5	2.4	10	1200
MYS	1988	400.4	0.6	21	741.7	0	24	399.7
	1989	670.4	1.1	15	1.4	0	23	669
	1990	877.8	1.3	14	1.8	0	26	876
	1991	1000	1.5	15	4.1	0.1	21	1000
	1992	688.8	0.9	17	6.9	0.1	19	681.9
	1993	813.7	1	15	10.7	0.2	19	803.1
	1994	1100	1.3	14	18	0.2	19	1000
	1995	1700	2.2	8	25.9	0.2	19	1700
	1996	1900	2.6	7	18.3	0.1	20	1900
	1997	1900	2.4	7	22.5	0.2	20	1900
	1998	345.5	0.4	39	18.1	0.2	21	327.4
	1999	846.4	1	15	23	0.3	21	823.4
	2000	1100	1.2	13	24.1	0.2	23	1100
	2001	1000	1.2	12	21.3	0.2	24	997.3
	2002	1100	1.1	13	19.9	0.2	23	1000
	2003	1300	1.3	15	25.3	0.2	24	1300
	2004	1500	1.3	16	34.4	0.3	24	1500
	2005	1500	1.2	18	37.1	0.3	26	1500
	2006	1300	0.9	20	40.9	0.3	25	1200
	2007	1400	0.9	21	53.5	0.4	25	1300
	2008	1900	1.1	18	64.1	0.4	24	1800
	2009	1700	1.7	13	44.9	0.4	24	1700
	2010	2400	1.7	14	66.5	0.5	23	2400
	2011	2600	1.7	13	71.5	0.4	23	2500
	2012	2800	1.7	14	86.4	0.4	24	2700
	2013	2500	1.7	13	68.8	0.3	24	2400
	2014	2100	1.5	15	82.1	0.4	25	2000
	2015	1700	1.3	15	82.9	0.4	23	1600
	2016	1800	1.3	17	88	0.4	24	1700
THA	1988	897.1	1.5	11	4.1	0.1	16	893
	1989	1200	2	6	5.6	0.1	15	1200
	1990	1800	2.7	6	8.4	0.1	17	1800

1991	1300	1.9	9	15.9	0.2	14	1300
1992	1700	2.2	9	21.3	0.3	13	1700
1993	2400	2.9	7	22.1	0.3	16	2300
1994	2600	3.2	5	24	0.3	18	2600
1995	3700	4.8	3	32.5	0.3	16	3600
1996	3300	4.5	3	36.9	0.3	18	3300
1997	1700	2.2	8	69.3	0.6	17	1700
1998	414.9	0.5	32	104.9	1.3	12	310
1999	998	1.2	13	130.5	1.4	12	867.4
2000	1200	1.4	11	166.2	1.6	12	1000
2001	1000	1.2	13	268	2.7	9	732.9
2002	1300	1.4	10	297.2	2.9	10	971.9
2003	1700	1.7	10	408.1	3.5	7	1300
2004	2300	1.9	8	376.9	2.8	10	1900
2005	2300	1.9	8	385.1	2.8	9	1900
2006	2400	1.7	11	455.6	3.2	7	1900
2007	2900	1.8	10	565.5	3.7	6	2300
2008	3300	1.9	11	695.2	4.3	5	2600
2009	2700	2.6	5	451.8	4.1	5	2200
2010	4400	3	6	1100	7.2	3	3300
2011	4500	3	6	1200	6.7	4	3300
2012	6300	3.9	5	1600	7.6	4	4700
2013	5000	3.4	5	1400	6.6	4	3700
2014	3100	2.2	10	1200	5.5	4	1900
2015	3100	2.3	9	1000	5.5	4	2000
2016	3200	2.2	8	1100	5.4	5	2000

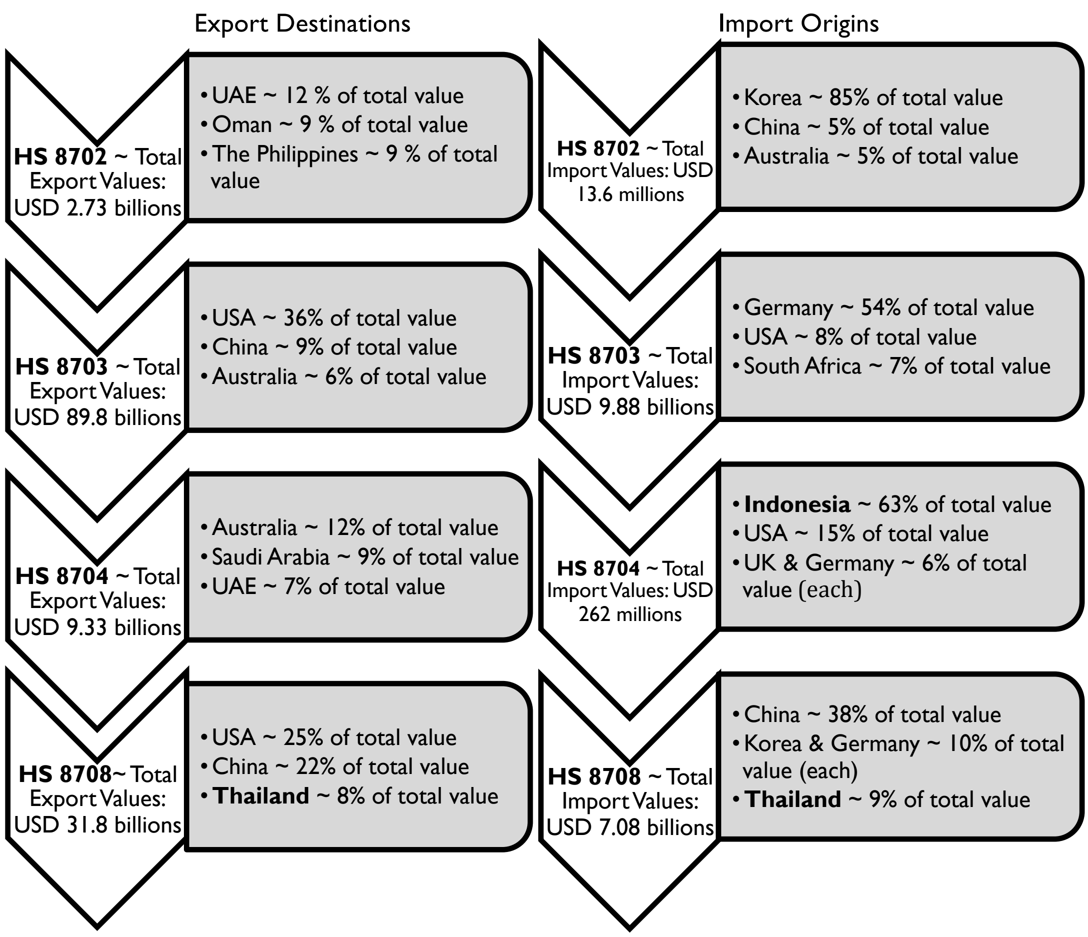
Source: UN Comtrade Database (as recapped by the Dept. of Business Innovation and Skills UK)

On average, export and import percentages (to and from Thailand) of the total Japan export in HS 87 is the highest if compared to percentages of the Indonesian and Malaysian ones. Average export percentage to Thailand of the total Japanese export in HS 87 (1988-2016) is 2.3%, whereas its average import percentage is 2.8%. Average export percentage to Indonesia and Malaysia during the same period is 1.3%, whereas their import percentages are 1.1% and 0.3% respectively. The figures show high significance of Thailand (ranked 9th on average as Japan's HS 87 major export destination and 10th on average as Japan's HS 87 major import origins during the past 25 years). Indonesia and Malaysia meanwhile are ranked 18th and 15th respectively as Japan's HS 87 major export destination and 15th and 23rd respectively as Japan's HS 87 major import origins. Overall average export percentage to ASEAN3 of the total Japan's HS 87 export is 1.6% (1988-2016), and overall import percentage to ASEAN3 of the total Japan's HS 87 import is 1.4% during the same period.

2.3.2. Japan Trade in Key Automotive Products (4-Digits HS 87)

This sub-section presents latest (as of 2014) trade pattern of Japan and its key partners in four major automotive products, i.e. public transport type passenger motor vehicles (motor vehicles for the transport of more than 10 persons) (HS 8702), motor vehicles for the transport of persons (except bus) (passenger cars or cars) (HS 8703), motor vehicles for the transport of goods (motor vehicles for transporting goods) (HS 8704), and parts and accessories for motor vehicles (parts and accessories of the motor vehicles) (HS 8708).

Fig. 2.6: Top 3 Major Export Destinations and Import Origins of JAPAN Trade in Key Automotive Products (2014)



Source: UN Comtrade Database

Table 2.6: **JAPAN** Main Trade Partners in Key Automotive Products (2014)[76]

	Passenger Cars-HS 8703 Export (Total Values: USD 89.8 billions)							
Major Country of Destination	USA	CHN	AUS	RUS	UAE	CAN, KSA, OMN	UK, BLG	FRA, MEX, NZ, KOR, QTR
	Export (% of Total)							
	36	9	6	5	4	3	2	1
	Export Value (billion USD)							
	32.328	8.082	5.388	4.49	3.592	2.694	1.796	0.898
	Passenger Cars-HS 8703 Import (Total Values: USD 9.88 billions)							
Major Country of Origin	GER	USA	SA	UK	ITA	BLG, **THA**, HGR	MEX, FRA, SPA	SWE, ATR
	Import (% of Total)							
	54	8	7	6	4	3	2	1
	Import Value (billion USD)							
	5.3352	0.7904	0.6916	0.5928	0.3952	0.2964	0.1976	0.0988
	Public Transport Passenger Type Motor Vehicles-HS 8702 Export (Total Values: USD 2.73 billions)							
Major Country of Destination	UAE	OMN, PHI	KSA	AUS	QTR, MEX	EGY, SA	HK, BHR, KWT, **MYS**, **THA**, NGR, ALG, PER, PNG	IRQ, **IDN**, JOR, YMN, BOL, PAN
	Export (% of Total)							
	12	9	7	5	4	3	2	1
	Export Value (billion USD)							
	0.3276	0.2457	0.1911	0.1365	0.1092	0.0819	0.0546	0.0273
	Public Transport Passenger Type Motor Vehicles-HS 8702 Import (Total Values: USD 13.6 millions)							
Major Country of Origin	KOR	CHN, AUS	BLG, UK, USA	**THA**	**IDN**	**PHI**		
	Import (% of Total)							
	85	5	1	0.56	0.24	0.23		
	Import Value (million USD)							
	11.56	0.68	0.136	0.07616	0.03264	0.03128		
	Motor Vehicles for Transporting Goods-HS 8704 Export (Total Values: USD 9.33 billions)							
Major Country of Destination	AUS	KSA	UAE	USA	**MYS**, **MYA**, **PHI**	**SGP**, ECU, MEX	CHI, KNY, ALG, EGY, SA, RUS, OMN, HK, **VNM**	PER, CAN, **IDN**
	Export (% of Total)							
	12	9	7	6	4	3	2	1
	Export Value (billion USD)							
	1.1196	0.8397	0.6531	0.5598	0.3732	0.2799	0.1866	0.0933
	Motor Vehicles for Transporting Goods-HS 8704 Import (Total Values: USD 262 millions)							
Major Country of Origin	**IDN**	USA	UK, GER	CHN	SWE	ITA		
	Import (% of Total)							
	63	15	6	3	2	1		
	Import Value (million USD)							
	165.06	39.3	15.72	7.86	5.24	2.62		
	Parts & Accessories for Motor Vehicles-HS 8708 Export (Total Values: USD 31.8 billions)							
Major Country of Destination	USA	CHN	**THA**	MEX	**IDN**, CAN	UK	IND, BRA, RUS, KOR	**SGP**, BLG, UAE
	Export (% of Total)							
	25	22	8	6	4	3	2	1
	Export Value (billion USD)							
	7.95	6.996	2.544	1.908	1.272	0.954	0.636	0.318
	Parts & Accessories for Motor Vehicles-HS 8708 Import (Total Values: USD 7.08 billions)							
Major Country of Origin	CHN	KOR, GER	**THA**	USA	**VNM**	**IDN**	**PHI**	NLD, MEX
	Import (% of Total)							
	38	10	9	7	5	4	3	2
	Import Value (billion USD)							
	2.6904	0.708	0.6372	0.4956	0.354	0.2832	0.2124	0.1416

Source: UN Comtrade Database

[76] Notes on Abbreviations: ALG=Algeria, ATR=Austria, AUS=Australia, CAN=Canada, CHI=Chile, CHN=China, BHR=Bahrain, BRA=Brazil, BLG=Belgium, BOL=Bolivia, ECU=Ecuador, EGY=Egypt, FRA=France, GER=Germany, HGR=Hungary, HK=Hong Kong, IDN=Indonesia, IND=India, IRQ=Iraq, ITA=Italy, JOR=Jordan, KNY=Kenya, KOR=Korea, KSA=Kingdom of Saudi Arabia, KWT=Kuwait, MEX=Mexico, MYA=Myanmar, MYS=Malaysia, NGR=Nigeria, NLD=Nederland, NZ=New Zealand, OMN=Oman, PAN=Panama, PER=Peru, PHI=the Philippines, PNG=Papua New Guinea, RUS=Russia, SA=South Africa, SGP=Singapore, SPA=Spain, SWE=Sweden, QTR=Qatar, THA=Thailand, UAE=United Arab Emirates, UK=United Kingdom, USA=United States of America, VNM=Vietnam, YMN=Yemen

As presented in the above Chart 2.6, Thailand and Indonesia are included in the list of top 3 three major export destinations and import origins in Japan's key automotive products trade. Thailand is included for HS 8708 (parts and accessories for motor vehicles, parts and accessories of the motor vehicles) both as export destination (8% of the total Japan export in HS 8708 of USD 31.8 billions) and import origin (9% of the total Japan import in HS 8708 of USD 7.08 billions). Indonesia is brought in HS 8704 (motor vehicles for the transport of goods, motor vehicles for transporting goods) as import origin (63% of the total Japan import in HS 8704 of USD 262 millions).

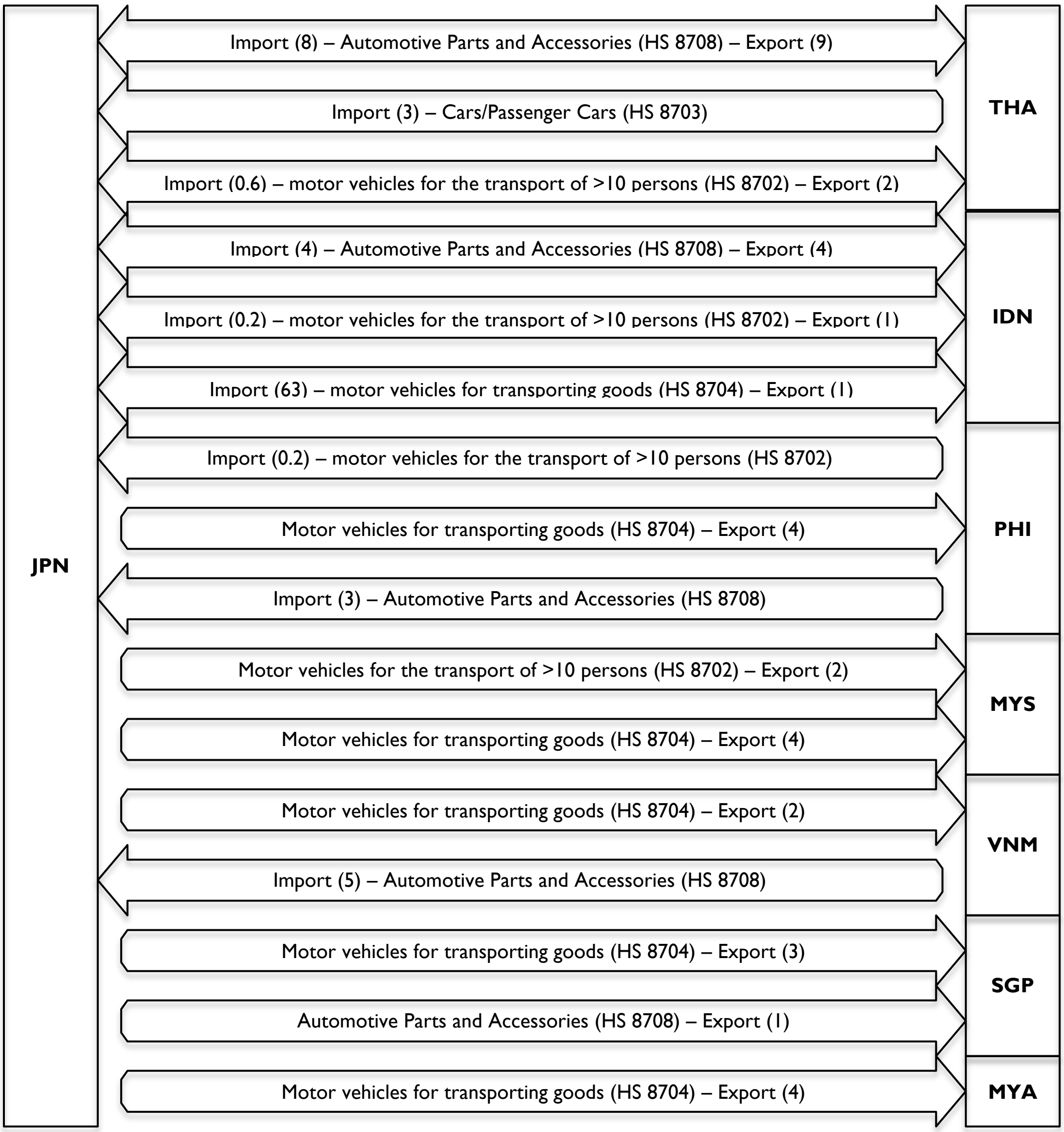
The above Table 2.4 provides detailed information on the Japan trade activities in its key automotive products (HS 8702, 8703, 8704 and 8708) containing its major export destinations and import origins, percentage of the total trade values for each country of destination and origin, and export and import values for each country of destination and origin. In the cases of ASEAN3 and other Southeast Asian countries, the following observation is worth noticed:

a. For HS 8703 (cars/passenger cars), Thailand is the only ASEAN country listed as one of the major country of import origins (valued USD 0.3 billions or 3% of the Japan total HS 8703 import value of USD 9.88 billions);
b. For HS 8702 (motor vehicles for the transport of more than 10 persons), ASEAN3 countries are all listed as the major country of export destination, i.e. Malaysia (2%), Thailand (2%) and Indonesia (1%) of the Japan total HS 8702 export of USD 2.73 billions; whereas Thailand, Indonesia and the Philippines are listed as the major country of import origins with percentages of 0.6%, 0.2% and 0.2% respectively of the Japan total HS 8702 import of USD 13.6 millions;

c. For HS 8704 (motor vehicles for transporting goods), Japan exports 4% of its total HS 8704 export (USD 9.33 billions) to each of the following ASEAN countries, i.e. Malaysia, Myanmar and the Philippines, and 2% to Vietnam and 1% to Indonesia; whereas the country is also imported 63% of its total HS 8704 import (USD 262 millions) from Indonesia (as indicated earlier);
d. For HS 8708 (parts and accessories for and of the motor vehicles), Japan exports 8%, 4% and 1% of its total HS 8708 export (USD 31.8 billions) to Thailand, Indonesia and Singapore respectively; whereas the country imports 9%, 5%, 4% and 3% of its total HS 8708 import (USD 7.08 billions) from Thailand, Vietnam, Indonesia and the Philippines respectively.

To summarize, as suggested earlier, Japan trade activities with Southeast Asian countries in automotive-related products are featured as follows. In terms of trade value, automotive parts and accessories dominate the activities with Thailand and Indonesia have been at the forefront with a total trade valued at USD 4.7 billions (2014). Vietnam, Singapore and the Philippines together are also major trading partners of Japan in automotive parts and accessories with a total value reached USD 0.9 billions (2014). Japan's export of trucks (motor vehicles for transporting goods) to Malaysia, Myanmar, the Philippines, Singapore, Vietnam and Indonesia reached a total value of more than USD 1 billion (2014), while it imported trucks from Indonesia at USD 0.17 billion (2014). Japan's trade with several Southeast Asian partners in public transport vehicles has a total value of more than USD 0.1 billion and its import of passenger cars from Thailand valued at approximately USD 0.3 billion (2014). The following Diagram 2.7 recaps Japan trade activities in those 4 automotive product categories with Southeast Asian countries.

Fig. 2.7: Japan Trade with Southeast Asian Countries in Main Automotive Product Categories (figures in brackets represent % of Japan's Total Import/Export in Each Category, for 2014)

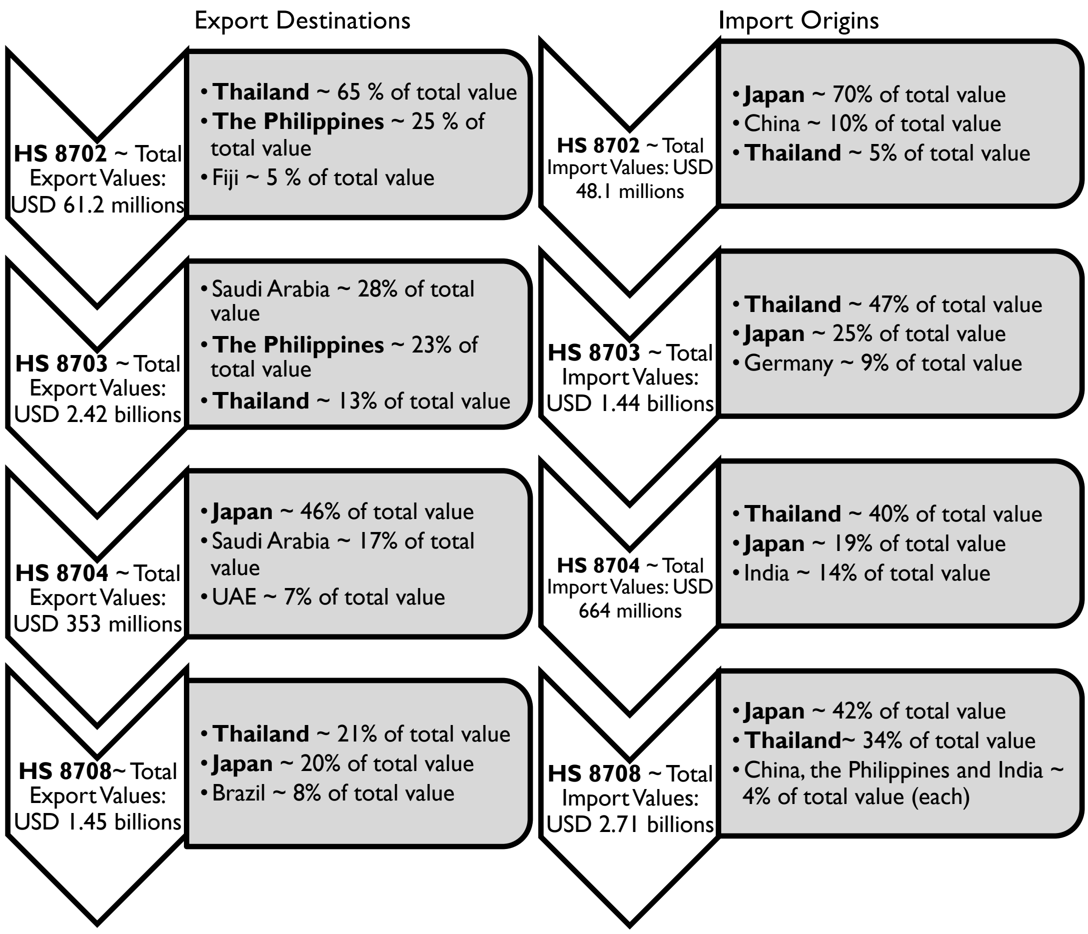


Source: UN Comtrade Database
Notes on Abbreviations: IDN=Indonesia, JPN=Japan, MYA=Myanmar, MYS=Malaysia, PHI=the Philippines, SGP=Singapore, THA=Thailand, VNM=Vietnam

2.3.3. ASEAN3 Trade in Key Automotive Products (4-Digits HS 87)

Corresponding to the previous sub-section, presentation of the latest (i.e. as of 2014) trade pattern of ASEAN3 countries and their key partners in four major automotive products (HS 8702, 8703, 8704 and 8708) is offered as follows. Fig. 2.8, 2.9 and 2.10 are presented for Indonesia, Malaysia and Thailand respectively. In the case of Indonesia, Japan and Thailand are the major partners in all categories of products both as export destinations and import origins suggesting that the three countries are in major development of automotive production network/hub in the two regions. As shown in Fig. 2.8, in terms of trade value, HS 8703 (passenger cars) and HS 8708 (parts and accessories for motor vehicles) are the main drivers in which the three countries (plus the Philippines at a lesser extent as major destination of Indonesia HS 8703 exports) actively involved both in export and import sides.

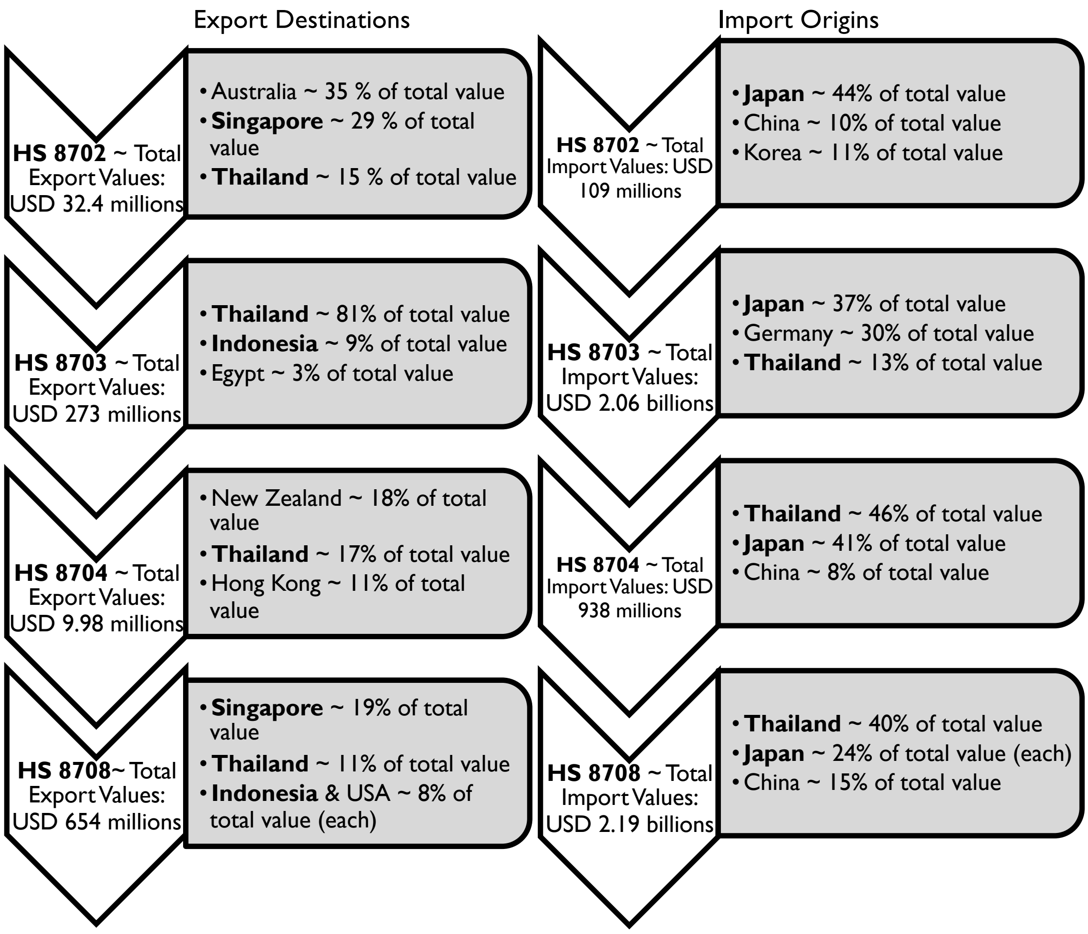
Fig. 2.8: Top 3 Major Export Destinations and Import Origins of INDONESIA Trade in Key Automotive Products (2014)



Source: UN Comtrade Database

In the case of Malaysia, as shown in the following Fig. 2.9, Thailand and Japan are major partners in all categories products. For HS 8702, 62% of total Malaysian in this category is exported to Thailand, while 70% of its import came from Japan. For HS 8703, Malaysia exports 13 % of its total value in this category to Thailand, and the country imports 47% and 25 % from Thailand and Japan respectively. For HS 8704, Japan is the main destination of Malaysian export, i.e. 47% of its total exports value, whereas Thailand and Japan are the country's major source of imports (40% and 19% respectively of Malaysian total imports value in HS 8704). For HS 8708, both Thailand and Japan are major destination and origin countries of Malaysian export and import in this category.

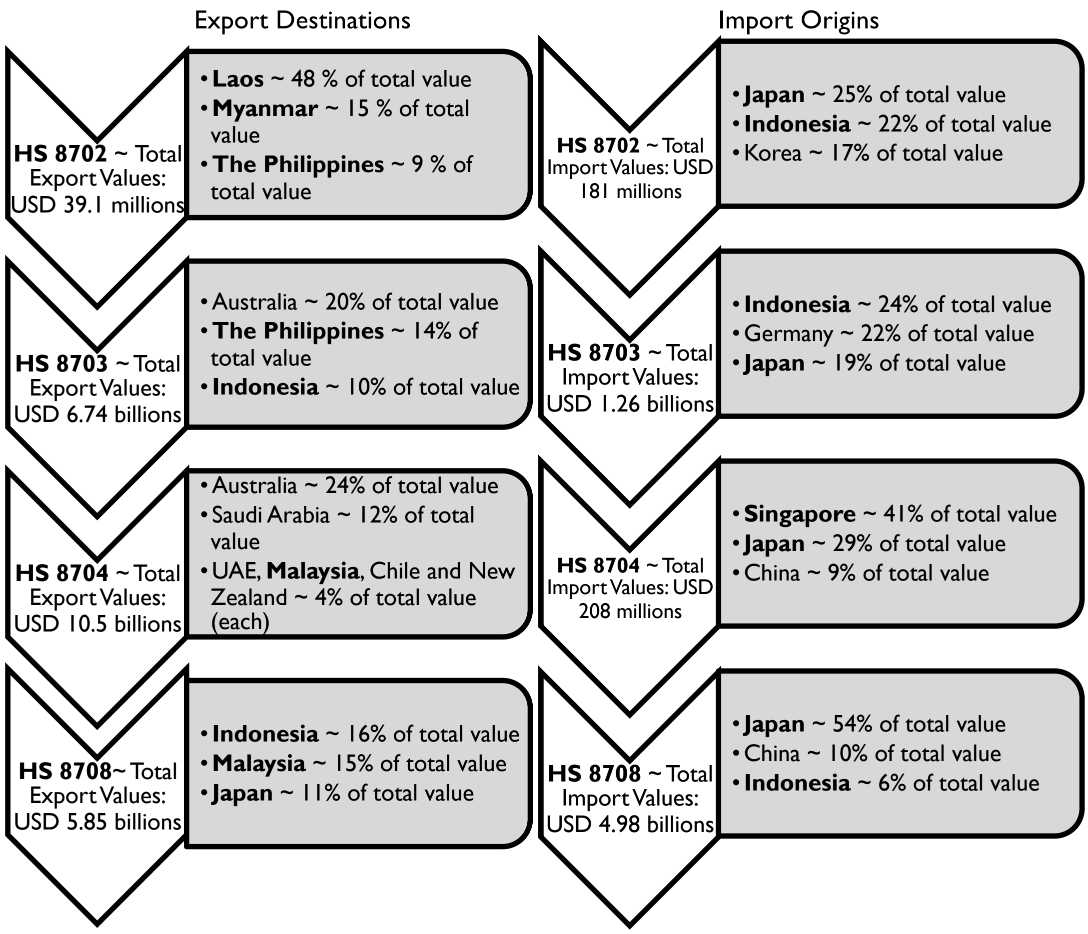
Fig. 2.9: Top 3 Major Export Destinations and Import Origins of MALAYSIA Trade in Key Automotive Products (2014)



Source: UN Comtrade Database

In the case of Thailand, as shown in the following Fig. 2.10, Indonesia and Japan are major partners for all categories of products expect HS 8704. For HS 8702, the country imports 25% and 22% of its total import value from Japan and Indonesia respectively. For HS 8703, Thailand exports 10% and imports 24% of its total HS 8703 export and import value respectively to and from Indonesia, while it imports 19% from Japan in the same category. For HS 8708, Thailand exports 16% and imports 6% of its total HS 8708 export and import value respectively to and from Indonesia, while it exports 11% to Japan in the same category of products.

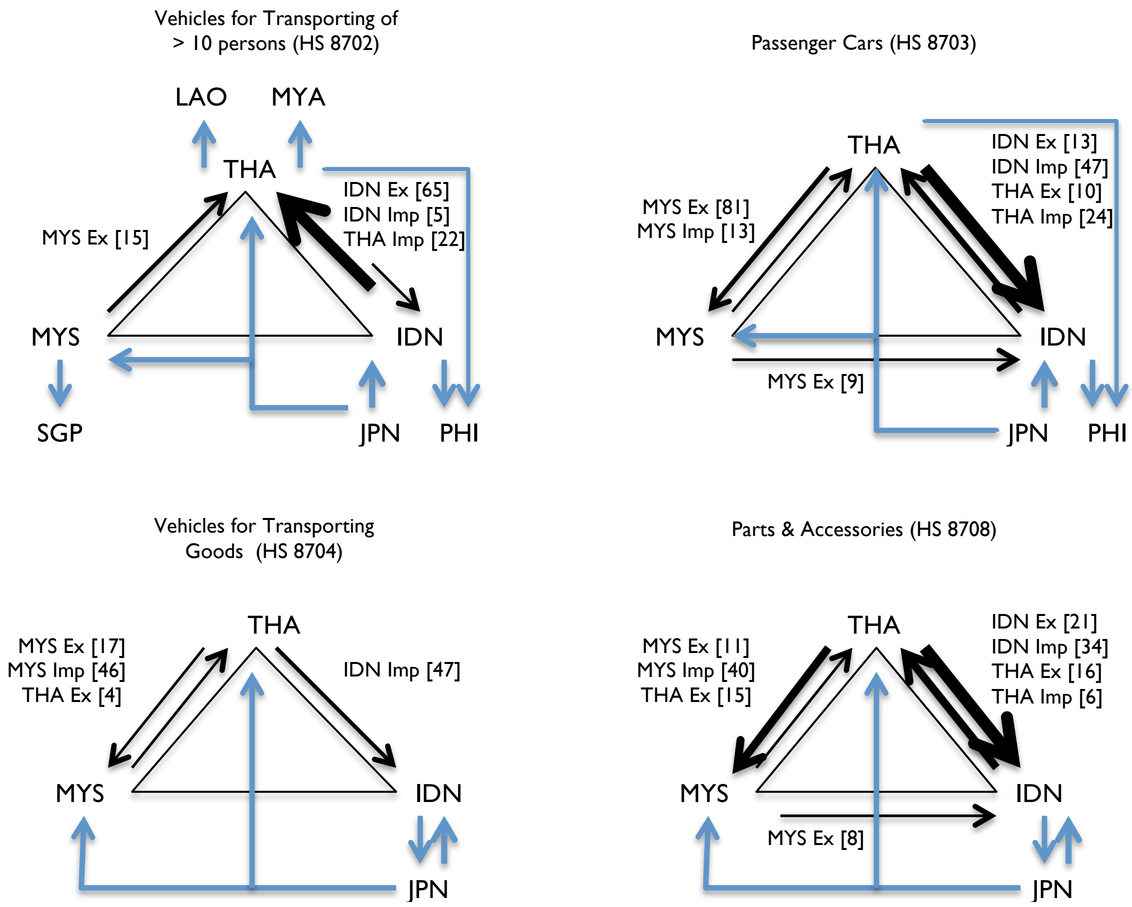
Fig. 2.10: Top 3 Major Export Destinations and Import Origins of THAILAND Trade in Key Automotive Products (2014)



Source: UN Comtrade Database

The following Fig. 2.11 recaps trade activities of the ASEAN3 countries in the four automotive products categories (2014):

Fig. 2.11: ASEAN3 Trade in Main Automotive Product Categories (figures in brackets represent % of Each of ASEAN3 Country's Total Import/Export in Each Category, for 2014)



Source: UN Comtrade Database
Notes on Abbreviations: IDN=Indonesia, JPN=Japan, LAO=Laos, MYA=Myanmar, MYS=Malaysia, PHI=the Philippines, SGP=Singapore, THA=Thailand, Ex=Export, Imp=Import

2.3.4. Japan-ASEAN3 Trade in Passenger Cars (HS 8703)

This sub-section further observes Japan trade activities in passenger cars (HS 8703) with ASEAN3 countries since 1988. A couple of assessments are presented, i.e. to offer the overall trade pattern (as shown in Fig. 2.12) and detailed trade pattern capturing 6-digits/sub-categories of products under HS 8703 (Fig. 2.13).

Fig. 2.12: Japan Exports and Imports to and from ASEAN3
(HS 8703-Passenger Cars, 1988-2016, USD)

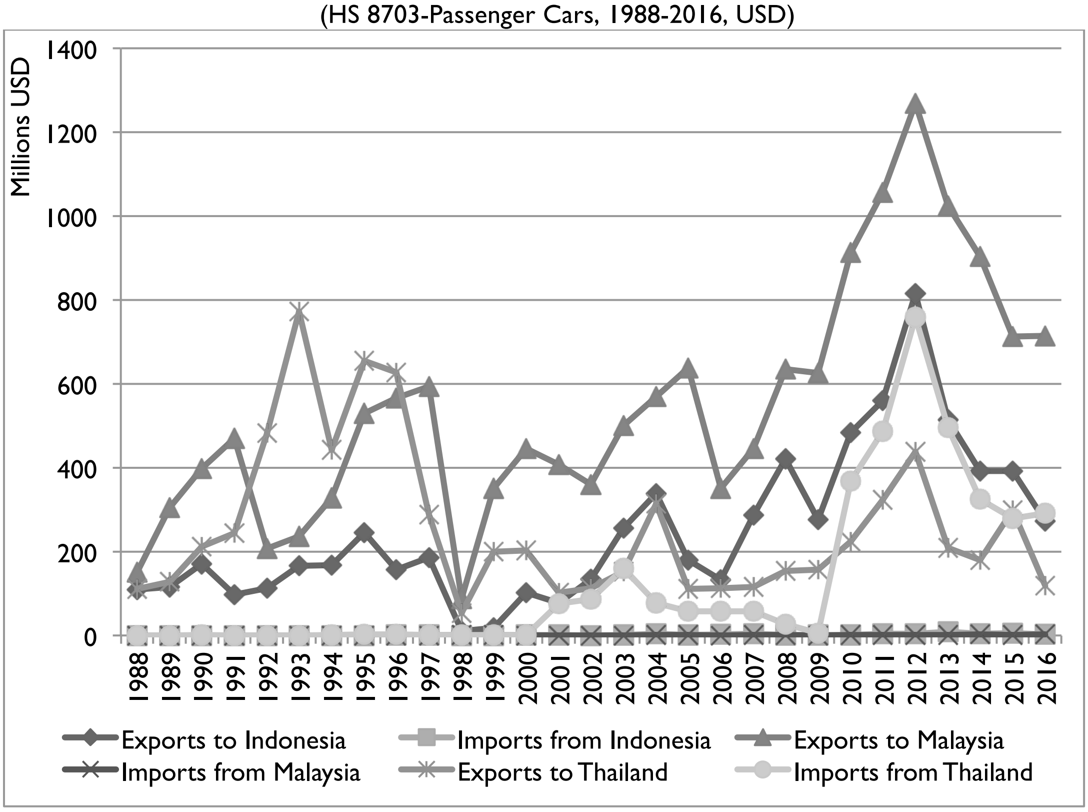


Table 2.7: Japan Exports and Imports to and from ASEAN3
(HS 8703-Passenger Cars, 1988-2016, USD)

	Exports to IDN	Imports from IDN	Exports to MYS	Imports from MYS	Exports to THA	Imports from THA
1988	109,730,444	37,350	150,968,507	20,711	111,504,501	87,875
1989	115,121,404	55,435	304,591,043	66,982	127,149,439	60,025
1990	170,899,013	37,276	398,630,969	20,820	212,524,798	370,326
1991	97,205,745	79,694	470,179,486	51,458	243,690,721	133,854
1992	112,041,162	135,500	206,535,518	37,793	481,517,603	201,357
1993	165,733,970	84,276	237,056,035	84,196	771,957,441	220,442
1994	167,275,226	188,592	327,914,653	207,498	443,250,405	510,186
1995	245,319,734	295,654	529,750,904	147,279	655,345,542	2,279,721
1996	157,447,294	557,873	566,456,507	190,907	626,608,622	2,272,912
1997	186,176,750	588,098	593,443,531	191,012	288,414,166	1,711,525
1998	10,709,911	220,839	87,765,093	557,810	53,657,087	494,936
1999	17,412,883	101,853	351,572,271	714,020	200,144,867	783,026
2000	101,930,830	639,278	444,936,167	169,002	202703439	534,543
2001	76,817,002	781,781	407,174,436	246,366	101,814,691	76,089,844
2002	133,970,731	295,539	359,371,403	283,210	113,138,250	86,373,432
2003	256,061,134	456,637	500,908,654	224,191	152,642,026	160,121,067
2004	338,098,989	4,726,001	568,501,559	432,697	314,386,227	78,097,047
2005	179,860,770	1,325,786	637,335,641	860,125	111,035,791	56,985,854
2006	132,089,563	2,118,668	350,933,742	300,176	111,954,832	58,199,586
2007	286,115,053	4,850,970	445,166,006	539,299	115,544,023	57,100,621
2008	420,512,009	1,656,255	635,264,717	739,396	154,551,610	27,178,010
2009	276,054,412	1,045,986	625,801,967	325,804	157,034,407	4,971,588
2010	483,968,112	1,013,237	912,855,003	635,145	223,827,463	367,161,234
2011	560,621,679	4,185,489	1,057,124,431	935,866	323,594,549	486,947,459
2012	814,390,817	4,301,640	1,269,195,494	1,562,097	437,385,854	758,333,579
2013	514,582,974	9,061,479	1,024,574,962	1,474,502	209,119,464	495,971,284
2014	392,396,414	3,488,205	903,013,363	2,769,039	179,845,656	324,585,893
2015	391789009	5,064,625	712,598,877	1,081,766	299,508,797	279,154,135
2016	272,500,278	3,031,424	714,157,662	2,882,713	119,017,980	290,704,843

Source: UN Comtrade Database
Notes on abbreviations: IDN=Indonesia, MYS=Malaysia, THA=Thailand

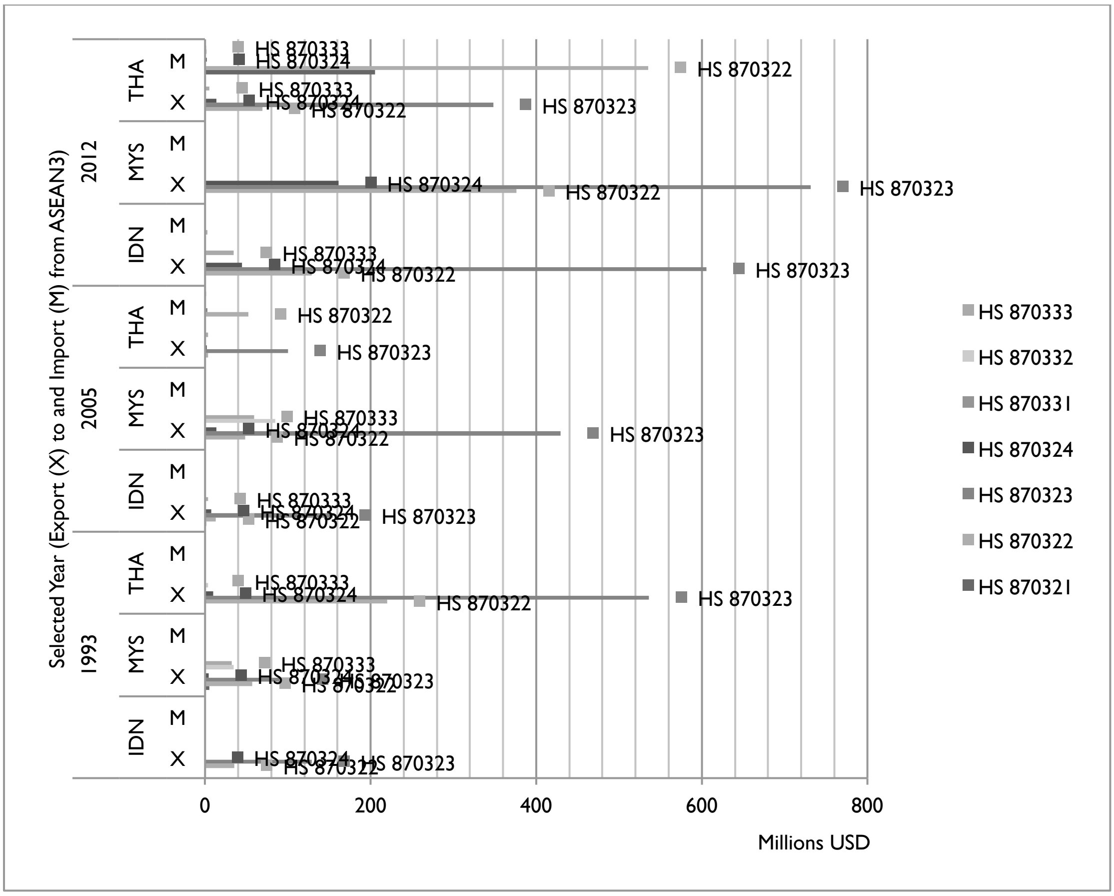
Referring to Fig. 2.12, Japan's trade with ASEAN3 countries in passenger cars (HS 8703) is in parallel trend to the country's overall automotive trade performance (see Fig. 2.5 in HS 87). However, in terms of value, Japan's trade in passenger cars with ASEAN3 is much smaller, i.e. by approximately ¼, than the value of the country's automotive parts and accessories trade (HS 8708). For example, at its peak performance (2012), Japan's export value of passenger cars to Malaysia was USD 1.2 billions, while its export value of parts and accessories to Thailand reached more than USD 4 billions. It indicates that Japan's automotive trade relations with ASEAN3 have been much less dependent on cars exportation and shifted to trade in parts and accessories confirming the significance of Japanese automotive firms' intra industry trade and production network in the region.

Nevertheless, as Japan exports of cars to ASEAN3 have also been substantial in the past five years (particularly to Malaysia, i.e. surpassing the value of USD 1 billion annually since 2011), the types of cars exported need to be scrutinized further. As shown in Fig. 2.13 –singled out figures during Japan's trade peak performance in the years of 2012, 2005 and 1993, it is observed that Japan's cars exports have been relied on vehicles with only spark-ignition internal combustion reciprocating piston engine with cylinder capacity of over 1500cc but not over 3000cc (HS 870323). This gasoline type car with specific medium to large-size design is the most exported car to Malaysia (2005 and 2012) and Thailand (1993)[77].

The following Fig. 2.13 offers details of the Japanese trade with ASEAN3 in passenger cars based on seven selected categories of products (car types):

[77] Meanwhile, trade value that is resulted from the importation of gasoline type (under 1000 cc) cars (HS 870321) from Thailand is growing significantly. The value reached USD 200 million in 2012 which was a staggering increase from its mere value of less then USD 14,000 in 1993.

Fig. 2.13: Japan Export to and Import from ASEAN3 in 6-Digits HS 8703 (Car Types)
(Selected Years: 1993, 2005 and 2012, USD)

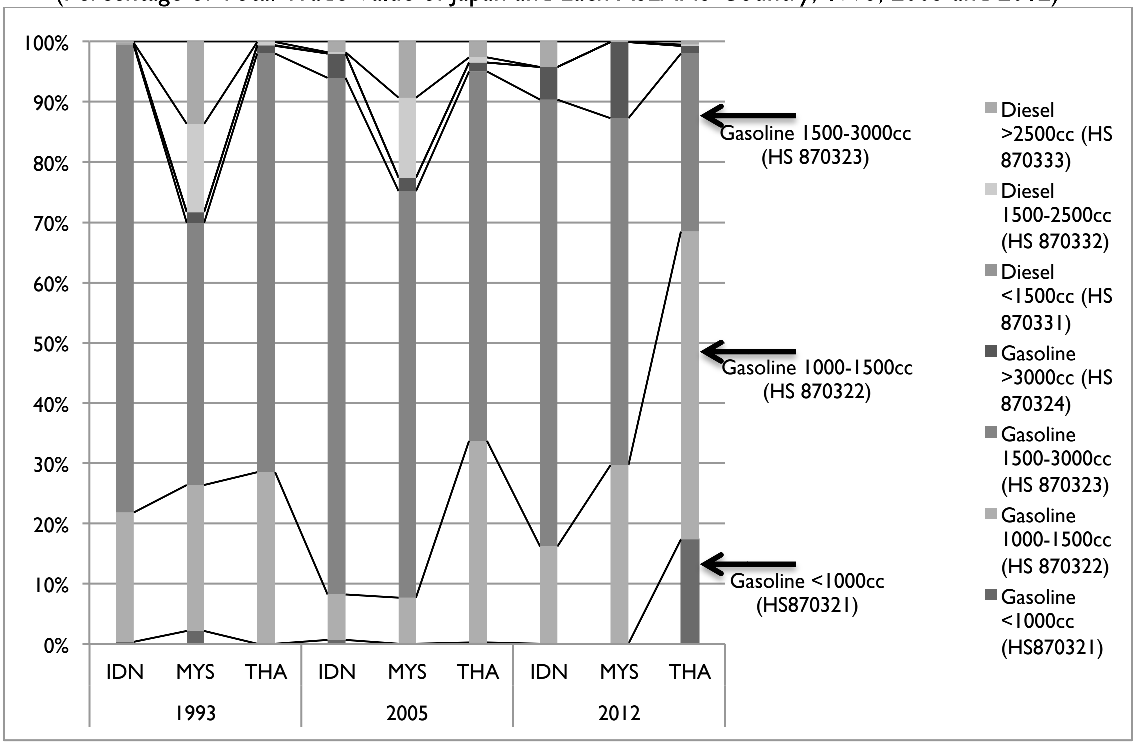


Year	ASEAN3	HS 870321	HS 870322	HS 870323	HS 870324	HS 870331	HS 870332	HS 870333
1993	Export to IDN	669,835	35,422,428	128,644,209	98,185	446,739	163,827	267,390
	Import from IDN	8,424	30,745	3,705			24,761	
	Export to MYS	5,219,004	57,271,116	103,075,212	4,232,296	40,532	34,571,879	32,530,216
	Import from MYS		26,582	57,614				
	Export to THA	140,836	220,091,681	536,330,679	9,741,628	830,269	3,495,830	863,297
	Import from THA	13,492	42,461	56,663			65,195	40,595
2005	Export to IDN	1,259,001	13,139,525	154,105,017	7,289,886		324,317	3,286,637
	Import from IDN	14,620	432,390	865,596			13,180	
	Export to MYS	209,165	48,097,384	429,553,006	13,715,232		84,573,112	59,637,588
	Import from MYS	29,195	291,705	498,951				40,273
	Export to THA	384,213	3,762,533	99,982,728	2,328,284		809,139	3,354,951
	Import from THA	40,826	52,282,869	2,690,478	276,062		544,125	1,106,701
2012	Export to IDN	48,921	128,695,246	605,581,799	44,751,735		4,234	34,482,256
	Import from IDN	487,446	2,904,456	801,580			108,158	
	Export to MYS	133,960	376,159,007	731,160,767	161,047,967		42,595	489,037
	Import from MYS	26,535	753,461	705,642			76,459	
	Export to THA	178,309	6,902,1125	348,066,080	13745244		225,602	5,488,088
	Import from THA	205,081,490	535,210,497	13,459,297	1778740		1,822,158	958,797

Source: UN Comtrade Database
Notes on 6-Digits HS 8703 Codes and Abbreviations:
* Vehicles with only spark-ignition internal combustion reciprocating piston engine, cylinder capacity: not over 1000cc (HS 870321), over 1000 but not over 1500cc (HS 870322), over 1500 but not over 3000cc (HS 870323), over 3000cc (HS 870324)
** Vehicles with only compression-ignition internal combustion piston engine (diesel or semi-diesel), cylinder capacity: not over 1500cc (HS 870331), over 1500 but not over 2500cc (HS 870332), over 2500cc (HS 870333)
*** IDN=Indonesia, MYS=Malaysia, THA=Thailand

Fig. 2.14 below describes shifting patterns of Japan's trade with ASEAN3 in HS 8703 product categories during the past 25 years (i.e. in the year of 1993, 2005 and 2012) based on figures presented in Fig. 2.13:

Fig. 2.14: Shifting Pattern: Japan-ASEAN3 Trade in Passenger Cars
(Percentage of Total Trade Value of Japan and Each ASEAN3 Country, 1993, 2005 and 2012)

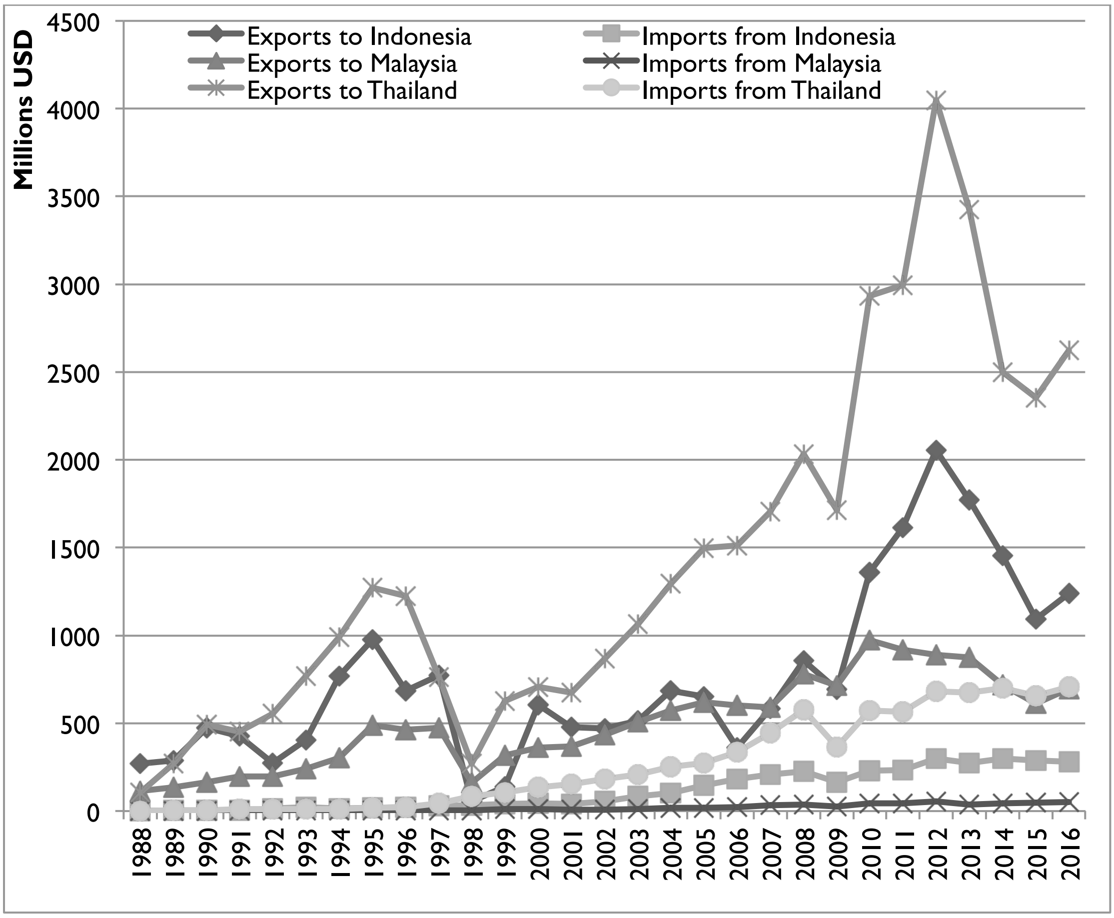


Source: UN Comtrade Database (calculated based on figures from Fig. 2.13)

2.3.5. Japan-ASEAN3 Trade in Parts and Accessories for Motor Vehicles (HS 8708)

This sub-section further observes Japan trade activities in parts and accessories for motor vehicles (HS 8708) with ASEAN3 countries since 1988. Assessments are presented in two ways, i.e. by offering the overall trade pattern (as shown in Diagram 2.15) and detailed trade pattern capturing 6-digits/sub-categories of products under HS 8708 (Fig. 2.16).

Fig. 2.15: Japan Exports and Imports to and from ASEAN3
(HS 8708-Parts and Accessories for Motor Vehicles, 1988-2016)

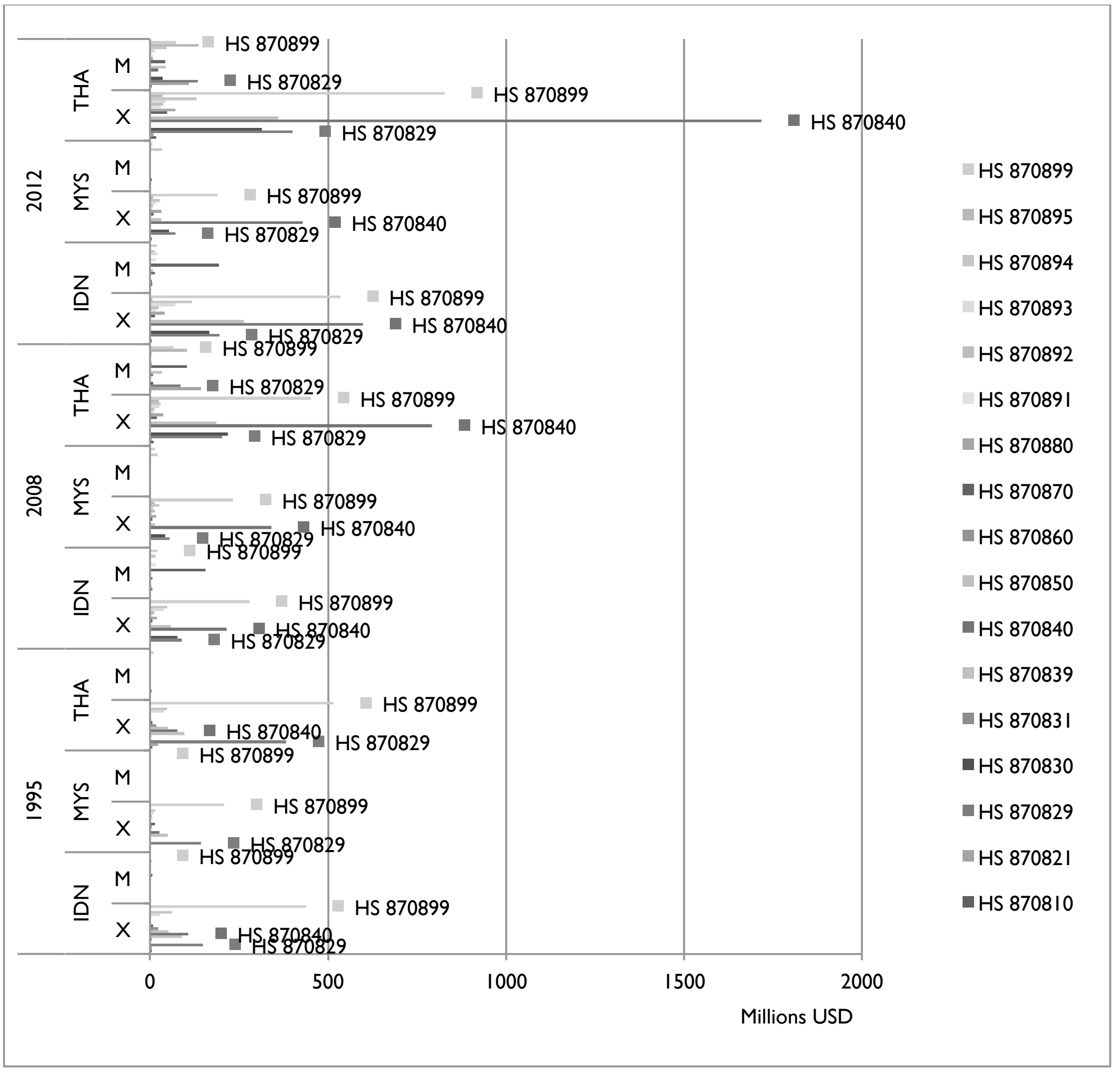


	Exports to IDN	Imports IDN	Exports to MYS	Imports from MYS	Exports to THA	Imports from THA
1988	268,668,715	1,531,210	114,688,704	679,920	105,135,476	627,639
1989	290,063,035	2,487,076	136,538,409	818,629	270,404,057	2,901,696
1990	474,891,625	3,068,028	164,212,827	1,254,753	490,996,666	5,900,988
1991	426,175,215	5,879,677	198,597,883	2,725,676	451,983,669	11,932,834
1992	273,550,100	14,034,883	197,997,501	3,164,564	553,147,567	12,742,018
1993	405,197,568	21,841,787	239,400,823	3,682,912	769,998,798	10,240,266
1994	767,851,087	13,704,957	303,806,538	2,970,996	989,808,749	12,794,049
1995	976,865,558	19,577,781	488,766,092	5,698,247	1,272,036,716	17,400,198
1996	685,034,510	21,726,935	463,125,078	4,322,024	1,223,675,459	22,270,906
1997	771,345,668	29,051,675	475,386,460	4,441,981	762,850,257	44,556,316
1998	55,572,229	32,191,155	160,873,159	5,319,655	271,010,054	84,099,974
1999	139,556,410	39,435,384	317,623,337	9,673,538	626,532,400	105,502,688
2000	607,005,306	44,316,179	362,380,255	11,788,544	708,925,420	135,630,518
2001	475,993,376	41,310,614	368,029,809	9,505,973	672,832,086	155,311,104
2002	468,707,223	56,891,229	435,705,825	8,397,533	865,860,424	183,528,136
2003	514,538,842	84,535,666	508,616,651	13,212,916	1,062,567,356	210,012,800
2004	685,295,822	103,652,068	573,031,849	19,158,859	1,292,104,612	251,931,400
2005	651,651,509	146,250,370	621,709,674	19,818,458	1,499,446,579	272,183,667
2006	361,085,263	181,755,209	601,954,975	24,045,443	1,513,214,628	336,143,764
2007	584,320,010	209,162,464	590,196,030	31,982,446	1,704,243,300	446,634,452
2008	855,654,730	227,694,577	780,040,555	38,474,413	2,032,187,755	575,076,820
2009	693,488,262	165,626,408	715,667,907	26,836,365	1,713,022,276	365,991,641
2010	1,358,987,185	231,685,759	973,748,905	44,809,869	2,934,559,456	570,773,071
2011	1,615,190,975	234,350,021	917,681,307	45,799,796	2,996,278,856	566,169,481
2012	2,055,497,493	297,842,382	889,448,636	55,132,444	4,048,434,736	680,180,438
2013	1,769,448,469	272,685,678	875,053,676	38,472,426	3,426,152,108	673,812,066
2014	1,454,126,947	300,598,070	719,082,486	43,706,750	2,499,352,465	698,783,580
2015	1,093,809,875	288,193,745	614,221,709	49,303,404	2,354,902,771	65,7898,709
2016	1,238,259,727	279,400,266	696,625,797	51,249,157	2,624,115,544	705,520,571

Source: UN Comtrade Database

Referring to the above-presented Diagram 2.15, Japan's trade with ASEAN3 in automotive parts and accessories is significantly different from its overall automotive pattern and trends presented in Diagram 2.5, particularly by observing its exports to Thailand and Indonesia. The surge of its export to Thailand was apparent in 2003 when its annual value surpassed USD 1 billion, while similar trend has also been the case for its export to Indonesia which began to surge in 2010 surpassing annual value of USD 1.3 billion. The following Fig. 2.16 is further detailing the trend:

Fig. 2.16: Japan Export to and Import from ASEAN3 in 6-Digits HS 8708 (Types of Parts and Accessories) (Selected Years: 1993, 2005 and 2012, USD)



		1995			2008			2012		
		IDN	MYS	THA	IDN	MYS	THA	IDN	MYS	THA
HS	M	48,152		1,141,178	779,447	960,349	2,575,133	909,425	308,431	4,367,821
870810	X	4,429,374	1,948,274	7,545,782	2,229,797	1363,115	10,596,265	5,156,338	4,219,894	17,096,757
HS	M			305,682	43,064	3,042	143,057,515	17,799	5,916	109,622,131
870821	X	4,691,281	50,329	22,105,353	1,425,566	1,488,981	5,131,951	2,047,376	597,704	10,404,430
HS	M	1,210,551	1,884,236	4,081,420	6,918,485	987,101	85,161,764	6,212,641	3,661,025	134,521,315
870829	X	147,807,793	143,853,086	382,366,536	89,037,421	56,134,051	202,407,821	194,575,726	71,107,601	400,552,835
HS	M				3639632	361,445	7,812,851	4,074,305	4,830,160	35,620,844
870830	X				76251356	42,506,951	219,455,402	166,411,879	53,323,766	314,345,968
HS	M		307,375	75,158						
870831	X	4,473,475	1,018,638	3,635,112						
HS	M	586,574	1,190,214	735,920						
870839	X	88,676,058	49,287,079	96,508,565						
HS	M	37,328	10,759	28,827	6,889,038	92,754	7,897,995	14,150,375	37,540	22,292,505
870840	X	108,113,158	26,756,107	76,492,545	214,668,382	340,689,095	792,459,100	598,320,996	428,617,925	1,718,004,016
HS	M		2,748	35,283	1,022,004	576,767	33,462,833	7,923,094	251,312	43,622,340
870850	X	51,587,232	2,777,743	49,568,631	58,473,907	13,269,949	185,858,602	262,802,836	32,095,951	360,894,999
HS	M			3,014						
870860	X	23,216,481	5,424,016	18,259,123						
HS	M	6,437,219	1,176,120	725,193	155,580,070	590,076	102,949,108	192,711,810	589,725	42,998,033
870870	X	9,126,127	13,393,795	6,609,885	6,926,945	6,201,725	19,570,101	14,701,996	10,143,274	48,819,791
HS	M	31,309			8,354	266,760	4,725,340	214,173	665,470	7,941,018
870880	X	3,985,742	1,131,785	2,686,534	18,746,966	16,922,737	37,803,350	40,221,615	31,783,719	72,251,957
HS	M	3,917,223	4,325	32,396	14,827,548	2,724	5,262,017	16,757,229	733,406	8,129,446
870891	X	973,289	6,572,514	202,362	6,920,589	5,540,740	12,562,524	17,499,314	7,580,314	30,218,991
HS	M	791,732		159,392	19,065	31,291	2,039,943	20,819	4,537	2,701,814
870892	X	732,340	4,636,664	3,329,360	12,582,952	14,427,155	12,500,189	23,972,617	8,767,954	37,360,141
HS	M	217,921		404,873	88,1473	87,558	6,321,581	20,802,092		14,370,251
870893	X	29,002,720	9,849,604	39,093,413	39,239,458	9,842,737	26,255,326	70,804,289	15,311,877	45,047,956
HS	M	5,637,007	112,316	28,550	16,280,506	20,912,618	4,781,693	14,726,275	34,182,348	45,437,053
870894	X	62,609,278	13,227,086	47,716,343	48,836,076	26,046,321	30,424,878	118,360,997	27,583,883	130,736,897
HS	M					90,436	103,230,190	3,121	2,449,750	136,051,074
870895	X				1,338,289	12,107,805	24,230,686	5,917,417	8,524,425	35,697,582
HS	M	662,765	1,010,154	9,643,312	20,805,889	13,511,491	65,798,855	19,319,224	7,412,823	72,504,793
870899	X	437,441,210	208,839,372	515,917,172	278,977,025	233,499,191	452,931,561	534,704,097	189,790,350	827,002,415

Source: UN Comtrade Database

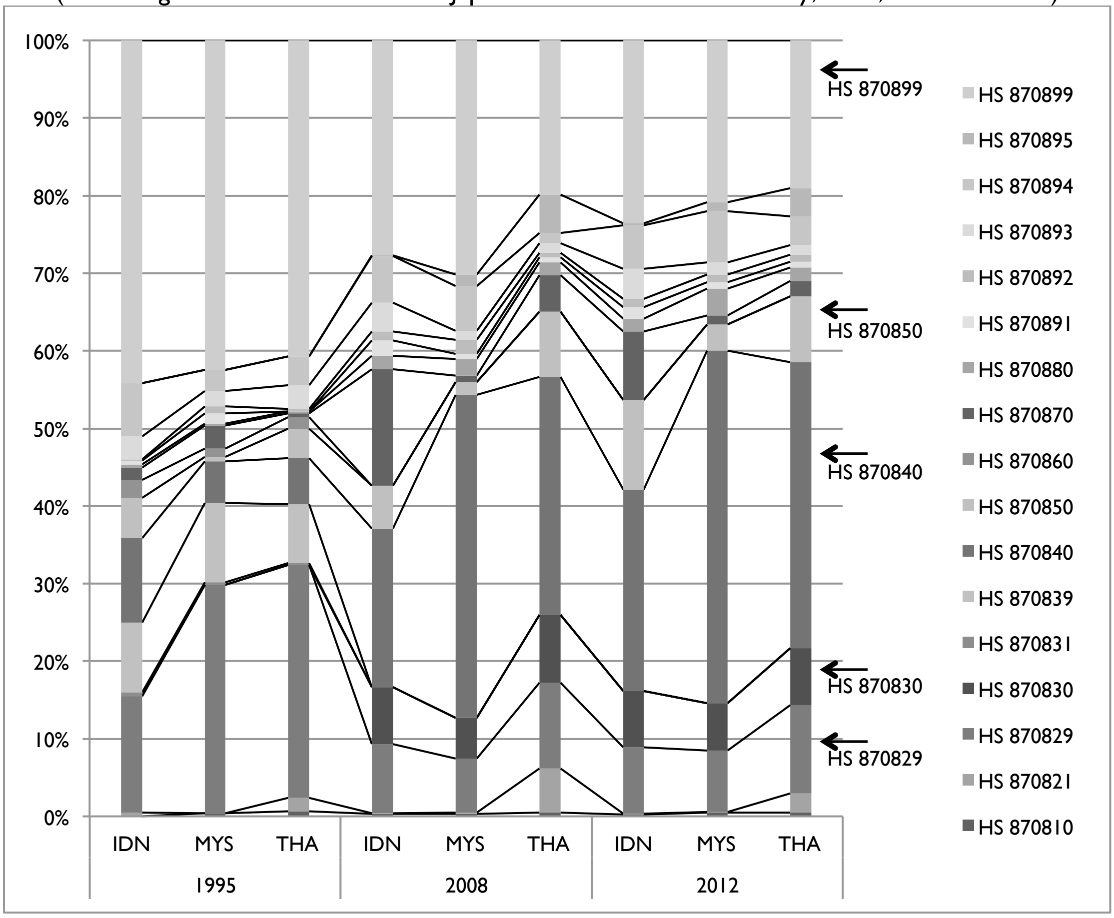
Notes on 6-Digits HS 8703 Codes and Abbreviations:

- Parts and accessories of the motor vehicles of headings 8701 to 8705: bumpers and parts thereof (870810), other parts and accessories of bodies (including cabs)-safety seat belts (870821), -other (870829), brakes and servo-brakes; parts thereof (870830), mounted brake linings (870831), brake system parts except linings (870839), gear boxes and parts thereof (870840), drive-axles with differential, whether or not provided with other transmission components, and non-driving axles; parts thereof (870850), non-driving axles/parts (870860), road wheels and parts and accessories thereof (870870), suspension systems and parts thereof (including shock-absorbers) (870880), other parts and accessories -radiators and parts thereof (870891), -silencers (mufflers) and exhaust pipes; parts thereof (870892), -clutches and parts thereof (870893), -steering wheels, steering columns and steering boxes; parts thereof (870894), -safety airbags with inflater system; parts thereof (870895), -other (870899).
- X=export to, M=import from
- IDN=Indonesia, MYS=Malaysia, THA=Thailand

As exhibited in the above Fig. 2.16, shifting patterns of Japan's trade with ASEAN3 in HS 8708 product categories during the past 25 years have been chiefly in HS 870840 (gear boxes and parts thereof), HS 870829 (other parts and accessories of bodies), HS 870830 (brakes and servo-brakes; parts thereof), HS 870839 (brake system parts except linings) and HS 870899 (others). Based on figures presented in

Fig. 2.16, the following Fig. 2.17 offers details of such shifting trade patterns in Japan's trade with ASEAN3 in automotive parts and accessories (1995, 2008 and 2012):

Fig. 2.17: Shifting Pattern: Japan-ASEAN3 Trade in Automotive Parts & Accessories
(Percentage of Total Trade Value of Japan and Each ASEAN3 Country, 1995, 2008 and 2012)



Source: UN Comtrade Database (calculated based on figures from Fig. 2.15)

2.4. Value Added of Japan Automotive Trade (SITC T34T35)

This section aims at further elucidating pattern of Japan automotive trade (i.e. in terms of value added) with its key partners in East and Southeast Asia as discussed in the previous sections. It highlights value added of Japan's trade in automotive-related products (i.e. SITC C34T35-transport equipment) by featuring domestic value added embodied in foreign final demand (FFD-DVA) and foreign value added embodied in domestic final demand (DFD-FVA) based on the OECD-WTO TiVA (Trade in Value Added) Database[78]. Key partners to be highlighted are East Asian and Southeast Asian countries (particularly China, Korea and ASEAN6 comprising Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. Three sub-sections are offered, i.e. on the general trends of Japan's DFD-FVA and FFD-DVA in the past 20 years (by referring to the country's gross export and import, production gross output and value added in transport equipment/SITC C34T35), trends of FFD-DVA and DFD-FVA of Japan trade in SITC C34T35 with several key partners in East and Southeast Asia, and major gainers of domestic value added (DVAs) and foreign value added (FVAs) of Japan trade in SITC 34T35 in East and Southeast Asia.

2.4.1. General Trends

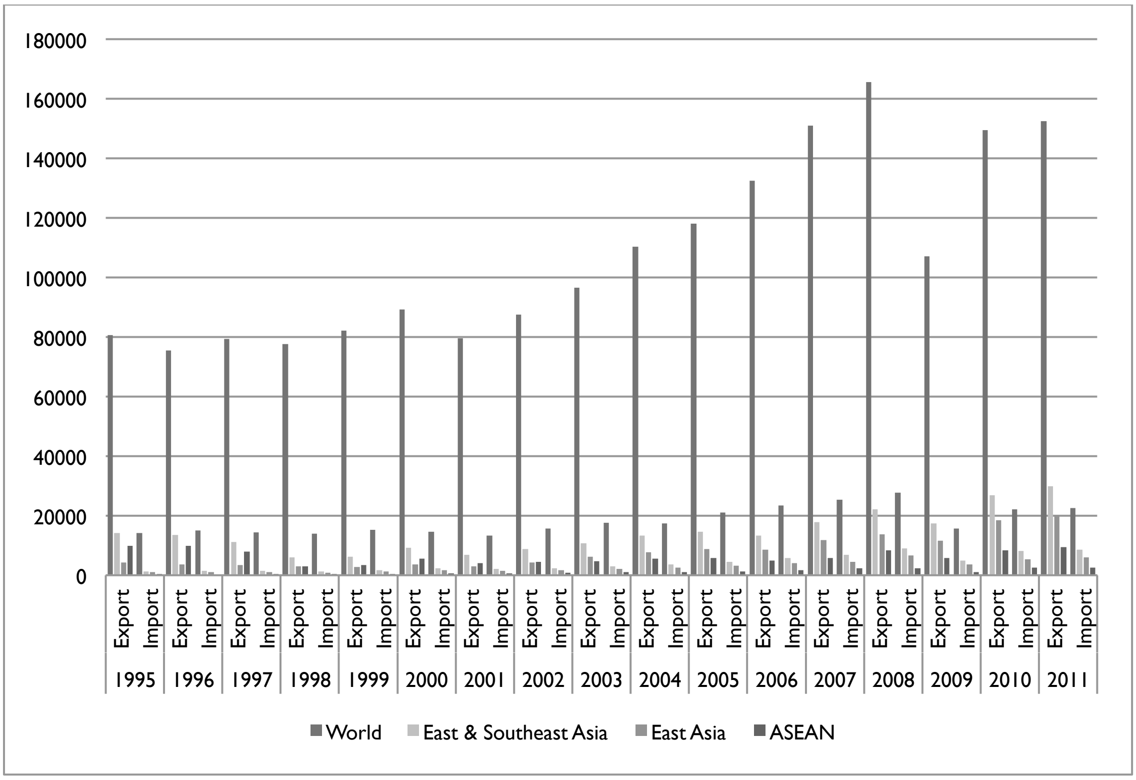
As of 2011, Japan's trade in transport equipment (SITC C34T35) generated a total value of more than USD 174 billions worldwide (i.e. gross export of USD 152 billions and import of USD 22 billions). The value is approximately 9.5% of the country's trade in all products or 16.2% of its trade in manufacture products[79]. The following Fig. 2.18 offers Japan's year on year (between 1995 to 2011) gross export

[78] Accessed on-line at http://stats.oecd.org/ as of June 29th 2017. **Remarks on TiVA** database: as a joint OECD-WTO initiative, its aim is to allow better tracking of global production networks and supply chains than is possible with conventional trade statistics. It contains a range of indicators measuring the value added content of international trade flows and final demand. The indicators are derived from the 2016 version of OECD's Inter-Country Input-Output (ICIO) Database. Remarks on selected indicators: FFD-DVA is domestic value-added content of export, i.e. domestic content of exported products, while DFD-FVA is foreign value-added content of export, i.e. foreign content of exported products.

[79] In 2011, total trade value of Japan for all products is approximately USD 1,839 billions consisting of gross export of USD 893,342.6 millions and gross import of USD 946,931.9, whereas its total value of trade in manufacture products is around USD 1,076 billions consisting of gross export of USD 621,663.3 millions and gross import of USD 455,626 millions (OECD-WTO TiVA Database).

and import in SITC C34T35 products at world level which is presented in comparison to East and Southeast Asia, East Asia and ASEAN shares.

Fig. 2.18: Japan's Gross Export and Import in Transport Equipment (SITC C34T35)
(Millions USD, 1995-2011)

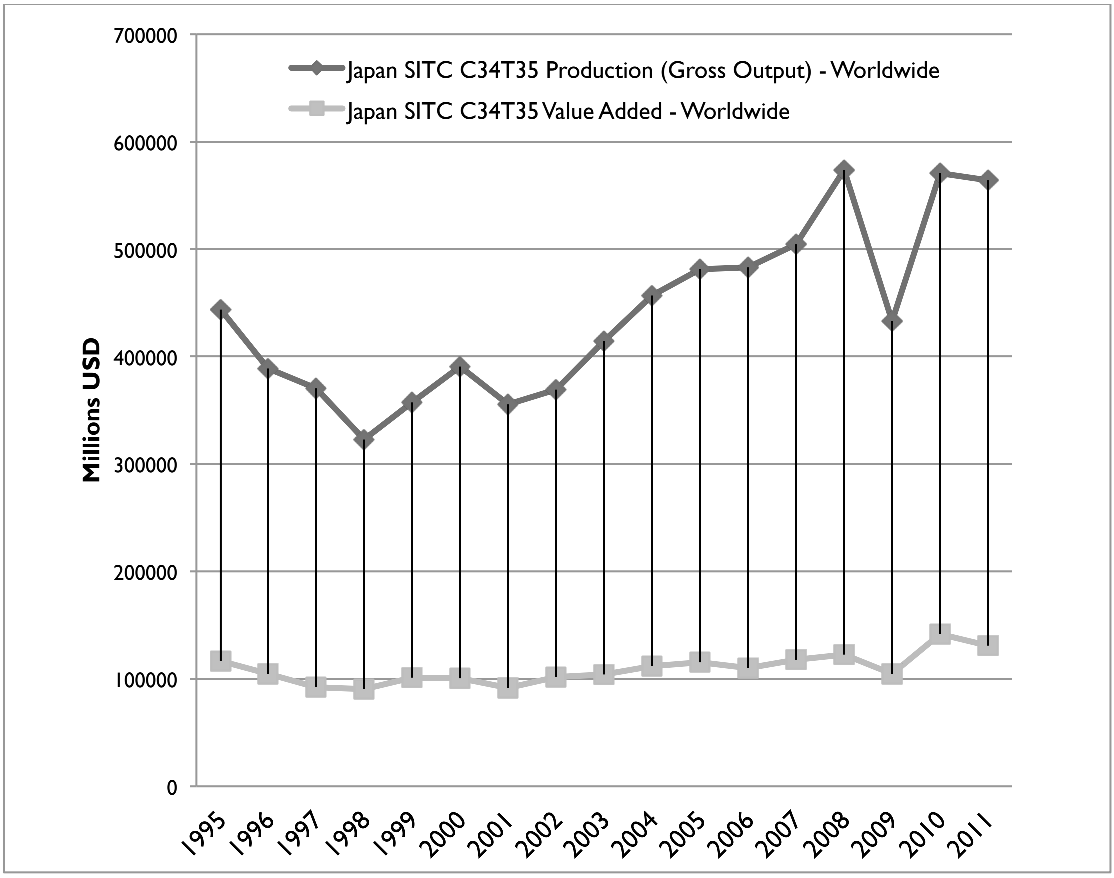


	Gross Export (EXGR) to				Gross Import (IMGR) from			
	World	East & Southeast Asia	East Asia	ASEAN	World	East & Southeast Asia	East Asia	ASEAN
1995	80,597	14,157.7	4,272.9	9,884.8	14,214.3	1,283	954	329.1
1996	75,532.6	13,476.3	3,633.6	9,842.7	15,140.7	1,388.8	1,100.9	287.9
1997	79,366.2	11,258.6	3,336.4	7,922.1	14,462.5	1,439.4	1,040.8	398.6
1998	77,738.8	6,077.5	3,081.1	2,996.4	13,887.3	1,305.4	863.3	442.1
1999	82,246	6,199.1	2,807	3,392.1	15,196.8	1,692.2	1,216	476.2
2000	89,166	9,150.4	3,540.7	5,609.7	14,617.7	2,261.9	1,628.6	633.3
2001	79,551.1	6,930.3	2,964.8	3,965.5	13,392.1	2,180.6	1,474.6	706
2002	87,576.7	8,801.4	4,326.8	4,474.7	15,616.8	2,354.3	1,595.4	758.9
2003	96,528.8	10,814.4	6,144.4	4,670	17,691.2	3,086	2,082.5	1,003.5
2004	110,236.2	13,252.9	7,730.5	5,522.4	17,311.2	3,569.5	2,510.5	1,059
2005	118,100.7	14,671.9	8,828.9	5,842.9	21,080	4,473.8	3,110.6	1,363.2
2006	132,585.3	13,385.5	8,502.2	4,883.4	23,348.3	5,735.4	4,107.3	1,628.1
2007	150,897.6	17,733.4	11,853.2	5,880.2	25,278.6	6,817.1	4,565.6	2,251.5
2008	165,608.9	22,053.7	13,659.2	8,394.5	27,750.3	8,969.4	6,556	2,413.4
2009	107,015.3	17,508.4	11,637.2	5,871.2	15,632.3	4,869.8	3,716.1	1,153.7
2010	149,561.3	26,955.6	18,496.3	8,459.3	22,193.1	8,061.2	5,405.1	2,656.1
2011	152,481.7	29,780.7	20,297.9	9,482.8	22,641.4	8,576.9	5,933.3	2,643.6

Source: OECD-WTO TiVA Database

The value of Japan's gross export in transport equipment to East and Southeast Asia (USD 29,780.7 millions) is about 19% of its worldwide gross export, while its gross import value to these two regions (USD 8,576.9 millions) is approximately 36% of its overall gross import (2011). The figures indicate significantly importance of East and Southeast Asian countries for Japan's trade in transport equipment. Throughout the period of 1995-2011, as Fig. 2.18 shows (see above), the shares of East and Southeast Asia in Japan's export and import activities in transport equipment endure to remain substantial, especially by the mid of 2000s onward.

Fig. 2.19: Japan's Production (Gross Output) and Value Added at World Level in Transport Equipment (SITC C34T35) (Millions USD, 1995-2011)



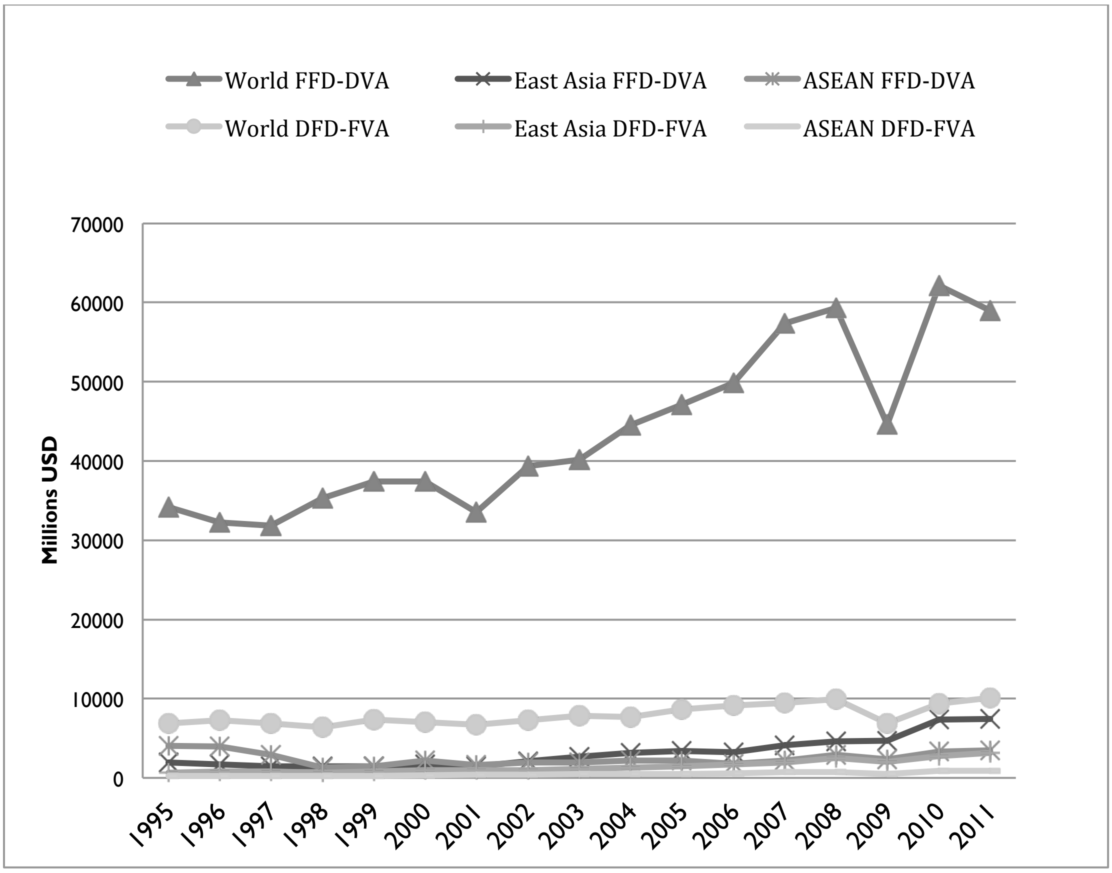
Source: OECD-WTO TiVA Database

In terms of production (gross output) and value added, Japan trade in transport equipment generated USD 563,980.6 millions and USD 131,158.7 millions at world level respectively (in 2011) where its value added is approximately 23.3% of production (gross output). Between 1995 and 2011, as shown in Diagram 2.19 (see above), value added generated from Japan trade in transport equipment has been quite constant (as a percentage of its production/gross output), i.e. 26.2% (1995), 25.6% (2000), 23.9% (2005) and 24.7% (2010). Even at its downward trends in 1998 and 2009 (following the Asian monetary and global financial crises), percentages of value added to production remains constant at 28% and 24.1% respectively.

In terms of FFD-DVA (domestic value added embodied in foreign final demand) and DFD-FVA (foreign value added embodied in domestic final demand), Japan trade in transport equipment in 2011 generated USD 58,983.3 millions (FFD-DVA) and USD 10,121.9 millions (DFD-DVA) worldwide. The figures indicate that Japan's trade in its transport equipment generates value added more in terms of FFD-DVA which is captured domestically, i.e. by approximately five times higher than its DFD-FVA which is captured internationally via among others via its foreign affiliates activities and production hubs. As shown in the following Fig. 2.20, the trends remain steady since 1995 where its DFD-FVA is one fifth of its FFD-DVA.

Comparably, Fig. 2.20 also presents the trend for Japan's FFD-DVA and DFD-FVA generated via its trade activity in transport equipment in East Asia and ASEAN for the same period of time. As for 2011, FFD-DVA generated from Japan trade in transport equipment in East Asia is 12.6% of its FFD-DVA generated worldwide. In ASEAN, for the same year, the FFD-DVA generated is 6% of the Japan's world FFD-DVA. For DFD-FVA, the percentage is 31% in East Asia and 8.8% in ASEAN. The full trend during the past 20 years of Japanese FFD-DVA and DFD-FVA in transport equipment is displayed in Diagram 2.20.

Fig. 2.20: Japan's FFD-DVA and DFD-FVA in Transport Equipment Trade (SITC C34T35): World, East Asia and ASEAN (Millions USD, 1995-2011)



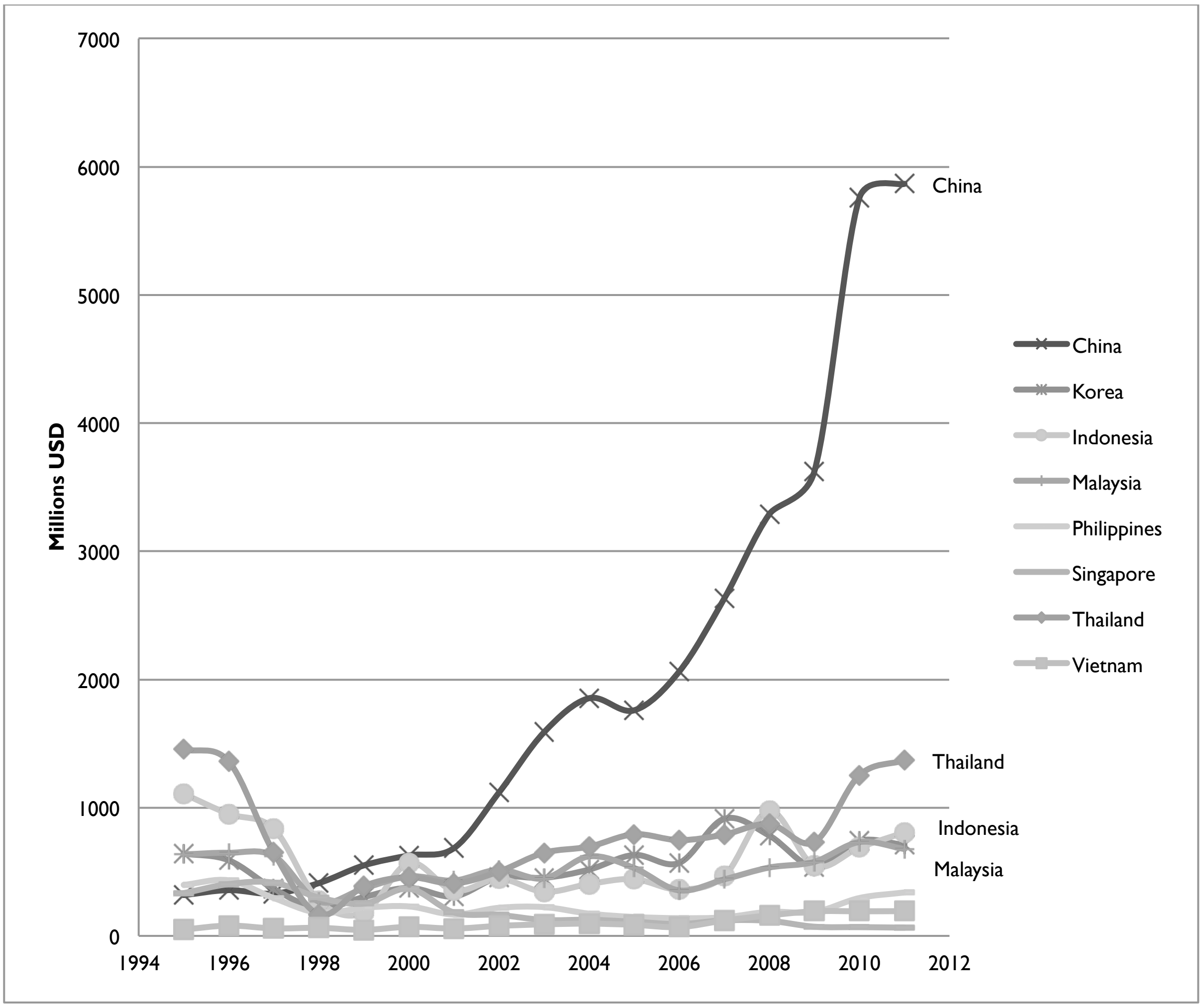
	FFD-DVA			DFD-FVA		
	World	East Asia	ASEAN	World	East Asia	ASEAN
1995	34,197.9	1,928.1	4,044.8	6,874.5	660.7	227.7
1996	32,209.5	1,689.9	3,956.9	7,282.5	792.9	234
1997	31,815.1	1,487.6	2,932.8	6,905.9	812	250.8
1998	35,342	1,429.4	1,276.3	6,362.7	636.5	234.3
1999	37,392.3	1,448.4	1,485.4	7,330.5	844.7	269.3
2000	37,385.6	1,690	2,177.8	7,073	976.2	333.3
2001	33,544.9	1,447.8	1,617.4	6,690.6	954.1	396.4
2002	39,340.5	2,110.1	1,945.7	7,297.7	964.2	438.6
2003	40,191	2,648	1,913.3	7,856.1	1,100.4	461.7
2004	44,513	3,153.7	2,155.4	7,698.7	1,281.2	464.9
2005	47,098.1	3,362.4	2,147.3	8,664.2	1,484.3	519.8
2006	49,884.5	3,216.9	1,805.4	9,117.7	1,718.7	572.4
2007	57,356.1	4,156.1	2,145.7	9,430.8	1,910.7	712.7
2008	59,278.5	4,616.2	2,908.1	9,952.7	2,514.8	769.6
2009	44,587.7	4,716.4	2,349.6	6,846.4	2,005	503.3
2010	62,175.2	7,322.2	3,284	9,351.9	2,732.1	890.2
2011	58,983.3	7,459.6	3,516.4	10,121.9	3,189.6	889.3

Source: OECD-WTO TiVA Database

2.4.2. Japan FFD-DVA and DFD-FVA

This sub-section elucidates Japan's domestic value added embodied in foreign final demand (FFD-DVA) and foreign value added embodied in domestic final demand (DFD-FVA) in transport equipment trade with its key East Asian and Southeast Asian partners (China, Korea and ASEAN6 comprising Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam). The following Fig. 2.21 and Fig. 2.22 present the details of the country's FFD-DVA and DFD-FVA respectively for each of country partners.

Fig. 2.21: Japan's FFD-DVA in Transport Equipment Trade (SITC C34T35): East Asia and ASEAN6 (Millions USD, 1995-2011)



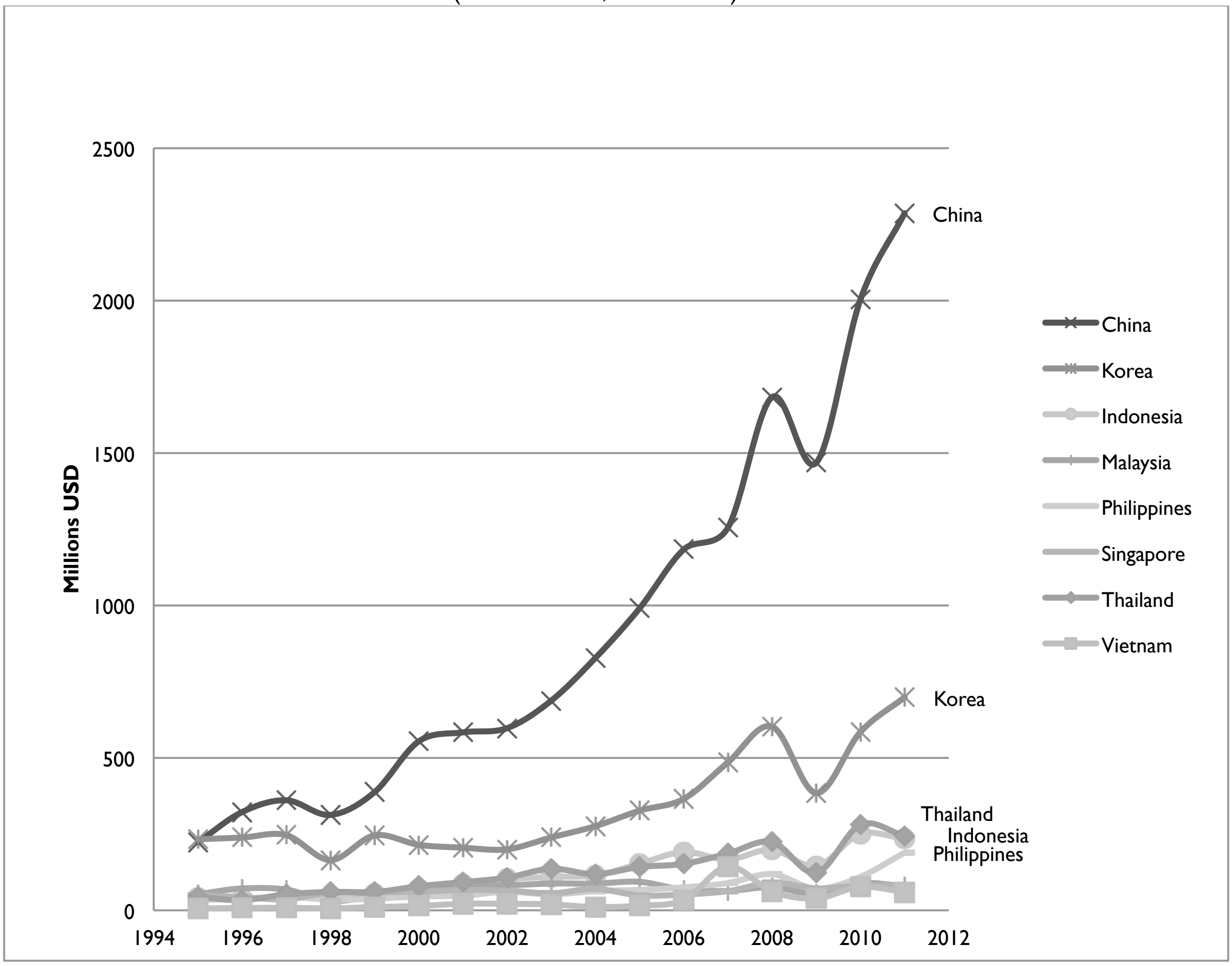
	China	Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
1995	317.5	643.3	1,107.4	634.8	396.7	331.8	1,454.7	49.2
1996	357.1	589.9	950.9	648.4	433.4	404.4	1,360.2	80.4
1997	329.9	366.9	835.3	623.7	295.2	415.1	649	58.1
1998	411.7	214.1	273.8	267.8	179.3	299.5	166.5	63.1
1999	550	303.1	180.2	370.7	219.2	251.8	387.4	46.6
2000	627.6	375.1	568.9	464.2	229.9	368.5	458.1	71
2001	684.5	308.3	352.7	431.6	166.7	182.2	409	57.3
2002	1,118.6	457.1	445.5	515.8	219.3	163.8	502.3	78
2003	1,588.7	453.2	343.9	448	224.6	124	648.4	90.1
2004	1,854.1	517.3	404.9	620.1	173.4	125.7	696.1	95.6
2005	1,759.8	631.4	442.9	529.7	147.5	110.3	792.5	86.4
2006	2,061.8	569.2	361.9	354.9	138.2	92.1	746.8	68.6
2007	2,631.7	913.7	467.3	440.9	144.7	121.3	790.3	120.1
2008	3,289.8	782.5	975	533.5	188.1	117.4	873.2	160
2009	3,622.6	538.8	546.4	577.7	185.9	71.7	731.7	191.8
2010	5,757.4	742.3	689.5	732	295.6	68.3	1,252.8	191.9
2011	5,866.8	709.6	807.1	678	338.9	64.4	1,369.9	192.9

Source: OECD-WTO TIVA Database

As shown in Fig. 2.21, Japan trade with China in transport equipment tops up its FFD-DVA compared to other trade partners in East and Southeast Asia. The value has significantly increased (and much higher than other partners) in the year of 2006 onward as it surpasses annual value of USD 2 billions. Among ASEAN partners, Japan trades with Thailand, Indonesia and Malaysia generate most of FFA-DVA. In the case of Thailand, the value exceeded USD 1 billion annually in 1995, 1996, 2010 and 2011. The figures created a "U-curve" trend of Japan's FFD-DVA in its transport equipment trade with Thailand during this particular period of time (1995-2011). Similar trends also apply to the cases of Indonesia and Malaysia albeit few differences in the 2008-2009 figures indicating different responses towards global financial crises among the three countries automotive markets.

Trend in Japan's DFD-FVA generated from its transport equipment trade with East and Southeast Asian partners is in contrast to that of FFD-DVA previously described. As displayed in the following Fig. 2.22, the trend has been in upward slope since 1995 despite its much lower value. Except in a short period of 2009 (following 2008 global financial crises), the annual DFD-FVA value has steadily been enlarged. As in the case of FFD-DVA, the Chinese case shows significant increase of DFD-FVA in 2006 onward. Among ASEAN partners, Japan trades with Thailand, Indonesia and the Philippines generate most of DFD-FVA. Unlike the case in FFD-DVA, Japan trade with Korea generates quite substantial DFD-FVA compared to other ASEAN partners.

Fig. 2.22: Japan's DFD-FVA in Transport Equipment Trade (SITC C34T35): East Asia and ASEAN6 (Millions USD, 1995-2011)



	China	Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
1995	222.9	233.5	41.2	53.3	34.1	49.8	43	5.9
1996	322.2	238.5	40	71.7	37.9	43.1	33.5	7.5
1997	361	246.7	40.8	67.9	44.9	36.3	52.6	8.3
1998	312.8	164.7	44	30.6	35	58.1	60.3	6.3
1999	387.6	245.8	53.8	47.1	38.4	59.1	60.1	10.6
2000	554.1	214.7	69.9	63.1	45.3	61.4	79	14.3
2001	583.8	205.5	86.7	80.7	48.2	66.4	92.5	21.6
2002	597.4	200.1	102.3	82.1	60.6	65	107.2	21.3
2003	687.7	239	109.5	87.8	52.6	55.6	136.4	19.5
2004	827.7	276	114.9	87.7	62.8	70.4	118.3	10.6
2005	990.5	326.9	152.7	93.4	67	48.8	142.2	15.4
2006	1,183.6	365.5	191.4	67.4	75.4	52	152.2	33.8
2007	1,255.3	485.3	166.5	63.8	89.5	62.8	186.3	143.6
2008	1,683.3	602.6	198.8	75.7	118.7	90.4	224	61.7
2009	1,468.1	384.4	144.5	53.8	71	71.7	122.8	39.1
2010	2,003.2	584.8	249.9	88.9	109.9	81.5	280.6	77.2
2011	2,286.4	698.9	234.5	79.2	189.3	81.9	243.7	59.7

Source: OECD-WTO TIVA Database

To conclude the presentation on trends of Japanese FFD-DVA and DFD-FVA as just previously described and assessed, two leading propensities are found. First, as indicated in Fig. 2.21, as early as of 1995, value added of Japanese automotive industry that has captured domestically was much higher in the country's trade activities with Thailand and Indonesia than any other countries in the region (including that of China and Malaysia). Even in the case of the country's trade with China, back then in 1995, the value was much smaller compared to its trade with any other countries in the region except Vietnam. However, in the succeeding years that follow, Japan trade activities with China generate much larger value added than those of with other countries in the region (especially since 1998) and have reached its peak in 2010 and 2011 (when the value worth more than USD 5750 annually).

Second, as indicated in Fig. 2.22, the 1995 Japanese DFD-FVA in its automotive trade with Thailand, Indonesia and Malaysia was extremely low, i.e. reaching only respectively at USD 43, USD 41.2 and USD 53.3 annually. Figures for the country's trade with other ASEAN countries was also low, if especially compared to figures for China and Korea. This shows that during those early years of Japanese automotive firms operation in Southeast Asia (i.e. in the 1990s), value creation by Japanese firms have not been taken place at local sites. However, in the decade that follows (i.e. in the 2000s), countries like Thailand, Indonesia and the Philippines have become the sites for value added creation of Japanese automotive firms operation in the region as indicated by the increasing Japanese DFD-FVA values that reached a value of more than USD 100 annually in 2002 (in the cases of Thailand and Indonesia) and in 2008 (in the case of the Philippines). Such values have been doubled since 2009, i.e. just a year after the 2008 financial crisis, in the cases of Thailand and Indonesia.

2.4.3. DVA/FVA Gainers and Gaps

Observed from a reciprocated assessment of FFD-DVA and DFD-FVA, trade activity between East Asian countries (where automotive production is mostly located) and their key Southeast Asian partners results in alternate comprehension on gainers and gaps of the generated valued added, i.e. in terms of domestic value added (DVAs) and foreign value added (FVAs) that are seen from both sides of the trading partners[80]. In the context of East and Southeast Asian automotive trade, Japan trade with its key ASEAN partners has produced considerably more FVAs and DVAs than the ones resulted in China or Korea trades with the same ASEAN partners.

Japan-ASEAN6 (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) trade in transport equipment generated much more FVAs than FVAs created in the China-ASEAN6 or Korea-ASEAN6 trades. Japan-Thailand FVAs stood at USD 837.81 million (2008) and USD 1296.39 million (2011). Japan-Indonesia FVAs stood at USD 951.62 million (2008) and USD 782.51 million (2011). However, the largest FVAs are resulted from Japan-China trade that reached USD 3107.19 million (2008) and peaked at USD 5685.64 million (2011). Japan-Korea and Korea-China trade FVAs are far behind with the values that are comparable to Japan-Thailand and Japan-Indonesia FVAs respectively. The total added value of Japan-China FVAs is five

[80] The assessment is derived from a reciprocal data presentation of both sides of trading partners, i.e. by treating a country reporter to be another country's partner vice versa in data extraction from the OECD-WTO TiVA Database. By so doing, it is observed that a country reporter's FFD-DVA is essentially the country partner's DFD-FVA vice versa. Hence the actual gainers in such a reciprocal relations need to be understood mutually in trade nexuses or relations. For brevity, terms applied in this particular assessment are DVAs (for domestic value added) and FVAs (for foreign value added) to represent domestic and foreign content of exported products respectively.

times more than the FVAs value of Japan-Korea, China-Korea, Japan-Thailand or Japan-Indonesia.

In terms of DVAs, East Asia and ASEAN6 trade in transport equipment captures the highest value in Korea-China trade gaining USD 2803.45 million in 2011. It is then followed by China-Japan (USD 2276.11 million) and Korea-Japan (USD 696.83 million). It means that, the added value of domestic content of exported products is quite significantly captured intra-regionally, i.e. among the East Asian countries. It is slightly different from the trend in the FVAs, as previously described, where the added value of foreign content of exported products is captured inter-regionally, i.e. in the case of Japan-Thailand (although the value is one fifth of that of Japan-China). However, Japan-Thailand FVAs is slightly higher than that of China-Korea. The prevalence of Indonesia-Thailand DVAs that has an added value of USD 582.89 million in 2011 is worth noted since the value is close to that of Korea-Japan USD 696.83 million.

The following Table 2.8 summarizes the top 10 trade nexuses representing most gainers of FVAs and DVAs in East Asian countries and ASEAN6 trade in transport equipment:

Table 2.8: Top 10 Trade Nexuses of FVAs and DVAs Gainers
in the East Asia and ASEAN6 Trade in Transport Equipment (2011, millions USD)

FVAs	DVAs
1. Japan-China (5685.64)	1. Korea-China (2803.45)
2. Japan-Thailand* (1296.39)	2. China-Japan (2276.11)
3. China-Korea (1102.49)	3. Korea-Japan (696.83)
4. Japan-Indonesia* (782.51)	4. Indonesia-Thailand*** (582.89)
5. Japan-Korea (697.32)	5. Indonesia-Singapore*** (290.03)
6. Japan-Malaysia* (671.06)	6. Malaysia-Thailand (281.02)
7. China-Indonesia (638.32)	7. Thailand-Japan (244.13)
8. China-Malaysia (404.8)	8. Indonesia-Japan (235.37)
9. Thailand-Indonesia** (394.26)	9. Singapore-China (188.62)
10. China-Thailand (385.64)	10. Malaysia-China (145.64)

Source: OECD-WTO TiVA Database

Inter-regionally, Japan secures substantial capture of FVAs in most of its trade nexuses in ASEAN6 which means that Japan gains most foreign value added content of its export in transport equipment to its key ASEAN6 partners. The total value is USD 2749.96, a sum of Japan's FVAs with Thailand, Indonesia and Malaysia (highlighted by * in the above Table 2.15). Intra-regionally, among ASEAN6 countries, Thailand-Indonesia automotive trade captures the greatest FVAs which means that Thailand gains most foreign value added content of its export in transport equipment to Indonesia (worth USD 394.26, indicated by ** in the Table). Indonesia-Thailand and Indonesia-Singapore automotive trades capture most DVAs which means that Indonesia gains most domestic value added content of its export in transport equipment to Thailand and Singapore (worth USD 872.92, a sum total of Indonesia's DVAs with Thailand and Singapore, indicated by *** in the Table).

In correspondence with the above Table 2.8, the following Table 2.9 recaps the bottom 10 trade nexuses comprising the least gainers of FVAs and DVAs in East Asian countries and ASEAN6 trade in transport equipment:

Table 2.9: Bottom 10 Trade Nexuses of FVAs and DVAs Gainers
in the East Asia and ASEAN6 Trade in Transport Equipment (2011, millions USD)

FVAs	DVAs
1. Vietnam-Philippines (9)	1. Singapore-Vietnam (1.41)
2. Vietnam-Malaysia (12.17)	2. Philippines-Singapore (2.7)
3. Philippines-Malaysia (17)	3. Korea-Philippines**** (5.6)
4. Singapore-Indonesia (34.9)	4. Singapore-Thailand (7.02)
5. Singapore-Malaysia (41.26)	5. Malaysia-Vietnam (10.67)
6. Singapore-Philippines (44.2)	6. Korea-Vietnam**** (11.85)
7. Vietnam-Indonesia (53.9)	7. Indonesia-Vietnam (14.94)
8. Japan-Singapore**** (63.3)	8. Korea-Malaysia**** (19.78)
9. Vietnam-Singapore (64)	9. China-Philippines**** (21.1)
10. Thailand-Malaysia (90.28)	10. Thailand-Vietnam***** (20.24)

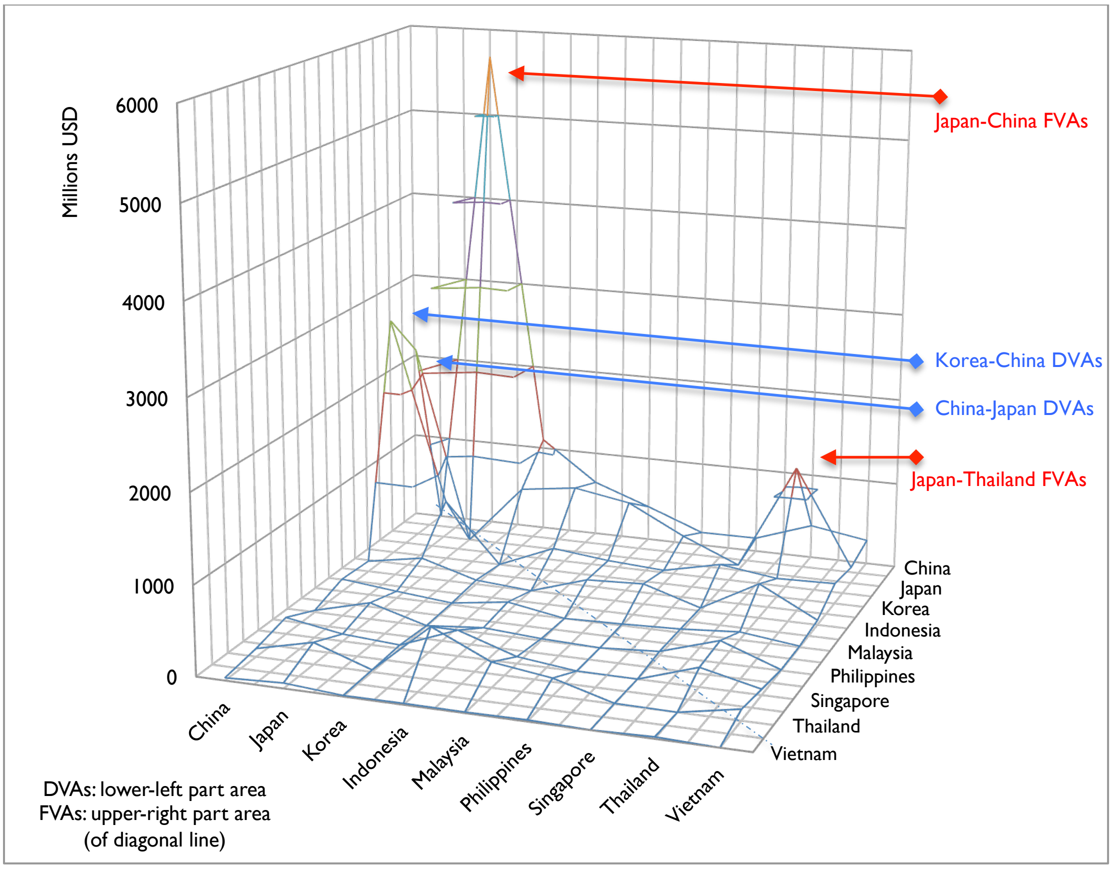
Source: OECD-WTO TiVA Database

Those trade nexuses at the bottom 10 in East Asian countries and ASEAN6 trade in transport equipment have all FVAs/DVAs that are under USD 100 millions annually. Inter-regionally, five trade nexuses are on the list (highlighted by **** in Table 2.6), i.e. one under FVAs list (Japan-Singapore) and four under DVAs list (Korea-Philippines, Korea-Vietnam, Korea-Malaysia and China-Philippines). All other nexuses originate within ASEAN6. Intra-regionally, minor trade nexuses suggest stronger trade nexuses of Thailand, Indonesia and Malaysia than the one covering Singapore, Vietnam and the Philippines. This has been evidenced particularly in trade nexuses of Singapore-Vietnam (with generates DVAs of only USD 1.41 millions in 2011) and Philippines-Singapore (which produces DVAs of USD 2.7 millions in the same year).

Those trade nexuses with very low FVAs/DVAs indicate gaps that are existed both inter-regionally and intra-regionally in the East Asian-ASEAN6 trade in transport equipment. The gaps reflect differences, disparities and contrasts among participating countries, i.e. in terms of automotive industrial development levels and stages, government policy orientation, strategies of firms and their responses to the changes in the supply chains and production networks. Late industrial development is apparent in the case of Vietnam, i.e. by capturing the least of both DVAs and FVAs as of 2011. In the context of being a close neighbor of Thailand (which conversely captures the most DVAs/FVAs among ASEAN6), Vietnam trade nexus with Thailand has not yet generated substantial FVAs (with a value of USD 123.75 millions in 2011). Let alone in its DVAs, Thailand-Vietnam nexus (highlighted by ***** in Table 2.6) is among the bottom 10 indicating that disparities in automotive industrial development between the two countries are apparent.

The following Fig. 2.23 depicts graphical illustration of gainers and gaps of DVAs/FVAs captured in the East Asian and ASEAN6 trade in transport equipment:

Fig. 2.23: Gainers and Gaps in Value Added of East Asian and ASEAN6 Trade FVAs/DVAs in Transport Equipment (Millions USD, 2011)



	China	Japan	Korea	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
China		2276.11	2803.45	122.99	145.64	21.1	188.62	92.22	30.32
Japan	5685.64		696.83	235.37	79.02	189.3	81.65	244.13	59.75
Korea	1102.49	697.32		48.06	19.78	5.6	40	23.21	11.85
Indonesia	638.32	782.51	270.51		110.55	63.6	290.03	582.89	14.94
Malaysia	404.8	671.06	199.43	207.13		21.4	77.66	281.02	10.67
Philippines	155.7	338.9	158.3	237	17		2.7	192.2	17.7
Singapore	159.68	63.3	304.74	34.9	41.26	44.2		7.02	1.41
Thailand	385.64	1296.39	216.02	394.26	90.28	249.2	215.4		20.24
Vietnam	279.52	185.34	233.6	53.9	12.17	9	64	123.75	

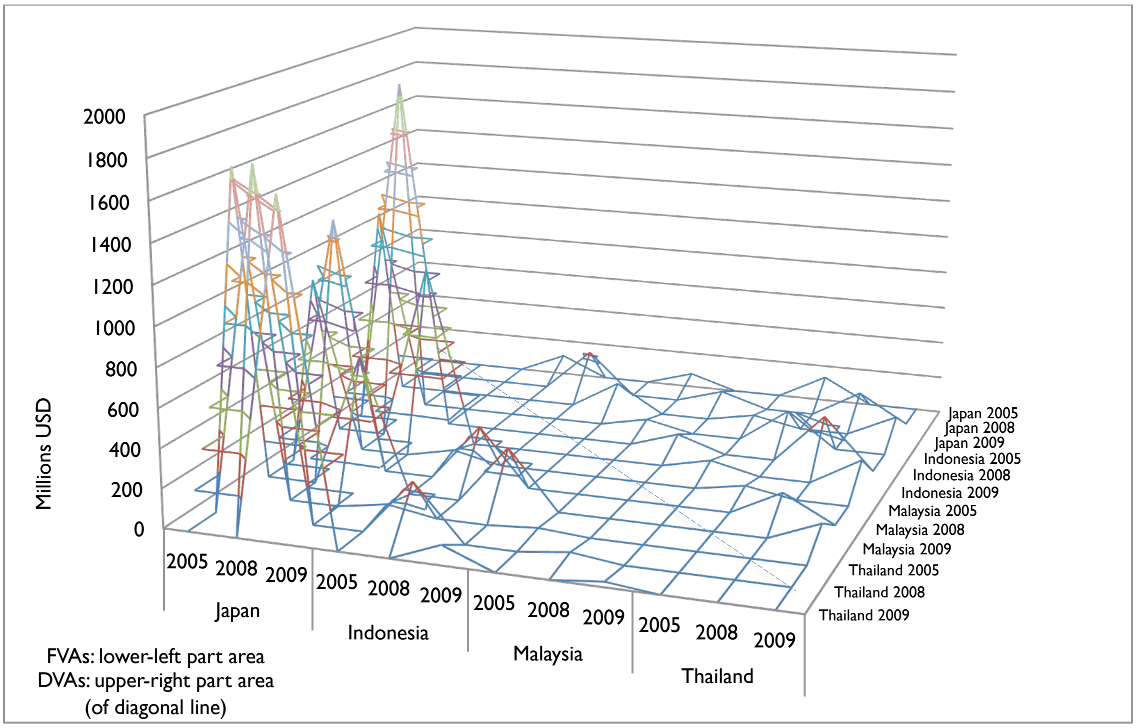
Source: OECD-WTO TiVA Database
Remarks on FVAs/DVA: positions at lower part of diagonal line represent FVAs, while its upper part represents DVAs

In the case of Japan-ASEAN3 (Indonesia, Malaysia and Thailand) trade in transport equipment, inter-regional trade generates much more FVAs/DVAs than the ones resulted from intra-regional trade among ASEAN3 countries. Japan-Thailand and Japan-Indonesia FVAs are dominating at US $ 1,681.8 million (2009) and US $ 937.4 million (2009) respectively. As presented in the following Diagram 2.24 illustrating FVAs/DVAs pattern of Japan and ASEAN3 trade in transport equipment (for a time series of 2005, 2008 and 2009), Japan gains most of its FVAs and DVAs by trading with Thailand and Indonesia.

Japan-Thailand FVAs has steadily reached more than US $ 1.6 billions annually in 2005, 2008 and 2009. See the lower-left part area (Japan axis-column) for its graphic visualization and the lower-left boxes (under Japan column) for its actual figures in Diagram 2.24. Likewise, Japan-Indonesia FVAs reached its record high in 2008 worth at USD 1863.2 millions or slightly more than USD 1.8 billions. See the upper-left corner area (Japan axis-column) and the upper-left boxes (under Japan column) in Chart 2.21. Japan-Indonesia's FVAs for 2005 and 2009 are worth of USD 1082.9 millions and USD 937.4 millions respectively (see Chart 2.21 in the upper-left boxes).

Japan-ASEAN3 DVAs are generally far lower than those of the FVAs. Area in the lower-right corner in Fig. 2.24 represents DVAs values of respective countries that are clearly far much lower than the FVAs values. Japan-Thailand and Japan-Indonesia DVAs are the highest values. Japan-Thailand DVAs stand at USD 133.5 millions (2005), USD 147.7 millions (2008) and USD 122.3 millions (2009), whereas Japan-Indonesia DVAs stand at USD 108 millions (2005), USD 229.6 millions (2008) and USD 149.5 millions (2009).

Fig. 2.24: FVAs/DVAs of Japan and ASEAN3 Trade in Transport Equipment
(2005, 2008, 2009, millions USD)



		Japan			Indonesia			Malaysia			Thailand		
		2005	2008	2009	2005	2008	2009	2005	2008	2009	2005	2008	2009
Japan	2005				108			76.2			133.5		
	2008					229.6			76.3			147.7	
	2009						149.5			48.9			122.3
Indonesia	2005	1082.9						53.4			183.2		
	2008		1863.2						83.1			265.2	
	2009			937.4						57.7			149
Malaysia	2005	901.8			54.1						44.5		
	2008		1304.3			293.9						133.1	
	2009			686			302						106.1
Thailand	2005	1665.5			41.8			18.1					
	2008		1748.3			282.7			31.1				
	2009			1681.8			100.7			26.9			

Source: OECD-WTO TiVA Database
Remarks on FVAs/DVA: positions at lower part of diagonal line represent FVAs, while its upper part represents DVAs

Although the value is much lower than the FVAs created between Japan and ASEAN3, FVAs stemmed from trade among ASEAN3 countries are quite substantial. Indonesia-Malaysia and Indonesia-Thailand FVAs have considerably high values. Indonesia-Malaysia FVAs stand at USD 54.1 millions (2005), USD 293.9 millions

(2008) and USD 302 millions (2009), while Indonesia-Thailand FVAs stand at USD 41.8 millions (2005), USD 282.7 millions (2008) and US $ 100.7 millions (2009). In terms of DVAs, intra-trade activities among ASEAN3 countries have been quite intense, especially between Thailand and Indonesia and Thailand and Malaysia.

2.5. Summary, Discussions and Notes for Further Analysis at Micro-Level

To summarize, the following features are observed in the Japan-ASEAN trade in automotive-related products (for the period of 1988-2016):

a. On average, Japan trade with ASEAN3 in passenger cars is valued approximately ¼ of its trade in automotive parts and accessories;
b. Most traded passenger cars are gasoline engine type cars of 1500-3000cc, however trade value of this type of car tends to shrink overtime (1988-2016), whereas overall trade patterns in passenger cars is shifted towards gasoline engine type cars of 1000-1500cc;
c. Overtime (1988-2016), Japan trade with ASEAN3 in automotive parts and accessories has an upward trend peaked in 2012;
d. Overall trade patterns in automotive parts and accessories reflect ASEAN3 reliance on specific products/parts of gear boxes and bodies/cabs, while at the same time ASEAN3 reliance on other varieties of parts and accessories tends to decrease overtime (1988-2016);
e. Overtime (1988-2016), overall trade values in vehicles for the transport of goods and public transport type motor vehicles are stagnated and tend to shrink.

Trends in value added of Japan trade in automotive-related products with East and Southeast Asian partners (for the period of 1995-2011) are featured as follows:

a. With gross (export and import) trade value accounted for 9.5% of its total trade value in all products or 16.2% of its total trade value in manufacture products (as of 2011), Japan's overall trade value added in automotive-related products (as of 2011) was 23.3% of its production (gross output);
b. Overtime (1995-2011), East and Southeast Asian countries are important partners of Japan in its automotive trade with a gross export to and import from East and Southeast Asia accounted for 19% and 36% respectively of its total export and import (as of 2011);
c. Overtime (1995-2011), Japan captures its automotive trade value added much more domestically than internationally as the country's domestic value added embodied in foreign final demand (FFD-DVA) is five times higher on average than its foreign value added embodied in domestic final demand (DFD-FVA);
d. Overtime (1995-2011), overall Japan's FFD-DVA and DFD-FVA in automotive products are on upward trends as the country generated from its trade with East and Southeast Asian partners accounting for 12.6% and 6% (of Japan's world FFD-DVA) and 31% and 8.8% (of Japan's world DFD-FVA) respectively;
e. Overtime (1995-2011), main source of Japan's FFD-DVA in its trade in automotive products with East and Southeast Asian partners is China;
f. Among ASEAN partners, its main sources are Thailand, Indonesia and Malaysia of which a U-curve trends were observed in the FFD-DVA and an upward trends were observed on the DFD-FVA generated from Japan-ASEAN3 trade (1995-2011);

g. Gains from DVAs/FVAs in Japan trade in East and Southeast Asia have been captured from inter-regional nexuses, while gaps have resulted from mostly intra-ASEAN ones.

Keeping in mind those distinctive trade patterns (1988-2016) and trends in value added (1995-2011) of Japan's automotive trade in East and Southeast Asia, the study argues that changes in the country's automotive production network in the region have been driven by and featured as follows:

a. Intra and inter-firms trade, procurement and transfer of automotive parts and components within and among firms supply chains and production networks;
b. Japan's automotive trade relations with ASEAN3 that have less dependency on cars exportation and shifted to trade in automotive parts and components;
c. Significance of Japanese automotive firms' intra-industry trade (especially in parts and components) affirming Thailand (along with Indonesia) as major hubs for automotive industrial development;
d. Transfers of automotive parts and components which are centered around Japan-ASEAN6 trade nexus, with Japan's exportation mainly via Singapore-Thailand-Indonesia nexus and its importation mainly via Thailand-Philippines-Indonesia-Vietnam nexus;
e. Production shifts of Japan automotive manufacturing facilities that are in line with major trade patterns in key automotive products (increasingly importance of gasoline engines cars type of 1000-1500cc and diversification of parts and components available at or adjacent to local manufacturing sites);

f. Such a shift in the Japanese automotive production network in Southeast Asia entails adequate technical formation and manufacturing technological capability that needs to be acquired at local sites (forwardly linked to the automotive products specified previously in point e above);
g. Significantly important contribution of automotive parts and accessories in the Japan-ASEAN3 trade value added that needs to be carefully mapped out, i.e. in terms of which specific parts products of high value added are to be developed locally (recalling for example the electronic parts and components);
h. Gains and gaps of value added captured in the Japan automotive trade in East and Southeast Asia where inter-regional nexuses are the major gainers and major gaps are found mainly intra-regionally within/among ASEAN countries.

The following Table 2.10 summarizes key findings/observations and proposed arguments with regards to the study's macro-level setting that are previously presented in this chapter. Along with it is remarks/notes for micro-level analysis to be presented in the next chapters (Chapter 3 and 4 in particular). Key findings, observations and proposed arguments are to cover the general setting, trade patterns (under HS 87), trade patterns of key automotive products (under HS 8702, 8703, 8704 and 8708), trade patterns in HS 8703 (passenger cars), trade patterns in HS 8708 (automotive parts and accessories), and trend in value added (of products under SITC C354T35) which include its general setting and patterns of DVA (value added captured domestically in Japan) and FVA (value added created in foreign partner country of Japan)

Table 2.10: Key Macro-Level Findings/Observations, Arguments and Notes for Micro-Level Analysis

Key Findings, Observations, Proposed Arguments	**Remarks, Notes**
General Setting	
Significant share of road vehicles & other transport equipment (SITC 78 & 79) in East and Southeast Asia manufacture trade	Consequence of Japan trade in automotive-related with East and Southeast Asian countries for both regions' economic integration: automotive as one of the leading sectors
Trade Patterns (in HS 87)	
• East and Southeast Asia: Japan-ASEAN3 (Indonesia, Malaysia and Thailand) as the leading nexus • Japan-ASEAN3 Main products traded: parts and accessories (HS 8708), passenger cars (HS 8703), vehicles for the transport of goods (HS 8704), public transport type motor vehicles (HS 8702) Overall performance in HS 87 (1988-2016): "up and down" trends in three consecutive decades (1990s, 2000s and 2010s): peaked in 1995, plunged in1998, slow but steady recovered since then, and peaked in 2008, and shortly plunged in 2009 and to rapidly recovered and peaked in 2012, slowed down and once again plunged in 2015 In 2012 (i.e. at all time peak of export and import), Indonesia was ranked 9th (as both major exporter destinations and importer origins of Japan trade in HS 87 products), Malaysia was ranked 12th and 24th, and Thailand was ranked 5th and 4th In terms of value, export and import activities are dominated by Japan-Thailand-Indonesia nexuses, as Malaysia has the least values	• Assessment at micro-level through cases on Japanese firms (manufacturing and production) operation in ASEAN3 countries (Toyota and Denso) (Chapter 3) • Assessment on intra-firm and inter-firms trade, procurement of parts and components at firms (supply chains) level, with particular reference to Toyota and Denso (Chapter 3) ▪ Consequences of Japan's automotive trade relations with ASEAN3 which have been much less dependent on cars exportation and shifted to trade in parts and accessories ▪ Affirmation on the significance of Japanese automotive firms' intra industry trade and production network in the region • As Thailand and Indonesia are in major development of automotive production network/hub in the region (as a result of the two countries significant share in Japan-ASEAN automotive trade), assessment on Toyota and Denso operations in the two countries is to be more précised, i.e. to look at parts and components being transferred at firms level (Chapter 3 and 4)
Trade Patterns in Key Automotive Products	
HS 8702, 8703, 8704 and 8708 Products in Japan-ASEAN Trade	Observations on and implications of Japan-ASEAN trade in key automotive products
• Japan ▪ Among ASEAN, Thailand is the only country listed as one of the major country of import origins for HS 8703 products (cars/passenger cars) ▪ ASEAN3 countries are all listed as the major country of export destination for HS 8702 products (motor vehicles for the transport of more than 10 persons) ▪ Exports of HS 8704 products (motor vehicles for the transport of goods) are	▪ Thailand as major origin of Japan import in HS 8703 (cars/passenger cars): production/manufacturing facilities in the country is assumed to be close to or at similar level as the ones located in home country (Japan), existence of suppliers and other supporting industries located adjacent to the facilities are also considered as a reinforcement of Thailand automotive production hub (Chapter 4 and 5) ▪ As reflected in the pattern of HS 8708

to Malaysia, Myanmar and the Philippines (4%), Vietnam (2%) and Indonesia (1%); Imports are from Indonesia (63%)
  - Exports of HS 8708 (parts and accessories for and of the motor vehicles) are to Thailand (8%), Indonesia (4%) and Singapore (1%); Imports are from Thailand (9%), Vietnam (5%), Indonesia (4%) and the Philippines (3%)

- ASEAN3
  - Indonesia: Japan and Thailand are listed as major partners for Indonesia in all categories of products both as export destinations and import origins
  - Malaysia: Thailand and Japan are listed as major partners for Malaysia in all categories of products
  - Thailand: Indonesia and Japan are listed as major partners for Thailand in all categories of products expect HS 8704 (motor vehicles for the transport of goods or trucks type motor vehicles)

trade between Japan and ASEAN, supply chains and procurement of parts and components within Japanese automotive firms are existed primarily in Japan-Thailand-Indonesia-Singapore nexus (at Japan's export side) and Japan-Thailand-Vietnam-Indonesia-the Philippines nexus (at Japan's import side) (Chapter 3)
- Possible implications on production shifts and transfers of parts and components in ASEAN need to be scrutinized based on micro-level analysis and case studies (Toyota and Denso), i.e. to find out actual roles of each of ASEAN country and its production base in the production network (Chapter 3)
- Thailand core position and roles in the Japan automotive production network in ASEAN: major production hub and suppliers and supporting industries nurturing and development (Chapter 5)
- Indonesia emulates Thailand to become next major production hub albeit with different market orientation and nature of its suppliers and supporting industries development (Chapter 5)

Trade Patterns in HS 8703 (Passenger Cars)

Japan-ASEAN3 Trade in HS 8703
- In terms of value, Japan trade in HS 8703 with ASEAN3 is approximately ¼ of that of HS 8708
- Overall trade performance (1988-2016): all time peak was in 2012 (exports to Malaysia and Indonesia, and imports from Thailand), whereas other major peaks were in 2005 (exports to Malaysia) and 1993 (exports to Thailand); all time lowest was 1998 (where both Japan exports and imports to and from ASEAN3 are at its lowest values)
- Most traded cars (based on types under 6-digits HS 8703):
  - HS 870323-gasoline engines type cars 1500-3000 cc of which exports peaked to Thailand (1993), to Malaysia (2005), to Malaysia and Indonesia (2012)
  - HS 870322-gasoline engines type cars 1000-1500 cc of which imports peaked from Thailand (2012)
- Dynamic shifting pattern (in terms of value):
  - HS 870323-gasoline engines type cars (1500-3000 cc): Japan trade with Malaysia and Indonesia tend to shrink overtime (1993, 2005 and 2012), and its trade with Thailand substantially shrank in 2012
  - HS 870322-gasoline engines type cars (1000-1500 cc): Japan trade with Malaysia and Indonesia is constant overtime (1993, 2005 and 2012), and its trade with Thailand

Observations on and Implications of Japan and ASEAN3 Trade in Passenger Cars

- Despite its relatively low value, Japan's trade with ASEAN3 in HS 8703 represents the most basic tenets in automotive industrial development (as particularly aspired by ASEAN3 governments) since trade in passenger cars offers opportunities for technical formation and technological maturity in both manufacturing and research and design areas (Chapter 3)
- Technical formation and technological capability acquired within Thailand automotive industry (i.e. by being major exporters to Japan) offers essential milestones to be observed and learnt further (Chapter 4)
- Essential milestones in technical formation and technological capability need to be directed toward gasoline engines types cars (HS 870321, HS 870322 and HS 87023) (Chapter 3 and 4 on the cases of Toyota Southeast Asian IMV project)
  - Technical formation that is based on Toyota Production System/TPS), i.e. by applying locally-developed Just in Time/JIT and Kaizen (continuous improvement)
  - Technological capability that is in line and in parallel needs of TPS application

- is substantially increased in 2012 (where substantial importation was of the particular case)
  - HS 870321-gasline engines type cars (<1000 cc): Japan trade with Thailand is significantly appeared in 2012

  - Suppliers and lead firms relations that are also in line with TPS applications
  - Parallel technical formation (and in certain cases, also technological capability) at every suppliers level (1st, 2nd tiers and so on, up to the supporting industries)
- Looking at the shifting patterns, technical formation and technological capability are to be concentrated on the development of IMV cars with medium and small gasoline engines capacity (<1000 cc and 1000-1500 cc) and singled out the large one

Trade Patterns in HS 8708 (Parts and Accessories)

Japan-ASEAN3 Trade in HS 8708
- In terms of value, Japan trade with ASEAN3 in HS 8708 is the most significance, i.e. 4 times on average of that HS 8703 trade value
- Overall trade performance (1988-2016): all time peak was in 2012 (with total exports value to Thailand and Indonesia is twice as of the export values in 2008); all time lowest was in 1998
- Unlike HS 8703, overall pattern of Japan trade with ASEAN3 in HS 8708 shows an upward trend overtime
- Most traded parts (based on types under 6-digits HS 8708):
  - HS 870840-gear boxes and parts thereof of which exports to Thailand was peaked in 2012 (twice as of its value in 2008, and quadrupled as of its value in 1995)
  - HS 870829-other parts and accessories of bodies (including cabs) of which exports to Thailand, Malaysia and Indonesia increased steadily overtime (1995, 2008 and 2012)
  - HS 870899-other parts and accessories of which exports to Thailand, Indonesia and Malaysia tend to decrease overtime (1995, 2008 and 2012)

  Dynamic shifting pattern (in terms of value):

  - HS 870829-other parts and accessories of bodies (including cabs): Japan trade with all ASEAN3 shrank quite significantly (between 1995 and 2008), and slightly decreased (between 2008 and 2012)
  - HS 870830-brakes and servo-brakes; parts thereof: Japan trade with ASEAN3 was steady overtime (1995, 2008 and 2012)
  - HS 870840-gear boxes and parts thereof: Japan trade with all ASEAN3 increased quite substantially (between 1995 and 2008), and showed stable increase (between 2008 and 2012)
  - HS 870850-drive-axles with differential,

Observations on and Implications of Japan and ASEAN3 Trade in Parts and Accessories
- High value of Japan-ASEAN3 trade in HS 8708 indicates highly important feature of parts and components in automotive industry for both Japan and ASEAN
- An upward trends in parts and accessories trade between Japan and ASEAN3 during the past three decades confirm such an important feature
- Looking at the most traded parts and its trade patterns, ASEAN3 reliance on products under HS 870840 (gear boxes and parts thereof) and HS 870829 (other parts and accessories of bodies) which are mostly imported from Japan remains high, however their reliance on imported products under HS 870899 (other parts and accessories) tends to become lower and lower overtime
- Such trade patterns need to be assessed in light of comprehending the actual transfer or movement of parts within firms, or between the lead firms and their suppliers (cases on Toyota and Denso, Chapter 3), particularly for products under HS 870899 (other parts and accessories) which include more product varieties
- Domestic/local production of HS 870899 which is assumed to be the case for ASEAN3 hence needs to be broken down to suppliers level (Cases on Denso and Aisin Seiki, Chapter 3) in order to comprehend domestic or local parts production capacity levels
- Thus, at suppliers level, 1st tier firms technical formation and technological capability that is being transferred to host countries (ASEAN3) are to be assessed based on variety of parts and components that are locally manufactured
- Local 2nd tier and up suppliers in ASEAN3 (along with other supporting industries) are to be mapped out in line with the results of

whether or not provided with other transmission components: Japan trade with ASEAN3 was steady overtime (1995, 2008 and 2012)
- HS 870899-other parts and accessories: Japan trade with all ASEAN3 tends to shrink quite substantially overtime (1995, 2008 and 2012)

such assessments
- Mapping of local suppliers is also based on not only the need for existing production or manufacturing facilities, but also for continuing manufacturing activities that include automotive after-sales needs for parts replacement and automotive maintenance markets
- Apart from HS 870899, assessment on automotive parts and accessories that are mostly imported from Japan needs to be focused on HS 87840 (gear boxes and parts thereof), also on parts that increasingly produced locally in ASEAN3, i.e. HS 870829 (other parts and accessories of bodies)

Trends in Value Added (in SITC C34T35)

General Trends
- Gross trade (export and import) value of Japan trade in transport equipment (SITC C34T35): 9.5% of total trade value in all products or 16.2% of total trade value in manufacture products (as of 2011)
- Japan's trade value added in SITC C34T35: 23.3% of its production (gross output) (as of 2011)
- East and Southeast Asia countries overtime are important partners of Japan in its SITC C34T35 trade (1995-2011)
- Japan's gross export in SITC C34T35 to East and Southeast Asia is 19% of its total C34T35 export (as of 2011)
- Japan's gross import in SITC C34T35 from East and Southeast Asia is 36% of its total C34T35 import (as of 2011)

Observations on and Implications of Trends in Value Added of Japan Overall Trade in Transport Equipment (SITC C34T45)
- Significant share of transport equipment in overall Japan trade value and its substantial contribution to the country's manufacture products
- Referring to substantial value added generated from Japan transport equipment trade (in terms of production/gross output), the country's key partners characterize its endeavor in developing global value chains (GVCs) alongside existing global production networks (GPNs)
- East and Southeast Asian regions and countries –representing one fifth of Japan's gross export in transport equipment and over one third of its gross import— are indeed the most important partners of which envisioning regional value chains (RVCs) is an essential part of benefiting from the existing regional production networks (RPNs) in the automotive sector
- The two regions RVCs/RPNs would in turn signify Japan's GVCs/GPNs in the automotive sector

DVA and FVA Trends

Trends in Domestic Value Added (DVA) and Foreign Value Added (FVA) of Japan overall trade in SITC C34T35
- Japan's FFD-DVA (Domestic Value Added embodied in Foreign Final Demand) is five times higher than its DFD-FVA (Foreign Value Added embodied in Domestic Final Demand) worldwide, on average, overtime (1995-2011)
- Japan captures value added in its transport equipment trade much more domestically (DVA), rather than internationally (FVA), overtime (1995-2011)

Observations on and Implications of Trends in DVA and FVA of Japan Overall Trade in Transport Equipment (SITC C34T45)
- As Japan overtime captures its automotive trade value added much more domestically (FFD-DVA) than internationally (DFD-FVA), it is observed that value added creation has been taking place mostly within its borders through research and development (R&D) endeavored by the lead firms, their 1st tier suppliers and other related supporting institutions

• Overall Japan's FFD-DVA and DFD-FVA are on upward trends overtime (1995-2011) with a quite sharp decline in 2009 (especially in terms of FFD-DVA) • Japan's FFD-DVA generated from East Asian trade is 12.6% of Japan's world FFD-DVA, whereas from ASEAN trade is 6%; its DFD-FVA from East Asian trade is 31% of its world DFD-FVA, while from ASEAN trade is 8.8%	• However, the upward trends for both Japan's FFD-DVAs and DFD-FVAs (1995-2011) indicate that transfers of value added have also been occurring albeit their slow paced progress and low level values • Envisioning Japan-led RVCs in East and Southeast Asia would need to encompass Japan-China trade in the automotive sector as Japan's East Asian partners (of which China is the major source) generate more than one fifth of its domestically-captured value added and one third of its internationally-captured value added in the automotive sector • Japan-led automotive RVCs in ASEAN thus are inseparable part of its wider RVCs in East Asia
Trends in FFD-DVA and DFD-FVA of Japan's trade with East and Southeast Asian countries in SITC C34T35 • In terms of FFD-DVA, Japan trade with China tops up, compared to other partners in East and Southeast Asia: the annual value has surpassed USD 2 billions since 2006 • Among ASEAN partners, Japan trade with Thailand, Indonesia and Malaysia generate most of its FFD-DVA • U-curve trends were observed in the FFD-DVA generated from Japan-ASEAN3 (Indonesia, Malaysia and Thailand) (1995-2011) • Unlike FFD-DVA trends, the DFD-FVA trends of Japan trade with its East and Southeast Asian partners have been in upward slope despite its much lower value • Japan trade with China has resulted in substantial increase of its DFD-DVA since 2006 onward • Among ASEAN partners, Japan trade with Thailand, Indonesia and the Philippines generate most of its DFD-FVA DVAs/FVAs Gainers and Gaps • Gains from DVAs/FVAs in Japan trade in East and Southeast Asia have come from inter-regional nexuses, while gaps have resulted from mostly intra-ASEAN ones	Observations on and Implications of Trends in DVA and FVA of Japan Trade with East and Southeast Asia in Transport Equipment (SITC C34T45), and the Resulted Gains and Gaps • As suggested previously, Japan-China trade in the automotive sector is the most important nexus in terms of Japan's domestically-captured value added (FFD-DVA); thus, to envision RVCs in the automotive sector for both regions is to notice this particular nexus of Japan-China • The U-curve trend of Japan-ASEAN3 FFD-DVA suggests dynamic encounter in which Japan's value added has not always been domestically-captured • ASEAN3 countries, referring to its U-curve trend of FFD-DVA in its trade with Japan, have occasionally managed to capture value added within their borders through Japan-led RPNs in the automotive sector • Since gains from DVAs/FVAs have been generating more from inter-regional nexuses than intra-ASEAN ones in the East and Southeast Asian automotive trade, most ASEAN countries face with the gaps in value added resulted from the trade activities in this sector • Among ASEAN countries, the gaps are observed in light of differences and contrasts in each country's respective automotive industrial development, especially in the areas of related skills accumulation, manufacturing technological development, and R&D stages in the automotive sector and its supporting industries (Chapter 4 and 5)

Chapter 3

Formation of Production Network by Japanese Automotive Firms in Southeast Asia: Case on Toyota Production Shifts and Localization of Production

This chapter aims at further exploring the trade setting presented in Chapter 2. The exploration focuses on the elucidation of macro-empirical findings on shifting patterns of automotive goods/products traded between Japan and its key partners in East and Southeast Asia. The findings are both apparent in terms of trade pattern and trends in value-added indicating changes in production pattern and activities of automotive firms operating in the region. In light of such production shifts, this chapter correspondingly intends to explore automotive firms manufacturing and business activities by examining –as previously indicated— cases of Toyota Motor Corporation (or hereafter called as TMC) and its key 1st-tier suppliers (Denso Corporation and Aisin Seiki Corporation). These cases are explored in terms particularly of their efficiency at production sites, product development, supply chains organization, technological development and technical capacity building.

Referring to the empirical findings at the macro-level (as described in Chapter 2), this chapter offers an argument that production shifts and strategy of Japanese firms (as represented in the cases of TMC and its key 1st-tier suppliers) have resulted in deepened localization of manufacturing at their sites located in the host ASEAN countries. Centered around on the so-called Toyota ASEAN IMV (Innovative International Multi-purpose Vehicle) Project, these firms manage to go through measures reflecting accumulated processes of localized production and regional supply chains. The processes –elaborated in the final section of this chapter— are spanned across the value chains that have been developed through combined activities of FDIs (both green and brownfield ones), regional procurement and supply chains, locally developed research and development (R&D) centers and reinforced subsidiaries and local partnerships.

Those accumulating production and business activities of TMC, Denso Corporation and Aisin Seiki Corporation (along with their subsidiaries and local partners in Southeast Asia) –which are resulted from deepened localization of manufacturing processes and production shifts— have led to value chains upgrading within and along Toyota production network. As previously noted, areas of upgrading include manufacturing facilities and processes, product development, R&D and design, and sales, after-sales and after-markets. Full and/or semi automation and robotics techniques are applied in the areas of manufacturing facilities and processes. In the area of product development, Toyota ASEAN IMV Project serves as one of global major platforms and have lead to enhanced product specification and progressive vehicle design engineering at local manufacturing sites (with more locally-developed car specification and types). R&D and design facilities feature the need to support localization of production and manufacturing activities. Post-production and manufacturing activities have eventually been the areas of expertise conducted by Toyota local partners in ASEAN countries.

Three sections are presented in this chapter. The first section, entitled as "Japanese Automotive Firms Operation in Southeast Asia", offers background description on the emergence and development of Japanese automotive firms operation in Southeast Asia as they inaugurate and advance regional production networks in the automotive industry. The second section, designated to present firm-level analysis, explains micro-level feature of production shifts in the region's automotive industry by showcasing the cases of Toyota and its Key 1st-tier Suppliers operations in the ASEAN countries and focusing on two key automotive products of passenger cars and parts and accessories. The final section is designated to present analysis on the upgrading efforts by Toyota and its Key 1st-tier suppliers, i.e. to illuminate the Toyota-led value chains and structure and its inter-firm relations within the ASEAN countries.

3.1. Japanese Automotive Firms Operation in Southeast Asia

Dates back to the 1950s, Japanese automotive firms operation in Southeast Asia began with early expansion of automobile sales and distribution networks, particularly of Toyota. The region displays the longest history of Toyota's overseas expansion. The company's first distributors and the footholds for sales network expansion were established in the 1950s. The ASEAN3 (plus the Philippines) are its core host countries. It all began in Thailand, i.e. in August 1954, when Toyota received a single order of 117 fire trucks units. Then, as part of war compensations, the company also received order for fire truck units heading to the Philippines in January 1957. Toyota sales activity began in Thailand, i.e. in February 1957, by opening up of its Bangkok sales office to become the first one in the region. Initial exports of Toyota cars to the region were also made during those early years[81].

[81] Toyota's export activities in the region commenced with deliveries of a Toyota Crown unit to the Philippines in January 1956, a Toyota Land Cruiser unit in August 1956 to Malaysia, and a Toyota Crown unit in June 1957 to Indonesia (see Toyota Global Website, available on-line at: http://www.toyota-global.com/company/history_of_toyota/75years/data/automotive_business/sales/activity/asia/index.html for more historical records of the company).

The 1960s witnessed early major expansion of Japanese automotive companies in the region with the establishment of local partners/subsidiaries for sales, distribution and also assembly of certain car types. Toyota was the first to set up its local subsidiary in the region, i.e. by the establishment of Toyota Motor Thailand, Co. Ltd. (TMT) in October 1962, which is followed by its assembly plant operation in February 1964 (for Toyota Tiara and Stout). In Malaysia, the company signed distributorship agreement with Car Motor (CM)[82] in September 1960 and CKD (completely knocked down) export agreement with Borneo Motors in September 1967 (although both were cancelled in February 1974 and September 1982 respectively).

Other Japanese lead firm, Mitsubishi Motors, began its Southeast Asia operation in Thailand by setting up a wholesale company called Sittipol Motor Co. (SMC) in May 1961. In October 1964, the company established United Development Motor Industry (UDMI) to began assembly of trucks. A year later (October 1965), its parent company, Mitsubishi Heavy Industry Ltd. (MHI), took over 60% of UDMI share[83]. Thailand was also the first country to host motorcycle assembly plant by Suzuki Motor Company in 1967. The plant was also Suzuki's first overseas motorcycle manufacturing (Alexander 2008). Other Japanese automotive firms, such as Honda and Nissan (currently leading in Southeast Asian production networks along with Toyota and Mitsubishi), began establishment of their local/regional representatives for sales, distribution and assembly in much later years, i.e. after the 1970s and 1980s.

[82] Toyota later commenced assembly of its Corona and Corolla types in Malaysia with CM in February 1968 (Toyota Global Website).

[83] By April 1970, Mitsubishi Motors Corporation (MMC) separated from MHI, then in December 1973 took over 40% of SMC share (Mitsubishi Motors Thailand Co., 2015).

It was from those later years –1970s/1980s and on— that Japanese automotive firms operation in Southeast Asia began to consolidate, i.e. in terms of production shifts and expansion of manufacturing plants by adopting their home bases structure[84] in Japan into their manufacturing sites in the host Southeast Asian countries. Since then, structure of the Japanese automotive industry follows a hierarchical pattern consisting of the auto- makers or lead firms who conduct vehicle assembly activities (at the peak of structure), the primary (1st tier) suppliers who provide component and system assembly supports, the secondary and tertiary (2nd and 3rd tier) suppliers/sub-contractors who provide small parts and basic manufacturing, and the materials industry (at the bottom of the structure) who supplies iron, non-ferrous metals, resins and other basic materials to support the industry (Lin 1994).

The following Diagram 3.1 illustrates basic structure of the Japanese automotive industry with its pyramid-hierarchical pattern, commonly applied domestically in the home bases of Japanese firms and suppliers/subcontractors since 1970s/1980s. With such a structure, since end of 1970s onward, division of labor among Japanese automotive primary (1st tier) suppliers, secondary and tertiary (2nd and 3rd tier) suppliers or subcontractors has been dispersed along the following typical product lines: engine parts, electrical parts, driving assy, suspension/brake parts, meters and accessories, chassis assy, bodies and others parts[85]. By 1990, as Japan became the

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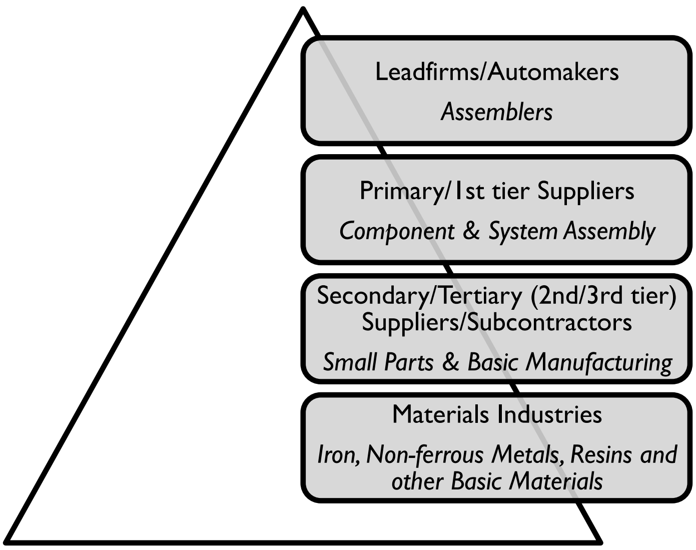
[84] Under Japanese automotive industry structure, relations between the auto makers/lead firms and their primary/1st tier suppliers are typically followed classical "keiretsu" system in which "groups of (Japanese) business firms tied by common industry or financial interest, and centrally coordinated by a bank, trading company, or major manufacturer" (as defined in *Keiretsu, USA: A Tale of Japanese Power* (Mid-America Project, Inc., KY, July, 1991), quoted in Lin 1994).

[85] A survey conducted by the Japanese Government Ministry of International Trade and Industry (MITI) in 1977 reveals the division of labor among the primary suppliers is shared by 25 suppliers for engine parts, 1 (electrical parts), 31 (driving assy), 18 (suspension/brake parts), 18 (meters and accessories), 3 (chassis assy), 41 (bodies) and 31 (other parts). Most of these primary suppliers are affiliates or subsidiaries of the assemblers (lead firms). As of 1990, 167 parts makers in the 1st tier

largest producer of cars in the world (i.e. reached its record of 9.7 million units shipped worldwide), firms and suppliers/subcontractors in the Japanese automotive industry have practically more oriented towards overseas market, rather than the domestic one[86]. As a result, since then, the structure of Japanese automotive industry has gradually transformed towards formation of specialized automotive cluster.

Diagram 3.1: Structure of Japanese Automotive Industry



Source: adapted from Lin (1994)

(primary suppliers) had equity relationships with the assemblers in which 53 of these parts makers had the assemblers as their majority shareholders. At the secondary subcontractors level, there were 912 suppliers for engine parts, 34 (electrical parts), 609 (driving assy), 792 (suspension/brake parts), 926 (meters and accessories), 27 (chassis assy), 1213 (bodies) and 924 (other parts). At the tertiary subcontractors level, there were 4960 suppliers for engine parts, 352 (electrical parts), 7354 (driving assy), 6204 (suspension/brake parts), 5936 (meters and accessories), 85 (chassis assy), 8221 (bodies) and 8591 (other parts). See Lin (1994), pp.8-9.

[86] Since the 1980s onward, Japanese lead firms/OEMs (Original Equipment Manufacturers) –with nearly 100% dominating domestic market— has turned their attention more towards global marketing strategy, hence towards setting up much more advanced global production networks to support such a strategy. See Putra et al (2016) for interesting discussion on how Japanese automotive clusters have been evolving in light of domestic market slowdown and global automotive stiff competition since 1990s.

The following Diagram 3.2 presents profile of Japanese automotive cluster consisting of dense core automotive manufacturers surrounded by up-stream non-manufacturing raw materials suppliers, down-stream non-manufacturing businesses (sales, after sales and adjacent related services), and other supporting industries and institutions. Automotive manufacturers serve as OEMs (Original Equipment Manufacturers) along with 1st to 5th tiers suppliers. As shown in Diagram 3.2, the 1st tier suppliers' major manufacturing products include engine, transmission, body parts and the like. The 2nd tier suppliers' core manufacturing products comprise parts machining, press work and assembly. The 3rd–5th tiers suppliers mainly deal with processing materials into parts. By the 2000s, advanced development of Japan automotive cluster has prompted further production shifts to foreign manufacturing plants, including particularly to East and Southeast Asia[87]. In Southeast Asia, especially in ASEAN3, cases of Toyota Motor Corporation (TMC) and Denso Corporation offer leading examples of such a move in the region[88].

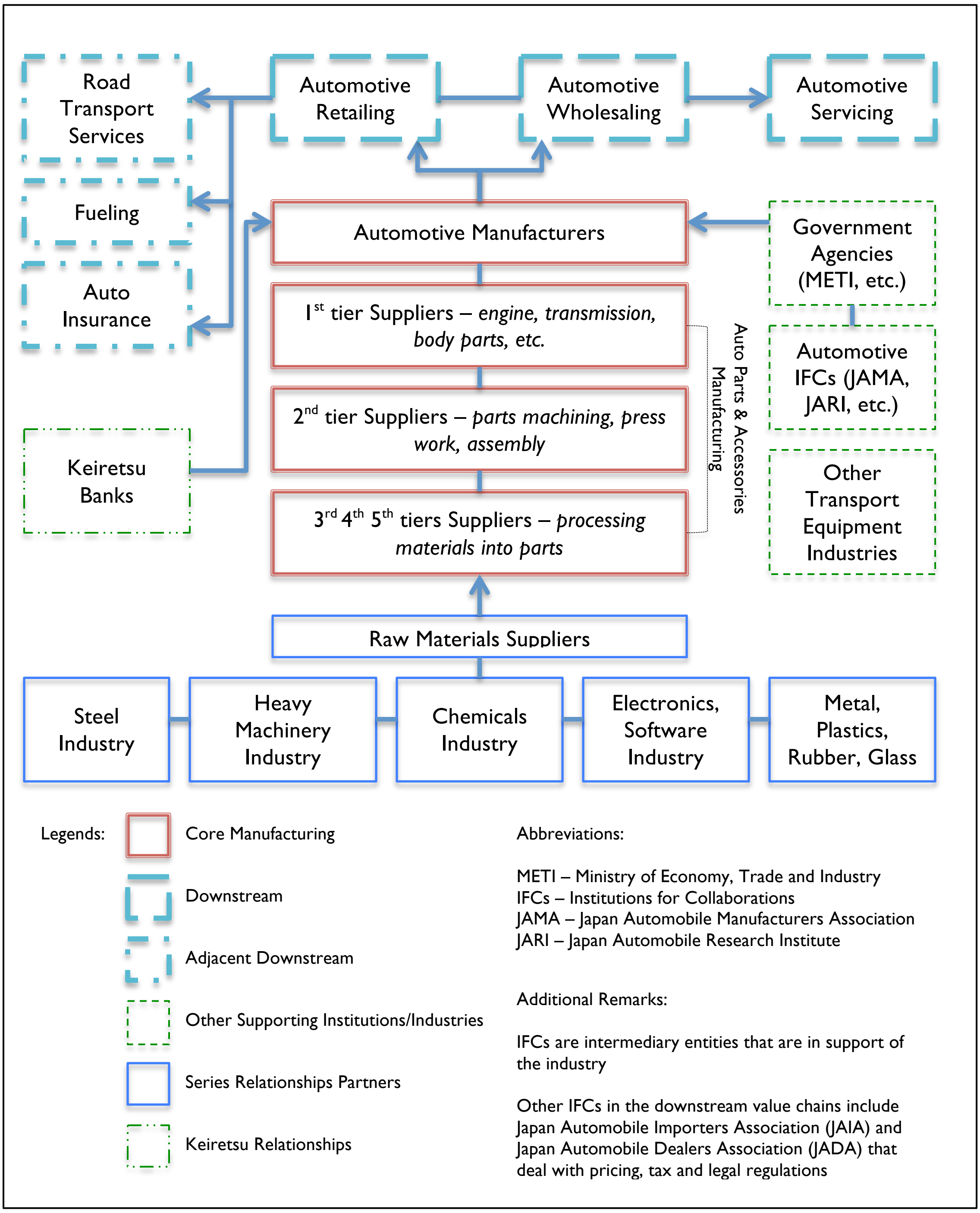
Japanese automotive manufacturers consist of 14 leading auto companies that are also members of JAMA (as of May 2017). They include Daihatsu Motor Co., Ltd., Fuji Heavy Industries Ltd., Hino Motors, Ltd., Honda Motor Co., Ltd., Isuzu Motors Ltd., Kawasaki Heavy Industries, Ltd., Mazda Motor Corporation, Mitsubishi Motors Corporation, Mitsubishi Fuso Truck & Bus Corporation, Nissan Motor Co., Ltd., Suzuki Motor Corporation, Toyota Motor Corporation, UD Trucks Corporation and Yamaha Motor Co., Ltd. (JAMA, 2017). In light of decreasing trends of domestic automotive sales in Japan since mid 1990s (JAMA Report 2015), advancing overseas

[87] Reasons of such production shifts include, among others, cheap labor wages, geographical proximity to countries where demand is growing, and (prior to tariffs liberalization and regional free trade schemes) tariffs and local content/production requirement (Putra et al 2016).

[88] We shall return to discuss in a more detailed manner on TMC and one of its 1st tier supplier (Denso) in the next section of this chapter (i.e. Sections 3.2.1 and 3.2.2).

production networks (at global or regional levels) are an essential step for those Japanese leading auto companies towards the execution of their global strategies.

Diagram 3.2: Profile of Japan Automotive Cluster



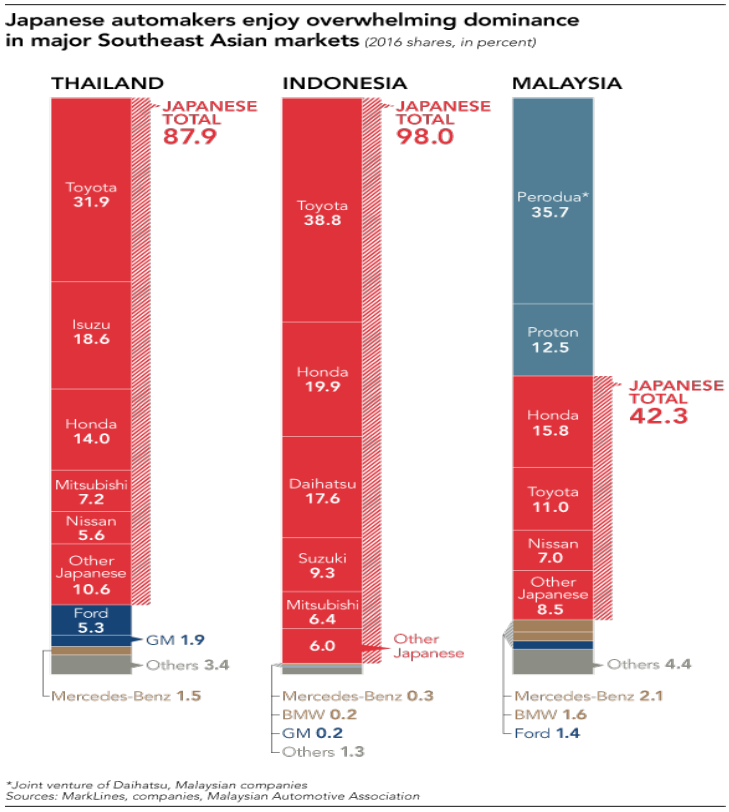
Source: adapted from Putra et al (2016)

As previously indicated, Southeast Asia has been considered as one of the most important regions, in addition to North America, Europe and East Asia, i.e. in terms of serving as overseas production networks for the Japanese automotive lead firms. As of 2013, total vehicle production of five Southeast Asian countries (ASEAN5 – Indonesia, Malaysia, the Philippines, Thailand and Vietnam) reaches 4,439,474 units of automobile which is about 5% of the world total vehicle production. Thailand (with its production of 2,457,057 units) and Indonesia (with 1,208,211 units) account for 83% of the total production. The two are followed by Malaysia (601,407 units), Vietnam (93, 630 units), and the Philippines (79,169 units) (AAF/ASEAN Automotive Federation, as quoted by Kobayashi 2014).

In terms of market share, as of 2016, Japanese automakers enjoy overwhelming dominance in major Southeast Asian countries, i.e. particularly in ASEAN3 (Indonesia, Malaysia and Thailand). In Thailand and Indonesia, their total shares are 87.9% and 98% respectively, whereas in Malaysia, the share is 42.3%. Individual automaker/OEM (brand) share in the three countries is presented in the following Diagram 3.3 shows.

Production activities of leading Japanese automotive OEMs in Southeast Asia have been centered on efforts to position and strengthen the region (particularly Thailand and Indonesia) as strategic assembly bases as well as the bases for automobile RD&D (Kobayashi 2014). Such strategic moves contribute to the development of Japanese automotive production network in the region. The following Table 3.1 recaps details of contemporary production activities by leading Japanese automotive OEMS in ASEAN5 (as observed by Kobayashi 2014).

Diagram 3.3: ASEAN3 Automotive Market Share by Brand (2016)



Sources: Nikkei Asian Review (June 1st 2017)[89]

Table 3.1: Contemporary Production Activities of Japanese Automotive OEMs in ASEAN5

ASEAN5	Japanese OEMs	Production/Manufacturing, Other Related Activities	Remarks
Thailand	Toyota	▪ IMV (International Multipurpose Vehicle) Project: Production of Hilux pickup trucks and Fortuner SUVs (Sport Utility Vehicles) ▪ Development of a compact car platform: Production of Yaris hatchback and Vios sedan (until 2013) ▪ Production of Camry and mid-level sedan Corolla ▪ Establishment of an R&D facility (in 2003)	▪ Developed based on a similar platform and directed at emerging markets (ASEAN and the Middle East), but Hilux is also exported to Europe and Australia ▪ Directed at emerging countries, and by using this platform, versions for Europe, North America, and Japan have slight differences in design and specifications ▪ Only exported within ASEAN ▪ Local engineers develop solutions for tough road conditions in ASEAN and other emerging countries
	Honda	▪ Production of Brio ▪ Production of Jazz (called Fit in Japan) ▪ Production of compact sedan	▪ Fulfilling the criteria for the Thai eco-car standards, and jointly designed and developed by both local and Japanese engineers in the Thai R&D center

[89] Quoting MarkLines, Companies, Malaysian Automotive Association, accessed on August 13th 2017, see: https://asia.nikkei.com/magazine/20170601/On-the-Cover/Chinese-automakers-launch-a-global-offensive-via-emerging-Asia?page=2.

		City, mid-sized SUV CR-V, and upper segment sedan Accord	▪ Strategic global compact car ▪ Accord is shipped to ASEAN markets and Australia
	Nissan	Production of pickup truck Navara (or Frontier in other markets), luxury sedan Teana, mid-sized sedan Sylphy, compact hatchback March, and compact sedan Almera (or Sunny, which is based on the March platform)	Thailand as strategic export base, especially for March and Almera (that is exported to ASEAN, Europe, Japan, and Australia)
	Mitsubishi	Production of mid-sized sedan Lancer, pickup truck Triton, SUV Pajero Sports, compact hatchback Mirage and its compact sedan derivate Attrage	▪ Pajero Sports shares the same platform as Triton ▪ Triton is exported to the rest of the world and Mirage is exported globally (except North America)
	Mazda	▪ Production of compact hatchback Mazda2 (or Demio in Japan), derived sedan Mazda3 (or Axla in Japan) ▪ Production of BT-50 pickup truck	▪ For Thailand domestic and ASEAN markets ▪ Sold domestically and in ASEAN and Australia
	Isuzu	Production of D-Max pickup truck and SUV MU-7	Both use the same platform, and D-Max is exported to the ASEAN, Australia, Europe and Africa.
Indonesia	Toyota	▪ Production of IMV models: Fortuner SUV and Innova multipurpose vehicle (MPV) ▪ Production of all Vios models	▪ Exported within ASEAN and to the Middle East ▪ Used to be imported from Thailand
	Daihatsu	▪ Production of popular compact MPV Xenia and its sister model, Toyota Avanza. ▪ Production of compact sedan Ayla and its sister model Toyota Agya (since 2013) ▪ Assembly of Terios SUV and the rebadged version of Toyota Rush	▪ With the exception of the brand logo, these two models are identical, Avanza is exported to ASEAN, South Africa, and some countries in the Middle East ▪ These two vehicles are also identical, and Agya is exported to the Philippines (from February 2014), both vehicles conforms to the Indonesian government LCGC (low cost green car) policy ▪ Daihatsu trails Toyota in terms of market share, but because it is part of the Toyota group, Daihatsu produces and sells main models in cooperation with Toyota
	Honda	▪ Assembly of subcompact Brio Satya ▪ Production of Mobilio MPV (based on the Brio's platform) ▪ Production of Freed MPV	▪ Conforming to the Indonesian government LCGC policy requirements ▪ Aiming to increase localization ▪ Exported to Thailand and Malaysia as well as sold domestically in Indonesia
	Suzuki	▪ Production of compact Swift, Grand Vitara SUV, and compact MPV Ertiga (rebadged as Mazda VX-1) ▪ Product development and production of Karimun Wagon R (based on Wagon R)	▪ Suzuki uses Indonesia as its strategic production base, as all models are exported to the ASEAN market ▪ Aiming to meet the LCGC requirement
	Nissan	Production of Livina MPV and Juke SUV, and introduction of Datsun brand (Datsun Go)	Datsun Go is aiming to expand sales, sold domestically through Nissan dealers, and the Go model is Nissan's response to the LCGC policy

Malaysia	Daihatsu	Co-production with Perodua (Daihatsu rebadged sedan)	Sold domestically for Malaysian market
Philippines	Toyota	Production of Vios and Innova MPV	Much smaller scale (than in Thailand and Indonesia), sold for domestic market only
Vietnam	Toyota	CKD assembly for IMV models and Corolla, Camry and Vios	Mainly for domestic market
	Honda & Nissan	CKD assembly for very few models	Mainly for domestic market

Source: Kobayashi 2014

In Thailand, leading Japanese OEMs –in the order of production capacity— include Toyota, Honda, Nissan, Mitsubishi, Mazda and Isuzu. In Indonesia, they include Toyota, Daihatsu, Honda, Suzuki and Nissan. Whereas in Malaysia, it has only been Daihatsu representing Japanese OEMs engaged actively in production activity. Similar case applies in the case of Philippines where Toyota is the only Japanese OEMs keenly involved in domestic car manufacturing/production. In spite of its much smaller scale, Toyota (alongside with Honda and Nissan) has struggled in maintaining its production in Vietnam.

The following two sub-sections elucidate Thailand and Indonesia as the principal production bases of Japanese leading automotive firms in ASEAN in which production capacity and structure of suppliers of each are presented.

3.1.1. Production Base in Thailand

In 2015, Japanese automotive OEMs production capacity in Thailand –as the major production hub— reached 2,221,000 units or 78% of overall automotive manufacturers capacity (i.e. 2,846,280 units). The figure is shared by the leading brands, i.e. Toyota (750,000 units), Mitsubishi (450,000 units), Isuzu (338,000 units), Nissan (370,000 units), Honda (280,000 units), Hino (27,000 units), and Fuso 6,000 (units). The figure is even higher if a Japanese affiliated firm –Auto Alliance Thailand (Mazda-Ford joint venture)— 250,000 units production capacity is added (Kuroiwa and Techakanont 2017). The following Table 3.2 presents production capacity of automotive assemblers in Thailand (1985-2015) that over time shows steady growth of overall Japanese automotive manufacturers production capacity.

Table 3.2: Production Capacity of Automotive Assemblers in Thailand (units, 1985-2015)

Assemblers	1985	1994	1999	2005	2010	2015
Toyota	40,800	135,000	200,000	350,000	600,000	750,000
Mitsubishi	*N.a.*	126,600	174,400	170,200	200,000	450,000
Isuzu	30,000	83,200	140,600	200,000	220,000	338,000
General Motor	*N.a.*	*N.a.*	40,000	100,000	160,000	180,000
Auto Alliance Thailand	*N.a.*	8,400	135,000	135,000	275,000	250,000
Nissan	*N.a.*	96,500	113,100	102,000	200,000	370,000
Honda	*N.a.*	39,000	70,000	120,000	240,000	280,000
Hino	9,600	24,000	9,600	28,800	28,800	27,000
Daimler-Chrysler	*N.a.*	4,600	14,900	16,300	16,300	*N.a.*
YMC Assembly	6,000	14,000	12,000	12,000	12,000	*N.a.*
Volvo (Thai Swedish Assembly)	3,000	7,000	6,000	10,000	10,000	15,000
BMW	*N.a.*	*N.a.*	*N.a.*	10,000	10,000	8,500
Tata Motors	*N.a.*	*N.a.*	*N.a.*	*N.a.*	35,000	15,780
Ford	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	150,000
SAIC Motor-CP	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	12,000
FUSO	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	6,000
Scania	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	720
United Motors	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	5,300
Total	89,400	538,300	915,600	1,254,300	2,007,100	2,846,280

Notes: (1) *N.a. = not applicable,* (2) Shaded area in the 1st column shows Japanese firms/affiliated firm
Source: Kuroiwa & Techakanont (2017) (compiled from various sources, mainly from TAIA (Thai Automotive Industry Association), TAI (Thailand Automotive Institute), Bank of Thailand, Ministry of Industry, and information received from the companies)

The existence of automotive suppliers in Thailand that have Japanese affiliation has been apparent. The following Diagram 3.4 shows in details contribution of Japanese firms and joint ventures in automotive suppliers activities in Thailand.

Diagram 3.4: Structure and Types of Thailand Automotive Suppliers (Japanese Contribution)
(Number of Japanese firms (Jf), Japanese affiliated joint venture (Jjv), % of total in each category, 2014)

Engine	•47 Jf (66.2%) - 25 Jjv (34.7%)
Drive Train	•11 Jf (61.1%) - 6 Jjv (31.6%)
Suspension, Steering, Wheel & Tire	•21 Jf (63.6%) - 8 Jjv (25%)
Axle, Brake, Body Control	•19 Jf (50%) - 14 Jjv (36.8%)
Body & Exterior	•31 Jf (58.5%) - 12 Jjv (26.1%)
Interior	•15 Jf (53.6%) - 12 Jjv (35.3%)
Climate Control	•11 Jf (52.4%) - 4 Jjv (17.4%)
Driving Support & Security	•6 Jf (50%) - 1 Jjv (16.7%)
Electronics, Electrical Parts	•17 Jf (54.8%) - 4 Jjv (12.1%)
Small, Genaral Parts	•34 Jf (64.2%) - 11 Jjv (21.6%)
Supporting Activities (categorized by production process)	•53 Jf (79.1%) - 16 Jjv (25%)
Motorcycle Parts	•45 Jf (73.8%) - 24 Jjv (32%)
Automobile Assembly	•2 Jf (33.3%) - 3 Jjv (27.3%)
Chemical, Oil, Lubricant, Paint, etc.	•10 Jf (58.8%) - 4 Jjv (36.4%)
Accessories	•12 Jf (66.7%) - 2 Jjv (11.1%)
Services (Trading, Logistics, Trade Show, Training, etc.)	•13 Jf (59.1%) - 4 Jjv (18.2%)
Machine Tools, Jigs & Fixtures, Moulds & Dies, etc.	•5 Jf (55.6%) - 0 Jjv (0%)

Source: adapted and calculated from Kuroiwa and Techakanont (2017)

As of 2014, approximately 70% of foreign supplier firms were Japanese specializing in engine parts, support activities, motorcycle parts, small and general parts, and body and exterior parts. Whereas Japanese affiliated joint venture supplier firms were also leading in numbers as they also specialize in the same areas (Kuroiwa and Techakanont 2017). Number and percentage of Japanese firms and Japanese affiliated joint ventures are presented in Diagram 3.4 for each category of suppliers.

3.1.2. Production Base in Indonesia

In terms of production capacity, Japanese leading automotive firms operating in Indonesia have similar situation and trends, i.e. they have been dominating in the past two decades. In 2016, Japanese brands/automotive manufacturers production capacity reached 1,172,968 units which is a staggering 99.6% of overall automotive production capcity in Indonesia (i.e. 1,177,797 units). Among the Japanese automotive brands, Toyota has been in the lead with its production capacity of 537,415 units in 2016 (45.8% of total production capacity of overall Japanese automotive manufacturers). The following Table 3.3 presents detailed data on production capacity of all automotive manufacturers in Indonesia during the past seven years, in which Japanese firms have been in the lead.

Table 3.3: Production Capacity of Automotive Manufacturers in Indonesia (units, 2010-2016)

Manufacturers	2010	2011	2012	2013	2014	2015	2016
JAPAN							
Total	694,361	827,757	1,041,020	1,182,244	1,284,371	1,085,812	1,172,968
Toyota	265,152	319,647	445,463	489,289	542,719	471,289	537,415
Daihatsu	117,969	136,703	157,267	178,808	181,870	163,315	185,331
Mitsubishi Motor	38,154	53,327	59,862	63,760	61,742	51,148	36,674
Mitsubishi Fuso	51,004	61,215	61,896	65,432	56,523	35,792	30,704
Suzuki	83,204	105,830	123,246	178,018	171,795	130,967	113,243
Nissan	37,684	54,863	65,900	59,787	28,550	18,800	10,203
Honda	53,566	40,844	55,828	81,614	159,346	148,096	195,274
Isuzu	22,811	28,047	31,645	29,187	27,770	16,934	14,062
Hino	22,237	24,161	36,694	34,411	32,404	19,735	24,422
UD Trucks	2,580	3,120	3,219	1,938	889	*N.a.*	*N.a.*
Mazda	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*
Datsun	*N.a.*	*N.a.*	*N.a.*	*N.a.*	20,763	29,736	25,640
KOREA							
Hyundai (Total)	2,663	5,366	4,875	1,223	461	2,840	510
GERMANY							
Total	4,970	4,296	6,273	7,065	5,144	5,429	4,220
Mercedes-Benz	4,133	2,958	3,755	3,410	2,303	2,777	1,977
BMW	837	844	1,682	2,544	2,045	2,170	2,102
Audi	*N.a.*	*N.a.*	226	210	245	103	3
Volkswagen	*N.a.*	494	610	901	551	379	138
USA							
Chevrolet (Total)	*N.a.*	*N.a.*	*N.a.*	15,720	8,547	4,562	*N.a.*
FRANCE							
Renault (Total)	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	137	99
CHINA							
Total	514	529	727	116	*N.a.*	*N.a.*	*N.a.*
Geely	*N.a.*	364	727	116	*N.a.*	*N.a.*	*N.a.*
Chery	514	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*	*N.a.*
Total Production	702,508	837,948	1,052,895	1,206,368	1,298,523	1,098,780	1,177,797

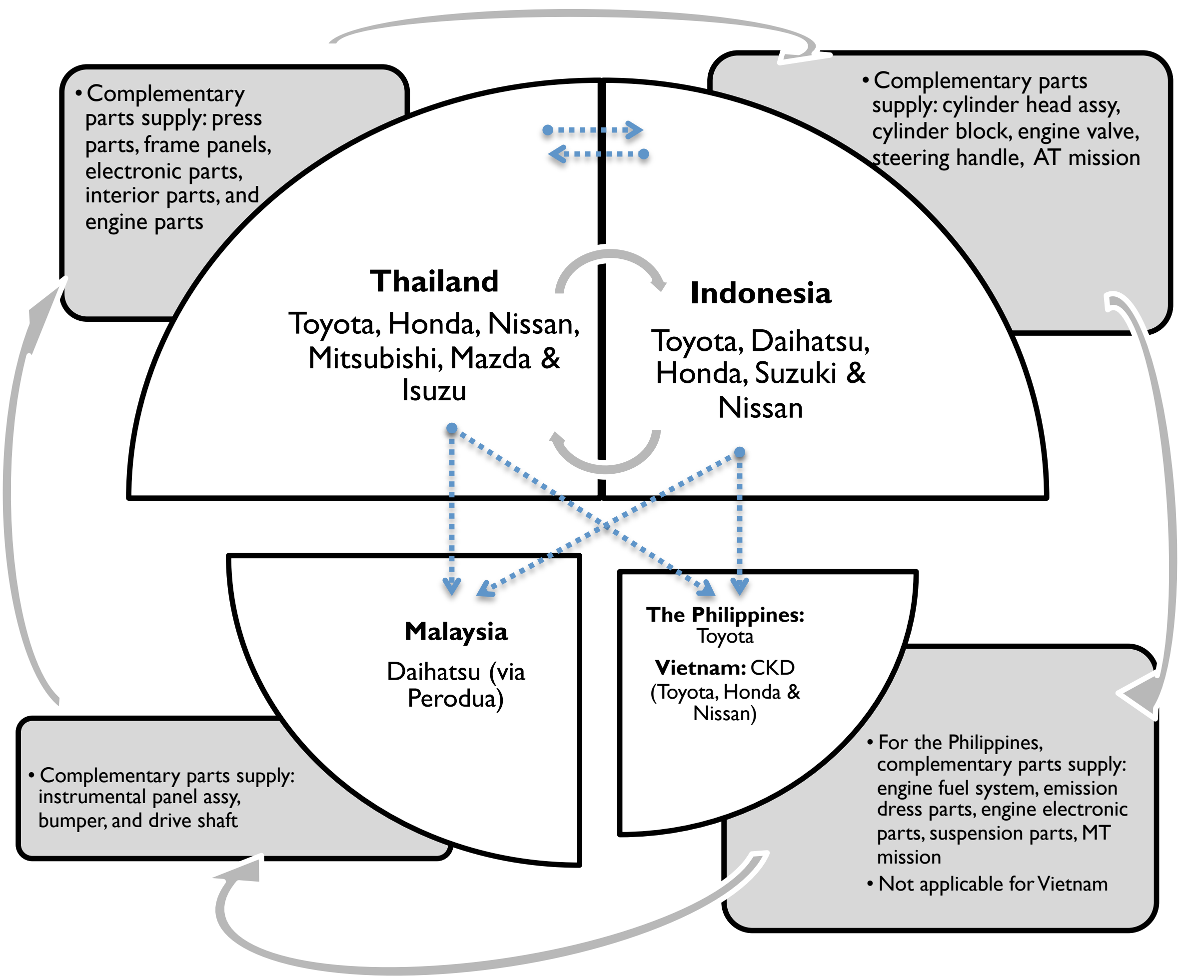
Source: GAIKINDO (2017)

Japanese brands/manufactures supremacy in Indonesian automotive production has been however linked to the three major domestic automotive companies (i.e. PT Astra International, PT Indomobil and PT Krama Yudha) which –in average— control around 83% of annual production capacity (KPMG 2014). Almost all of Japanese automotive OEMs have been operated in Indonesia by having affiliations or joint ventures with one of those three companies. Toyota, Daihatsu and Isuzu, for example, have been in close partnerships with PT Astra International. Whereas PT Krama Yudha and PT Indomobil have been a long time partner of Mitsubishi and Suzuki respectively. Unlike Thailand, automotive parts in Indonesia have largely been dominated by imports. It is estimated that up to 70% of automotive parts and components are imported (KPMG 2014). Major supplier firms (especially at the 1st tier level) have also been Japanese, i.e. associated with its leading OEMs, such as PT TMMIN (Toyota), PT ADM (Daihatsu), PT Krama Yudha Ratu Motor (Mitsubishi), PT Suzuki Indomobil Motor, PT Nissan Motor Indonesia, PT Honda Prospect Motor and PT Isuzu Astra Motor Indonesia.

3.2. Japanese Automotive Production Network in Southeast Asia

Based on the discussion presented in the previous section (3.1), this section offers an assessment on how Japanese automotive firms establish their supply chains and production network in Southeast Asia by emphasizing a phenomenon embedded in the network, i.e. production shifts. Cases on Toyota (as a lead firm) and its key 1st-tier suppliers (Denso and Aisin) are presented to illustrate the phenomenon.

Diagram 3.5: Japanese Automotive Production Network in ASEAN5



Source: author's assessment (complied from and based on Kuroiwa and Techakanont 2017, Kobayashi 2014, and Hiratsuka 2011)

Legends: Intra, inter and extra-firms transactions, including among supplier firms

Export directions of certain brands

The above Diagram 3.5 recaps Japanese automotive firms operation, production network and supply chains in Southeast Asia. Referring to Kuroiwa and Techakanont (2017), Japanese supplier firms and join ventures in Thailand are abundant (as of 2014), whereas number of Indonesia's auto parts suppliers reached only 550 or a mere third of total number of Thailand's suppliers (where both foreign and domestic firms are co-exist). In Indonesia, 1st to 3rd tier suppliers mainly consist of foreign parts makers (mostly Japanese), while locally owned companies are hardly found (Kobayashi 2014).

For complementary parts supply, as noted by Hiratsuka (2011), automobile assemblers operating in ASEAN and China –including particularly the ones originated from Japan— have procured most of their parts and components from domestic suppliers in host countries but key parts such as engines and transmissions from the parents countries. However, as shown by the case of ASEAN, this procurement has been changing to a new approach that automobile assemblers tend to procure key parts from affiliate plants in other countries (within the same region which has geographical proximity) as much as possible. As shown in the above diagram, component complementary operation of Japanese automobile makers operating in ASEAN has been keen towards this new approach.

3.2.1. Toyota Operation in ASEAN

Having previously outlined the emergence and evolving operation of Japanese automotive firms in Southeast Asia, this section (Toyota Operation in ASEAN) and the next one (Toyota Production Network in ASEAN) aims to deepen comprehension on how firms' activities operating in the ASEAN countries have eventually prompted major production shifts in the region. It intends to illuminate production activities taken by those firms in response to changes in the overall production network which eventually lead to localization of production[90]. In so

[90] Production shifts are assessed by way of identifying further movement of automotive products or goods related to automotive products (typically categorized under the UN Comtrade HS 87 and the OECD-WTO TiVA C34T35 as have been described at their macro-level in Chapter 2). The assessment is conducted based on and in parallel with the conceptualization of production fragmentation and vertical integration (elaborated in Chapter 1), i.e. by focusing on the intra-firm,

doing, cases on Toyota Motor Corporation (TMC) and two of its key 1st-tier suppliers (i.e. Denso Corporation Japan abbreviated as DNJP and Aisin Seiki Co. Ltd. Japan abbreviated as ASCJ) are offered.

The following Tables 3.4 presents basic features of Toyota Motor Corporation (TMC) operating in ASEAN countries. Historically, TMC operation started firstly in Thailand (1962), i.e. for sales and marketing only, emulated similarly in Malaysia (1968), Indonesia (1970), the Philippines (1989) and Vietnam (1996). Only as early as of late 1970s that the endeavors started to go beyond sales, marketing, distribution and after-sales, i.e. after local assembly lines for completely knock down (CKD) products are introduced in the early and mid of 1970s.

Table 3.4: Basic Features of Toyota (TMC) Operation in ASEAN

	THAILAND	MALAYSIA	INDONESIA	THE PHILIPPINES	VIETNAM
Starting year of operation	1962	1968	1970	1962 (TMC) 1989 (TMP)	1996
TMC local partners and subsidiaries in sales, marketing, distribution & after sales service	**Toyota Motor Thailand Co. Ltd. (TMT) & Toyota Body Service Co. Ltd. (TBS)** (subsidiaries of TMC)	**UMW (United Motor Work) Toyota Motor Sdn. Bhd. (UMWT**) (a joint venture of Toyota Tsusho & UMW)	**PT Toyota Astra Motor (TAM)** (TMC local partner with equity: 51% PT Astra International Tbk, 49% TMC)	**Toyota Motor Philippines Corporation (TMP)** (a subsidiary of TMC)	**Toyota Motor Vietnam Co. Ltd. (TMV)** (a subsidiary of TMC)
TMC subsidiaries or affiliates in production (manufacturing, assembling)	**TMT** (Prius, Vios, Corolla, Camry, Camry Hybrid, Yaris, Hilux, Fortuner), **Siam Toyota Manufacturing Co. Ltd. (STM)** (Engines, Propeller Shafts), **Toyota Auto Works (TAW)** (Hiace), **Hino Motor Manufacturing Thailand (HMMT)** (Trucks), **Toyota Auto Body**	**Assembly Services Sdn. Bhd. (ASSB)** (100% owned by TMC since 1982) (Vios, Fortuner, Hilux, Innova, Hiace) (Total Capacity: 56,000 units/year) **Daihatsu Perodua Engine Manufacturing Sdn. Bhd** (51% equity owned by DMC) (for small & medium MPVs)	**PT Toyota Motor Manufacturing Indonesia (TMMIN)** (Innova, Fortuner, Vios, Engines), **PT Astra Daihatsu Motor (ADM)** (Avanza, Agya), **PT Hino Motors Manufacturing Indonesia (HMMI)** (Dyna-Trucks), **PT Sugity Creatives** (Noah) (Total Capacity: 310,000	**TMP** (Innova, Vios), **Toyota Autoparts Philippines Inc. (TAP)** (1992) (Transmissions, Constant Velocity Joints) Total Capacity: 55,000 units/year)	**TMV** (Camry, Corolla, Vios, Innova, Fortuner) Total Capacity: 51,000 units/year)

inter-firm and extra-firm trade relations. With such an understanding, cases on both Toyota and its key 1st-tier suppliers (Denso and Aisin Seiki) are examined through their product exchanges within their supply chains and production networks.

	(Thailand) (TAB) (Body Parts), **Toyota Daihatsu Engineering & Manufacturing (TDEM)** (R&D) (Total Capacity: 556,000 – 760,000 units/year)	**Toyota Auto Body Malaysia Sdn Bhd (TABM)** (100% equity owned by TMC since 2005) (for production of minivan bumpers, instrument panels and other parts)	units/year)		
Key remarks on local production or manufacturing activities	TMT and its wider Toyota Group activities in Thailand –that range from auto assembly lines and production facility to its supporting industries in auto parts and accessories—represent a full and complete set of automotive industry (similar to the ones undertaken by TMC in its home country/Japan)	Local assembly began in 1968 with Toyota Corolla and Toyota Corona as a response to the CBU (completely built up) policy introduced by the Malaysian government in 1964; CKD (completely knock down) kits initially imported by TMC; then technology transfer in automotive assembly	Conducted since 1977 collaboratively by PT Astra International, PT TAM and PT TMMIN, the so-called "Kijang" type has been the showcase of efforts for locally-grown, designed passenger car -- which eventually integrated into Toyota IMV project and known, branded as "Kijang Innova"	Although assembly activities have began as early as of 1962 (by a local partner company, Delta Motor Corp), local full production that was conducted under TMC subsidiary has only undertaken in 1997 for Corolla type, then after 2003 for Vios and Innova types, and finally since 2008 for transmissions (including R-types)	Despite current consideration of possibility to end its manufacturing activities in light of full AEC scheme in Vietnam by 2018, Toyota localization of production is so far the most progressive one among OEMs with an average rate of local content reaching between 19% and 37% for Vios, Corolla, Camry, Innova & Fortuner types
Additional remark on TMC subsidiary in Singapore (as an operational/regional headquarter)	Toyota Motor Asia Pacific Pte Ltd (TMAP) (previously Toyota Motor Management Services Singapore/TMSS founded in 1990) has 2 affiliate companies, i.e. TMAP-MS (which replaced TMSS in April 2001) located in Singapore and Toyota Motor Asia Pacific Engineering & Manufacturing Co. Ltd. (TMAP-EM) located in Bangkok (which has also changed its name and core function into Toyota Daihatsu Engineering & Manufacturing (TDEM) as of April 3rd 2017).				

Source: author's assessment based on TMC-1 (2017), TMT (2017), TMMIN (2017), ASSB (2017), TMP (2017), TMV (2017), Toyota Annual Reports (2015, 2016), Vietnam Net (2015)

Toyota's production and market share for motor vehicles in ASEAN5 countries has been leading, especially in the Philippines, Indonesia and Thailand. The phenomenon has also been the case for Vietnam and Malaysia in the past several years. In Malaysia, Toyota is leading for its market share in commercial vehicle. The complete list and information for all ASEAN5 countries is as follows:

Table 3.5: Toyota Vehicle Production and Market Share in Southeast Asia

	Production Share	Market Share
Thailand	21.5% (as of 2015) of Total Domestic Vehicle Production Capacity (3.66 million units) or Actual Production (1.92 million units) [Rank: #1]	35.2% (as of 2015) of Total Domestic Passenger Vehicles Sales (0.299 million units), 32% (as of 2015) of Total Domestic Commercial Vehicles Sales (0.112 million

		units) [Rank: #1]
Indonesia	45.6% (as of 2016) of Total Domestic Vehicle Production (1.29 million units) [Rank: #1]	35% (as of 2016) of Total Domestic Vehicle Sales (1.21 million units) [Rank: #1]
Malaysia	10.3% (as of 2016) of Total Domestic Vehicle Production (0.545 million units) [Rank: #3, extrapolated from Natsuda et al 2012]	8.7% (as of 2016) of Total Domestic Passenger Vehicles Sales (0.515 million units) [Rank: #4], 29.2% (as of 2016) of Total Domestic Commercial Vehicles Sales (0.065 million units) [Rank: #1]
The Philippines	56.1% (as of 2016) of Total Domestic Vehicle Production (0.098 million units) [Rank: #1]	45.2% (as of 2016) of Total Domestic Vehicle Sales (0.350 million units) [Rank: #1]
Vietnam	22% (as of 2016) of Total Domestic Vehicle Production (0.236 million units) [Rank: #2]	28.14% (as of 2015) of Total Domestic Vehicle Sales (0.270 million units) [Rank: #1]

Sources: Yongpisanphob (2016) for Thailand, GAIKINDO (2017) for Indonesia, Natsuda et al (2012), MAA (2017) and Paultan (2017) for Malaysia, TMP (2017), APEC (2016) and Topgear Philippines (2017) for the Philippines, AAF (2016), Sundjojo (2016) and TMV (2017) for Vietnam

The following Table 3.6 presents types of automotive products and automotive parts and components manufactured by Toyota showcasing TMC's product range in ASEAN5. Thailand has the largest production capacity both for vehicles and parts and components. As the 2nd largest, Indonesia has also played a role as current and future hub for IMV production in addition to Thailand. Malaysia and the Philippines have been taken for specialized positions in the procurement of certain parts and components, i.e. electrical parts for the former and manual transmissions for the latter. As a latecomer, Vietnam is currently being considered for further localizing production of Vios, Camry, Corolla, Innova and Fortuner (especially for domestic market) albeit of TMC carefully made decision to keep its manufacturing plants in the country in light of the upcoming full implementation of AEC in 2018.

Table 3.6: Toyota Products Range (Manufactured in ASEAN5)

Products	Remarks
THAILAND	Manufactured by TMT, TAW and STM Vehicle Products are Marketed Domestically by TMT
Vehicles/Cars (2016)	Annual Total Production Capacity: 556,000 units
TMT ▪ Passenger Vehicles: Yaris, Vios, Altis, Camry ▪ Commercial Vehicles: Hilux Revo (Standard, Smart, Double), Ventury ▪ Multi Purpose Vehicles (MPVs): Avanza, Sienta, Innova Crysta, Fortuner, Alphard	Annual Production Capacity: 549,000 units Market: domestic and export (Asia, Oceania, Africa, EU, Central and South America) Domestic market share is approximately 40% and export market share is approximately 60% of the total production
TAW ▪ Commercial Vehicles: Hiace Commuter	Annual Production Capacity: 7,000 units Market: domestic
STM ▪ Engines & Propeller Shaft • Engine Assembly: KD, TR, NZ, NR, ZR, AZ, Casting KD, ZR • Casting Part: Cylinder Block Toyota (2L, 5L-E), Isuzu (4JA1, 4JB1, 4J), Nissan (TD 27), Propeller Shaft (5A 4E)	Market: domestic (major customer: TMT), export (Toyota affiliates in Japan, Vietnam, Taiwan, Philippines, Malaysia, Indonesia, India, Pakistan, Australia, Argentina, France and South Africa) GD (Diesel) Engine for Fortuner and Hilux Revo TR, ZR, NZ, NR (Gasoline) Engine for Hiace and Innova
INDONESIA	Manufactured by TMMIN, ADM, HMMI and Sugity Creatives Vehicle Products are Marketed Domestically by PT TAM
Vehicles/Cars (2016)	Annual Total Production Capacity: 310,000 units
TMMIN ▪ MPVs: Kijang Innova, Fortuner ▪ Passenger Cars: Etios, Yaris, Vios, Sienta	Annual Production Capacity: 218,000 units Market (Kijang Innova): domestic, export* Market (Fortuner): domestic, export** Market (Etios): domestic Market (Yaris): domestic Market (Vios): domestic, export*** Market (Sienta): domestic
ADM ▪ MPVs: Avanza ▪ Passenger Cars: Agya & Cayla	Annual Production Capacity: 89,000 units Market: domestic (in parallel to their twin car types under Daihatsu's brands of Xenia for Avanza, Ayla for Agya & Sigra for Cayla)
HMMI ▪ Dyna (Trucks)	Annual Production Capacity: 2,000 units Market: domestic
Sugity Creatives ▪ Premium MPVs: Noah	Annual Production Capacity: 1,000 units Market: export
Engine (TMMIN) ▪ 1 NR & 2 NR ▪ 1 TR & 2 TR	1300 cc & 1500 cc (market: domestic) 2000 cc & 2700 cc (market; domestic & export****)
Component (TMMIN)	More than 1800 types of component, category of component is: Body Part, Engine Part (Cylinder Head, Cylinder Block, Crank Shaft, Cam Shaft), Electric Part and Interior Part Market: domestic and export*****
Jig and Dies (TMMIN)	Jig: manual, semi-automatic, automatic, robotic Dies: outer, inner, others

	Market: domestic and export******
MALAYSIA	Manufactured by ASSB Vehicle Products are Marketed Domestically by ASSB
Vehicles/Cars ▪ Passenger Vehicles ▪ Commercial Vehicles ▪ MPVs	Annual Total Production Capacity: 56,000 units Market: domestic (Vios for Passenger Vehicles; Hilux, Hiace for Commercial Vehicles; Innova, Fortuner for MPVs)
PHILIPPINES	Manufactured by Toyota Motor Philippines Corporation (TMP) Vehicle Products are Marketed Domestically by TMP
Vehicles/Cars (TMP) ▪ Passenger Vehicles: Vios ▪ MPVs: Innova	Annual Total Production Capacity: 55,000 units Market: domestic
Component (TAP) ▪ Transmissions, Constant Velocity Joints	Manufactured by Toyota Autoparts Philippines Inc. (TAP) Market: domestic (TMP)
VIETNAM	Manufactured by Toyota Motor Vietnam Co. Ltd. (TMV) Vehicle Products are Marketed Domestically by TMV
Vehicles/Cars (TMV) ▪ Passenger Vehicles ▪ MPVs	Annual Total Production Capacity: 51,000 units Market: domestic (Camry, Corolla, Vios for Passenger Vehicles; Innova, Fortuner for MPVs)

Notes on Indonesia export destination:
*Brunei, Bermuda, Thailand, Saudi Arabia, UAE, Qatar, Oman, Kuwait, South Africa, Bolivia, Aruba, Fiji, ST Kitts
**Kuwait, Qatar, Oman, Bahrain, UAE, Iraq, Saudi Arabia, Colombia, Peru, Costa Rica, Guatemala, Nicaragua, Panama, Laos, Cambodia, N. Caledonia, Haiti, Panama, El Salvador, the Philippines, Sri Lanka, Trinidad, Lebanon, Libya, Yemen, Jordan, Bangladesh, PNG, Jamaica, ST Kitts, ST Vincent, Suriname, Guyana, G. Cayman, Belize
***Oman, UAE, Saudi Arabia, Jordan, Lebanon, Kuwait, Bahrain, Qatar, Brunei, Singapore, Yemen
****Japan, China, Thailand, Malaysia, Vietnam, Australia, South Africa, Argentina, Brazil, Venezuela, Egypt, Pakistan, India, Kazakhstan
*****Japan, China, Taiwan, Thailand, Malaysia, Vietnam, the Philippines, Australia, South Africa, Argentina, Brazil, Venezuela, Egypt, Pakistan, India, Kazakhstan
******Japan, Taiwan, Thailand, Malaysia, Vietnam, the Philippines, Australia, South Africa, Kenya, Argentina, Brazil, Venezuela, Colombia, Trinidad & Tobago, Pakistan, India, France

Sources: TMC (2016), TMMIN (2017), TMT (2016), STM (2016), Asawachintachit (BOI) (2012), Wesley Net E-Catalogue (2017)

In the case of Denso and Aisin, the two companies' operations were initially part of TMC production and manufacturing expansion in the region (as they were formerly under TMC organizational structure). Denso started its operation in Thailand in 1972 which was then followed in Indonesia (1975), Malaysia (1980), the Philippines (1995) and Vietnam (2001). Aisin started operation in Thailand and Singapore in 1977, which then was followed in Indonesia in 1995 and in the Philippines (under TAP) in 2016. The following Tables 3.7 and 3.8 present Denso and Aisin Seiki's operation basic features in ASEAN:

Table 3.7: Basic Features of Denso (DNJP) Operations in ASEAN

	THAILAND	INDONESIA	MALAYSIA	THE PHILIPPINES	VIETNAM
Starting year of operation	1972	1975	1980	1995	2001
Main subsidiary company	**Denso (Thailand) Co. Ltd.** (1972) - manufacture electrical automotive components, car air conditioners, magnetos for motorcycles, and spark plugs (equity owned by DNJP: 51.3%)	**PT Denso Indonesia** (1975) - manufacture and sale of car air conditioners, radiators, spark plugs, and filters (equity owned by DNJP: 68.34 %)	**Denso (Malaysia) Sdn. Bhd.** (1980)- manufacture and sale of car air conditioners, electrical automotive components, and electronic products (equity owned by Denso: 72.7%)	**Denso Philippines Corporation** (1995) – manufacture and sale of instrument clusters and car air conditioners (equity owned by DNJP: 100%)	**Denso Manufacturing Vietnam Co. Ltd.** (2001) – manufacture and sale of air flow meters, VIC actuators, and other engine-related products (equity owned by DNJP: 95%)
Other subsidiary or affiliate companies	**Denso Tool and Die (Thailand) Co. Ltd.** (1987) - manufacture and sale of dies and jigs for automotive equipment (owned 100% by DNJP); **Siam Denso Manufacturing Co. Ltd.** (2002)-manufacture fuel injection system products (fuel pumps and injectors) (owned 90% by DNJP); **Toyota Boshoku Filtration System (Thailand) Co. Ltd.** (2002)-manufacture oil filters (owned 40% by DNJP); **Denso Sales (Thailand) Co. Ltd.** (2002)-sale of automotive components (owned 100% by DNJP); **Anden (Thailand) Co. Ltd.** (2002)-manufacture relays and flashers (owned 100% by DNJP); **Siam Kyosan Denso Co. Ltd.** (2003)-manufacture fuel pump modules and diesel fuel filters (owned 100% by DNJP); **Air Systems Thailand Co. Ltd.** (2012)-manufacture car air conditioner hoses and pipes (owned 100% by DNJP)	**PT Asmo Indonesia** (1997) - manufacture power window regulator motors and electric fan motors (owned 100% by DNJP); **PT Hamaden Indonesia Manufacturing** (1997)-manufacture horns (owned 100% by DNJP); **PT Denso Sales Indonesia** (2004)-sale of automotive components, provide after-sale service (owned 100% by DNJP); **PT TD Automotive Compressor Indonesia** (2011)-manufacture and sale of compressors for car air conditioners (owned 20% by DNJP)	**Nippon Wiper Blade (M) Sdn. Bhd.** (1995) - manufacture wiper arms and wiper blades (owned 93.3% by DNJP)	**Denso Techno Philippines Inc.** (2005) – design and development of software (owned 100% by DNJP)	**Hamaden Vietnam Manufacturing Co. Ltd.** (2008) – manufacture automotive sensors and solenoid valves (owned 100% by DNJP)
Additional remarks	DNJP subsidiaries in Singapore, Denso International Asia Pte. Ltd. & Denso Wave Singapore Pte. Ltd., serve as the regional headquarter for Asia & sale of aftermarket products and product design for Rockwell Automation respectively				

Source: author's assessment based on DNJP (2017), DNIA (2017), DNMY (2017), DNTH (2017), DIAT (2017)

Table 3.8: Basic Features of Aisin Seiki (ASCJ) Operations in ASEAN

	THAILAND*	SINGAPORE	INDONESIA
Starting year of operation	1977 (SNF)	1977 (Aisin Asia Pte. Ltd.)	1995 (PT Aisin Indonesia)
Subsidiary or affiliate companies in manufacturing or production activities *Note on Thailand: six companies in iron and aluminum business (SNF, TEP, NIC, SATI, ATFB and AT-A) are member of **Aisin Takaoka Thailand Group (ATTG)**, a subsidiary of Aisin Takaoka Group Japan	**Siam Nawaloha Foundry Co. Ltd. (SNF)** (1977) - iron casting, machining; **Thai Engineering Products Co. Ltd. (TEP)** (1985) - aluminum casting and machining; **Nawaloha Industry Co. Ltd. (NIC)** (1990) - iron casting, machining; **Siam AT Industry Co. Ltd. (SATI)** (1996) - machining (iron); **Aisin Takaoka Foundry Bangpakong Co. Ltd. (ATFB)** (2001) - iron casting, machining, forming; **Aisin Thai Automotive Casting Co. Ltd. (ATAC)** (established 2008, started operation 2010) (97% equity owned by ASCJ) **-** production of automotive parts (intake manifold, oil pump, water pump, fluid coupling, timing chain case, timing gear case, etc.); **Siam Aisin Co. Ltd.** - production of automotive parts (brake master cylinders, drum brakes, hood latches, door hinges, door frames, clutch master cylinders, ABS sensors, etc.); **YCK (Thailand) Co. Ltd.** - manufacture of automotive clutch disks for repair, farm machine multiple disk clutch, and press parts; **HOSEI Brake Co. Ltd.** - manufacture of automotive parts (drum brakes and rear parking brakes)		**PT Aisin Indonesia** (1995) **-** manufacture of automotive parts (clutch covers, clutch disks, door latches, door checks, door hinges, door frames, window regulators, hood latches, inside/outside handles, intake manifolds, etc.); **PT AT Indonesia** (1996) - iron casting/machining, metal forming; **PT ADVICS Manufacturing Indonesia** (2003) - manufacture of automotive parts (brake boosters, drum brakes, parking brakes)
Subsidiary companies for regional supports	**Aisin Takaoka Asia Co. Ltd. (AT-A)** (1988) – sales & marketing, managerial support towards Southeast Asia regions; **Shiroki Asia Co. Ltd.** (2002) (100% equity owned by Shiroki Corp)- support technical capabilities, procurement, sales business in Asia	**Aisin Asia Pte. Ltd.** (1977) (100% equity owned by ASCJ) **-** import, export and sales of automotive parts, household sewing machines and apparel equipment	
Subsidiary companies in manufacturing and/or sales	**Aisin Chemical (Thailand) Co., Ltd.** - manufacture & sales of brake pads, plastic parts, & chemical products for automobile; **AW (Thailand) Co. Ltd.** - production, sales & after sales service of automotive parts; **Aisin AI (Thailand) Co. Ltd.** - manufacture & sales of automotive parts (manual transmissions & gears, etc.); **ADVICS Asia Pacific Co. Ltd.** - sales of automotive brake systems & sophisticated brake components; **ADVICS Manufacturing (Thailand) Co. Ltd.** - manufacture & sales of automotive sophisticated brake components, sales of automotive brake systems; **Shiroki Corp. (Thailand) Ltd.** - manufacture & sales of automotive parts; **Art-Serina Piston Co. Ltd. -** production & sales of pistons & piston pins for various kinds of internal combustion engines; **EXEDY Friction Material Co. Ltd.** - manufacture & sales of clutch facings for automobile		**PT Aisin Indonesia Automotive** - manufacture and sales of automotive parts (power sliding doors, door handles, engine front modules and other die-cast parts, oil pumps, etc.); **PT Aisin Chemical Indonesia** - sales of automotive parts and chemical products; **PT ADVICS Indonesia** - sales of automotive brake systems and sophisticated brake components; **PT Shiroki Indonesia** - manufacture and sales of automotive parts; **PT Art Piston Indonesia -** production and sales of pistons for various kinds of internal combustion engines
Additional remarks	In January 2016, Aisin Seiki (ASCJ) acquired a stake in **Toyota Autoparts Philippines Inc. (TAP)** in the Philippines, for equity of 25-34 percent, under an agreement to consolidate the development and production of manual transmissions under Aisin AI which was agreed previously in November 2014		

Source: author's assessment based on ASCJ-1 (2017), ASCJ-2 (2017), ATTG (2017), ATAC (2017), Aisin Asia (2017), Aisin Group Report (2016)

The following Table 3.9 presents types of automotive parts and components manufactured by Denso in ASEAN3 showcasing the company's product range. Denso has been focusing on five major categories of products/services, i.e. OEM Automotive Systems and Components, Automotive Service Parts and Accessories, Industrial Products, Consumer Products and Services.

Table 3.9: Denso Products and Services Range (Manufactured in ASEAN3)

	Products & Services
▪ OEM Automotive Systems and Components	▪ Powertrain related Products (Products for EVs and HVs, Gasoline Engine Management System, Diesel Engine Management System, Motorcycle Management System, Powertrain Cooling System, Transmission Control System, Other Powertrain related Products) ▪ Climate Control Products ▪ Driving Control and Safety Products (Driving Assist System, Lighting Control System, Steering System, Airbag System, Brake Control System) ▪ Information and Communication Products (Human Machine Interface, Data Communication System, Security System, Other Information and Communication Products) ▪ Body Electronics Products ▪ Small Motors (Wiper System, Power Window Motor, Washer System, Blower Motor)
▪ Automotive Service Parts & Accessories	▪ Automotive Service Parts • Maintenance Parts (Spark Plug, Oil Filter, Cabin Air Filter, Wiper Blade, Air Filter Element • Repair Parts (Starter, Alternator, Compressor, Oxygen Sensor, Fuel Pump, Air Conditioner Service Parts) • Collision Parts (Radiator, Condenser) ▪ Accessories (Plasmacluster Ion Generator, Dedicated Short Range Communication On-Board Equipment, Car Navigation System, Air Purifier) ▪ Business Use Products (Truck Refrigeration, Air Conditioner for Buses, Construction Vehicles) ▪ Service Tools (Refrigerant, Recovery, Recycling and Charging Machine) ▪ NaviBridge
▪ Industrial Products	▪ Industrial Robot ▪ Barcode and QR Code Handy Terminal ▪ Spot Cooler
▪ Consumer Products	▪ Home Energy Management System ▪ CO2 Refrigerant Heat-Pumps
▪ Services	▪ Product for consumer satisfaction ▪ Product repairs ▪ Product development

Source: DNIA (2017), DNMY (2017), DNTH (2017)

In line with Toyota operation history in Southeast Asia, Denso operation in the region started firstly in Thailand in 1972 (Denso (Thailand) Co. Ltd.), then in

Indonesia in 1975 (PT Denso Indonesia), and in Malaysia in 1980 (Denso (Malaysia) Sdn. Bhd.). These early operations of Denso were part of Toyota manufacturing expansion in the region. Since then, Denso establishes numerous affiliates/subsidiaries in these three countries in response particularly to the growing business activities and expanding production/manufacturing plants of Toyota (and also other manufacturers) in the region.

As business grew and scope of its activities was widened, Denso establishes variety of affiliates or subsidiary companies in the region beyond ASEAN3, i.e. lately in Singapore in 1998 for its regional headquarter and procurement center, i.e. Denso International Asia Pte. Ltd., and its latest establishment in 2016 (Denso Wave Singapore Pte. Ltd.) for product design. The Philippines and Vietnam have also been hosting Denso affiliates/subsidiaries, i.e. Denso Philippines Corporation (1995) for manufacture and sales of instrument clusters and car air conditioners, Denso Techno Philippines Ltd (2005) for design and development of software, Denso Manufacturing Vietnam Co. Ltd. (2001) for manufacture and sale of air flow meters, VIC actuators, and other engine-related products, and Hamaden Vietnam Co. Ltd. (2008) for manufacture automotive sensors and solenoid valves.

Similar to Denso, Aisin Seiki started its operation in Thailand and Singapore in 1977, i.e. much later than (or five years behind) that of Denso. This is particularly due to the bulky and heavy nature of parts and components manufactured that made expansion and production shifts to the region took longer time to materialize. In Thailand, Aisin took a strategic decision to set up local plants by joint venturing with local iron and aluminum company (Siam Nawaloha Foundry Group or formerly Thai Cement Group) for its casting and machining activities (ASCJ 2017). For the less bulky automotive parts and components, Aisin investment in the region was undertaken in much later phases in the 2000s, i.e. after series of booming periods of automotive production and sales in particularly Thailand and Indonesia.

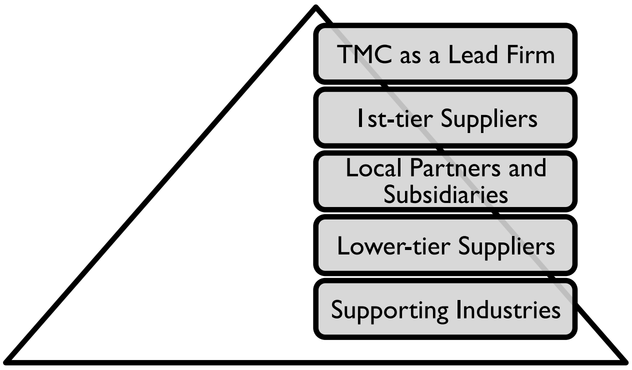
Toyota's (along with its two key 1st-tier suppliers, Denso and Aisin) product range, production and market share in ASEAN5 reveal vital Toyota's position in Southeast Asian automotive industry, both in terms of its production network/supply chains and sales/marketing activities which in turn indicates the company's central role in the region's automotive value chains. Toyota-led value chains in the region, therefore, are worth noticed to outline a general inclination of automotive lead firms (operating in the region) for pursuing value addition activities in light of their existing production network and supply chains. Thus, Toyota production network and value chains represent an overall depiction of the region's automotive production network and value chains[91].

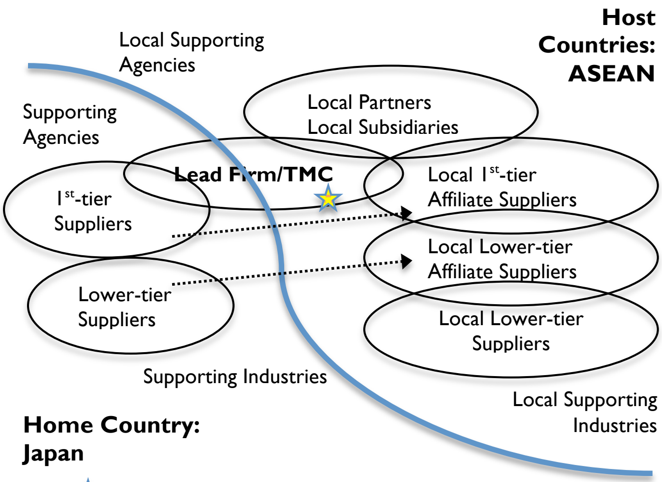
3.2.2. Toyota Production Network in ASEAN

As a firm that leads a production network, TMC maintains a hierarchical structure consisting of a lead firm (TMC), 1st tier suppliers (which are mostly home-based in Japan and have affiliates at local host countries), local partners (which are mostly joint ventures with local companies) and subsidiaries or affiliates at host countries, lower-tier suppliers (mostly at host countries) and local and home country's supporting industries and agencies.

[91] Toyota production network and value chains are proposed as prototypes representing the overall Japanese automotive production networks and value chains in Southeast Asia. It shall be presented in more detailed features in the next Sub-section 3.2.2 (Toyota Production Network in Southeast Asia) and Section 3.3 (Toyota IMV/Innovative International Multipurpose Vehicles Project in Southeast Asia) and in Chapter 4 (i.e. in Section 4.1 Toyota-led Value Chains). The presentation of Toyota-led Value Chains in Chapter 4 is part of an assessment on the company's upgrading strategy for value added.

Diagram 3.6: Structure and Spatial Linkages of TMC Production Network in Southeast Asia





☆Regional Headquarters (TMAP-MS in Singapore & TMAP-EM (or later known as TDEM) in Thailand)

**Notes on Toyota Group, 1st-tier and lower-tier Suppliers located in Japan: the companies serve domestically in Japan and globally, estimate number of 1st-tier suppliers (168, 200 and 175-500) are based on Tsuji (2004), Elsmar (not dated) and Kito et al (2014) respectively, and estimate numbers for 2nd and 3rd tier suppliers are based on Tsuji (2004).*

***Notes on Local Lower-tier Suppliers: estimate numbers are available only for Indonesia (via TMMIN) and the Philippines (via TMP).*

Source: author's assessment, based on Kuroiwa & Heng (2008), TMC-1 (2017), Investopedia (2015), Kito et al (2014) (referring to Sheard 1983, Smitka 1991, Fruin 1992, Lamming 1993), Tsuji (2004), TAM (2017), ASSB (2017), TMT (2017), TMP (2017), USSEC (2016), Valdez (2016), Elsmar (not dated).

	Location (Numbers)
Toyota Group*	Japan (17)
1st –tier Suppliers*	Japan (estimates: 168, 200, 170-500)
Local Partners (of TMC)	Indonesia (1) Malaysia (1)
Local Subsidiaries	Southeast Asia (21)
(of TMC)	Indonesia (1) Malaysia (2) The Philippines (2) Thailand (4) Vietnam (1) Singapore (1)
(of DMC)	Indonesia (1) Malaysia (1)
(of HMT)	Indonesia (1) Malaysia (2) The Philippines (1) Thailand (2) Vietnam (1)
(of TAB)	Indonesia (1)
Lower-tier Suppliers*	Japan (estimates: 2nd-tier: 5437, 3rd-tier: 41703)
Local 1st-tier Affiliate Suppliers	Southeast Asia (Estimate: 99, of Toyota Group) *Cases: Denso/D & Aisin/A* Indonesia (D: 5, A: 8) Malaysia (D: 2) The Philippines (D: 2, A: 1) Singapore (D: 2, A: 1) Thailand (D: 10, A: 15) Vietnam (D: 2)
Local Lower-tier Affiliate Suppliers	Southeast Asia (estimate number is not available) *Case: Aoyama (ASJ)* Indonesia (1) (AFD) Thailand (1) (AFT)
Local Lower-tier Suppliers (2nd & 3rd –tiers)**	Indonesia/TMMIN (407) Malaysia (not available) The Philippines/TMP (92) Thailand (not available) Vietnam (not available)

The above Diagram 3.6 illustrates the two elements of Toyota production network in Southeast Asia, i.e. its hierarchical structure and spatial linkages. As a lead firm, TMC is a member company of Toyota Group consisting of automotive production and non-automotive businesses companies home-based in Japan with its

17 member companies (as of April 2013)[92]. Estimate numbers of Toyota Group members (including TMC) which have investment and/or overseas operations in Southeast Asia are 121 subsidiary or affiliate companies[93]. The following Table 3.10 recapitulates companies and numbers of Toyota Group overseas subsidiaries/affiliates operating in Southeast Asia:

Table 3.10 Numbers of Toyota Group Subsidiaries/Affiliates in ASEAN Countries (2017)

	THA	IDN	MYS	PHI	VNM	SGP	MYA	LAO	CAM	Total
TMC	4	1	1	2	1	1				10
TIC		1			1					2
JTEKT	4	2	2	1		1				10
TAB	2	3	1							6
TTC	1	2	1	2	1	1	1	1	1	11
ASCJ	15	8		1		1				25
DNJP	10	5	2	2	2	2				23
TBC	9	2	1	1	2			1		16
TGC	3	2			1					6
HMT	2	1	2	1	1					7
DMC		1	4							5
Total	50	28	14	10	9	6	1	2	1	**121**

Note: for abbreviation, see footnote #13 below (for companies names) and/or in the Annex (for companies and countries names)
Source: author's assessment based on TMC-1, TIC, JTEKT, TAB, TTC, ASCJ, DNJP, TBC, YGC, HMT, DMC (2017)

TMC 1st tier suppliers consist of companies, who are members of Toyota Group and non-members, supplying main auto parts and components directly to TMC. Overall estimate numbers of TMC 1st–tier suppliers are between 175 and 500 (Kito

[92] Toyota Motor Corp. (TMC), Toyota Industries Corp. (TIC), Aichi Steel Corp., JTEKT Corp., Toyota Auto Body Co. Ltd. (TAB), Toyota Tsusho Corp. (TTC), Aisin Seiki Co. Ltd. (ASCJ), Denso Corp. (DNJP), Toyota Boshoku Corp. (TBC), Towa Real Estate Co. Ltd., Toyota Central R&D Labs Inc., Toyota Motor East Japan Inc., Toyoda Gosei Co. Ltd. (TGC), Hino Motors Ltd. (HMT), Daihatsu Motor Co. Ltd. (DMC), Toyota Housing Corp., and Toyota Motor Kyushu Inc.

[93] They include Toyota Industries Corporation (TIC) (in industrial vehicles and automobiles, logistics), JTEKT Corporation (in manufacture and sales of machine tools and auto parts), Toyota Auto Body Co. Ltd. (TAB) (in manufacture of auto and special vehicle bodies & parts), Toyota Tsusho Corporation (TTC) (in transactions of various auto related items, export and import), Aisin Seiki Corporation (ASCJ) (in manufacture and sales of auto parts), Denso Corporation (DNJP) (in manufacture and sales of electrical components for automobiles and other applications, air conditioning equipment & general appliances & electrical appliances), Toyota Boshoku Corporation (TBC) (in manufacture and sales of vehicle interior parts, filters and power train mechanical parts), Toyoda Gosei Co. Ltd. (TGC) (in manufacture and sales of rubber, plastic and urethane products, semiconductor related products, electronic products and adhesives), Hino Motors Inc. (HMT) (in manufacture and sales of large trucks, buses, small commercial vehicles, passenger vehicles, engines and spare parts), and Daihatsu Motor Co. Ltd. (DMC) (in manufacture and sales of automobiles, specialty vehicles and parts).

et al 2014) serving for domestic TMC plants in Japan and its worldwide operations through its subsidiaries and affiliates[94]. Estimate numbers of TMC 2nd-tier and 3rd-tier suppliers are 5437 and 41703 respectively (Tsuji 2004). Estimate numbers of TMC 1st-tier suppliers who are Toyota Group subsidiary/affiliate companies operating in Southeast Asia are 99 (i.e. by excluding TMC, HMT and DMC subsidiaries from the companies listed in Table 3.10). TMC local partners and subsidiaries/affiliates in Southeast Asia are based in ASEAN6 countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam). There are currently 2 key local partners and a total of 21 subsidiaries in these countries[95]. TMC affiliate in Singapore (TMAP-MS) is a procurement center and served as a regional operational headquarter (OHQ).

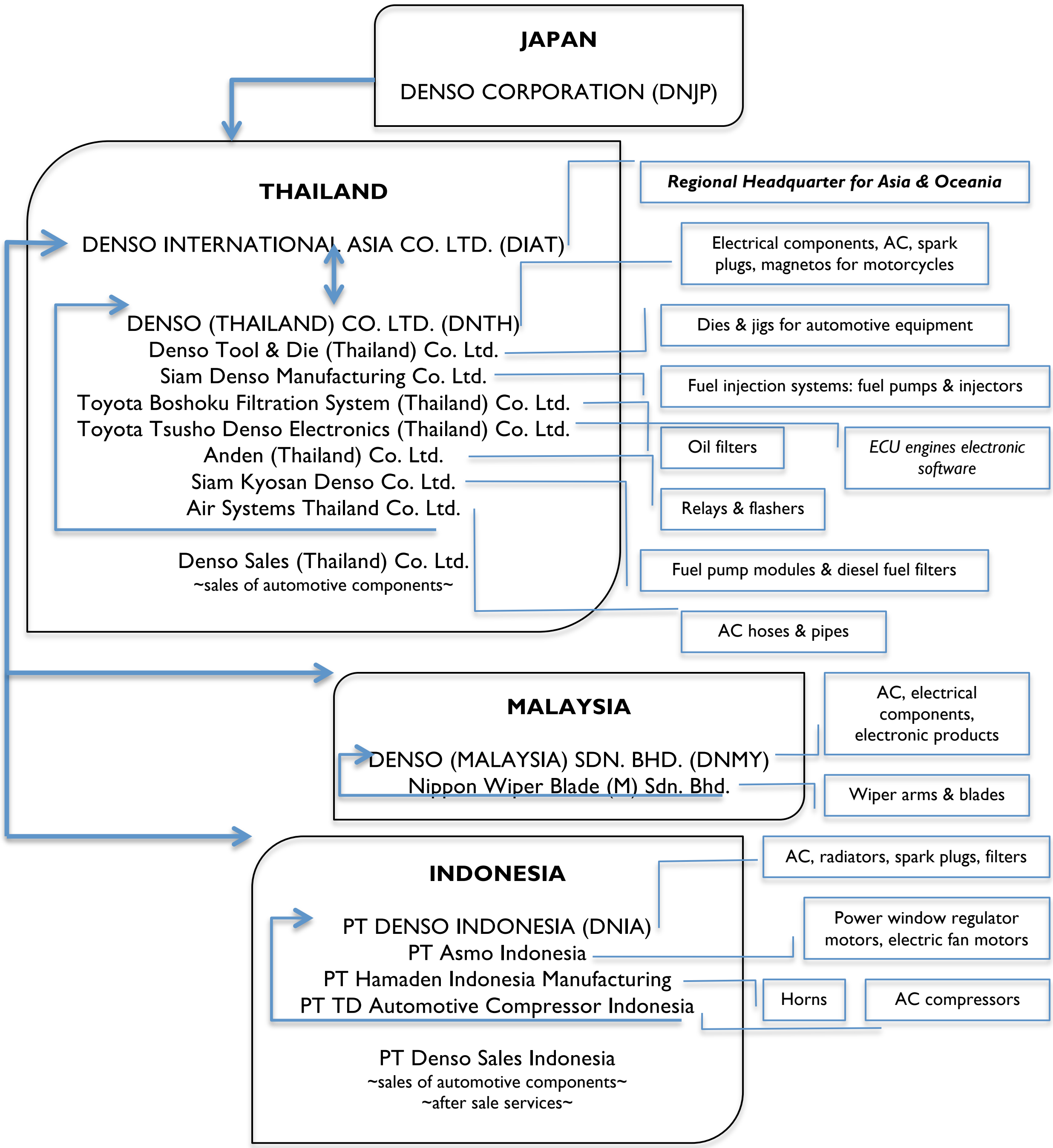
In the cases of two key companies serving as TMC 1st-tier suppliers (i.e. Denso and Aisin Seiki), ASEAN countries are currently hosting 48 subsidiaries/affiliates of the two companies. As shown in Diagram 3.6, there are currently 23 1st–tier local affiliate suppliers of Denso Corporation in ASEAN6 countries: 10 in Thailand, 5 in Indonesia, 2 in Malaysia, 2 in the Philippines, 2 in Singapore (as regional procurements) and 2 in Vietnam. In the case of Aisin Seiki Co. Ltd., there are 25 affiliate companies serving as 1st-tier suppliers in the region in which Thailand hosts 15 of them, Indonesia 8, the Philippines 1, and Singapore 1 (regional headquarter). As also indicated in Diagram 3.6, for lower-tier suppliers, this study takes Aoyama

[94] As shown in Diagram 3.6, other sources suggest that the numbers are 200 (Elsmar *not dated*) and 168 (Tsuji 2004).

[95] As shown in Diagram 3.6, the two key partners are in Indonesia (PT Toyota Astra Motor/TAM) and Malaysia (UMW Toyota Motor Sdn Bhd/UMWT), whereas 21 subsidiaries consist of 4 in Indonesia (1 via TMC, i.e. PT Toyota Motor Manufacturing Indonesia (TMMIN), 1 via TAB, i.e. PT Sugity Creatives, 1 via DMC, i.e. PT Astra Daihatsu Motor/ADM, and 1 under HMT, i.e. PT Hino Motors Manufacturing Indonesia/HMMI), 5 in Malaysia (2 via TMC, i.e. United Motor Works Sdn Bhd/UMW and Assembly Services Sdn Bhd/ASSB, 1 via DMC, i.e. Daihatsu Perodua Engine Manufacturing Sdn. Bhd, 2 via HMT), 2 in the Philippines (Toyota Motor Philippines Corporation/TMP and Toyota Autoparts Philippines Incorporated/TAP), 1 in Singapore (Toyota Motor Asia Pacific Pte Ltd/TMAP or formerly Toyota Motor Management Services Singapore/TMSS), 6 in Thailand (Siam Toyota Manufacturing Co Ltd/STM, Toyota Motor Thailand Co Ltd/TMT, Toyota Auto Works Co Ltd/TAW, Toyota Body Service Co Ltd/TBS, Hino Motor Manufacturing Thailand/HMMT, Toyota Daihatsu Engineering & Manufacturing/TDEM), and 1 in Vietnam (Toyota Motor Vietnam Co Ltd/TMV).

Seisakusho Co. Ltd. Japan (ASJ) as a case in point in which Indonesia hosts 1 of its local affiliate companies, i.e. PT Automotive Fasteners Aoyama Indonesia (AFD), and Thailand hosts 1 other, i.e. Aoyama Thai Co. Ltd. (AFT).

Diagram 3.7: Denso Production Network and Supply Chains in ASEAN



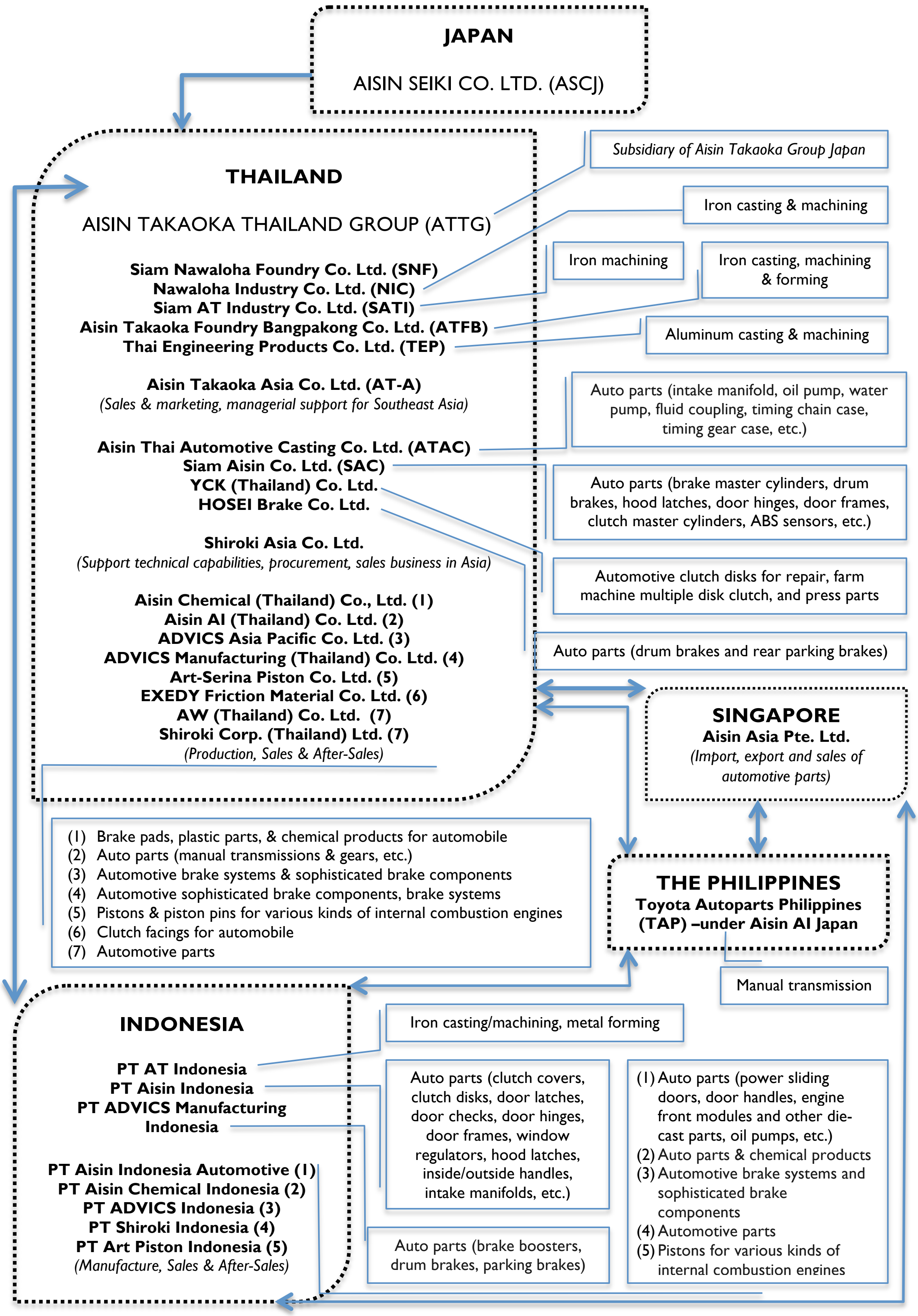
Remarks: DIAT serves as a business administration center for Denso group companies in the Asia and Oceania region performing business planning, accounting, legal, procurement, human resources and personnel training, information system, material engineering, production control and services.
Source: author's assessment, based on DNJP (2017)

In line with Toyota production network in ASEAN, the above Diagram 3.7 recaps Denso Corporation (DNJP)'s production network and supply chains in ASEAN3 countries. As a 1st tier supplier, Denso's products movement or transfer within ASEAN keeps tracks of its major OEMs production activity, particularly of Toyota. It therefore exemplifies a smaller-scale Toyota assembly line, i.e. by applying TPS (Toyota Production System) and its derivative management systems (such as Just In Time (JIT) and Kaizen) in its production system as well as by adjusting to other Toyota's business models.

DNJP (via its major regional subsidiary in Thailand, Denso International Asia Co. Ltd./DIAT) performs coordinating mechanism in division of labor among its subsidiaries in ASEAN3 (DNTH in Thailand, DNMY in Malaysia and DNIA in Indonesia). Thus, strategic decisions on product transfers are made upon considering overall business planning, procurement policy as well as technical aspects of production/manufacturing processes. However, by hosting DIAT, Thailand has been serving as the core hub of Denso production network in the region –similar to what has been initiated by Toyota since 1990 by establishing Toyota regional head quarter in Singapore and optimizing its Thai production facility as its core production hub. Through its 9 subsidiaries/affiliates in Thailand (including DIAT and DNTH), Denso Corporation (DNJP) oversees the region as part of its global production expansion strategy.

In the case of Aisin Seiki Co. Ltd. (ASCJ), 4 ASEAN countries (Thailand, Indonesia, Singapore and the Philippines) host its subsidiaries and affiliates which involve in various iron and aluminum casting and machining works, and conduct manufacture, sales and after-sales of a range of automotive parts. The following Diagram 3.8 illustrates ASCJ's production network and supply chains in ASEAN:

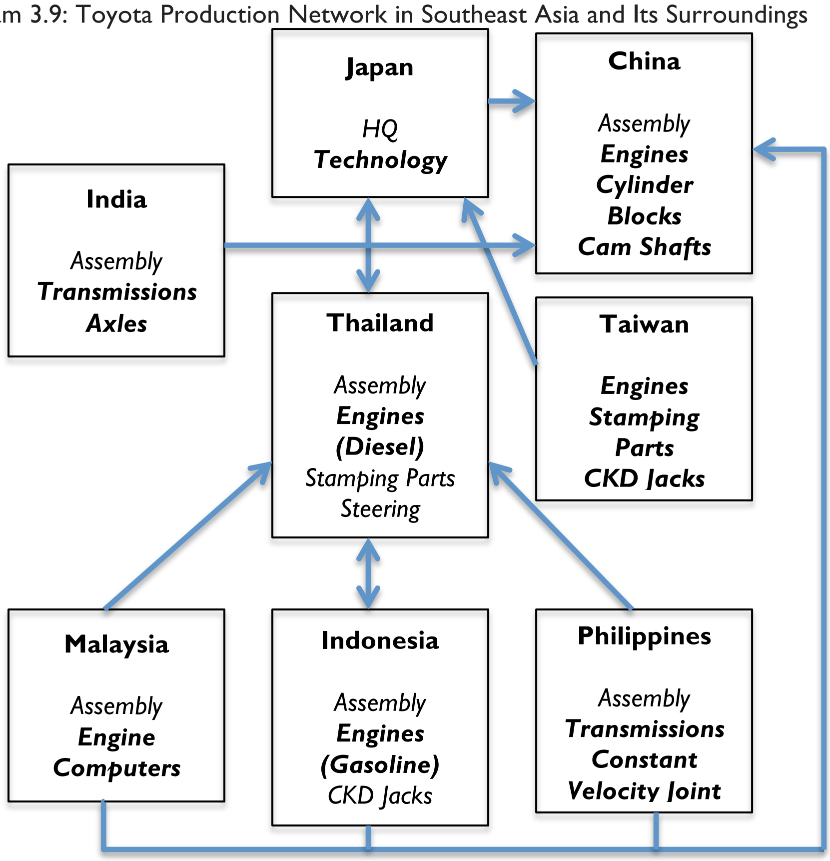
Diagram 3.8: Aisin Seiki Production Network and Supply Chains in ASEAN



Source: author's assessment, based on ASCJ (2017)

Toyota business operations –which have been ensued by major relocations of its production facility in the region since the 1990s— stick typically to the following order of manufacturing stages: (1) Assembly (Car Assembly) at the early stage of Toyota overseas production expansion, (2) Engine Parts Assembly, (3) Casting Engine Blocks (Large Scale), and (4) Parts and Accessories at the later stages. The following Diagram 3.9 illustrates configuration of component and parts transfers and related manufacturing tasks in Toyota production network in Southeast Asia and its surrounding countries/economies.

Diagram 3.9: Toyota Production Network in Southeast Asia and Its Surroundings



Sources: Cheewatrakoolpong, Sabhasri and Bunditwattanawong (2013), as adapted from Dent (2008), and Takeno (interview 2017)
Note: (1) highlighted (bold) activity in each box signifies each host country/economy's specialization in the production network at current condition (2017); (2) lines/arrows indicate movement and transfer direction of components and parts.

Host country/economy's position in the production network that are based on each manufacturing stages has eventually lead to specialization which –in the case of

Toyota operations in Asia— has been developed under Toyota IMV (Innovative International Multipurpose Vehicles) Platform or Project in which ASEAN countries are taken as the core part. The platform was initially launched since the commencement of IMV project in 1990[96]. Under such a platform, Toyota production activity in Thailand has been specialized its manufacturing facility for diesel engines production, whereas Toyota in Indonesia for gasoline engines, Toyota in Malaysia for engine computers, and Toyota in the Philippines for transmission and constant velocity joint (Takeno 2017).

Specialized production in the cases of Toyota Thailand (for diesel engines) and Toyota Indonesia (for gasoline engines) as mentioned previously is part of TNGA (Toyota New Global Architecture) strategy as applied in Southeast Asia for its ASEAN IMV project[97]. As a result, movement and transfer of products/parts and components between Toyota Thailand and Toyota Indonesia have changed in much more two-way traffic (as depicted by the double arrow line in Diagram 3.7) where the two sides have become more and more complementary to each other. IMV platform has been applied for products commonly manufactured both in Thailand

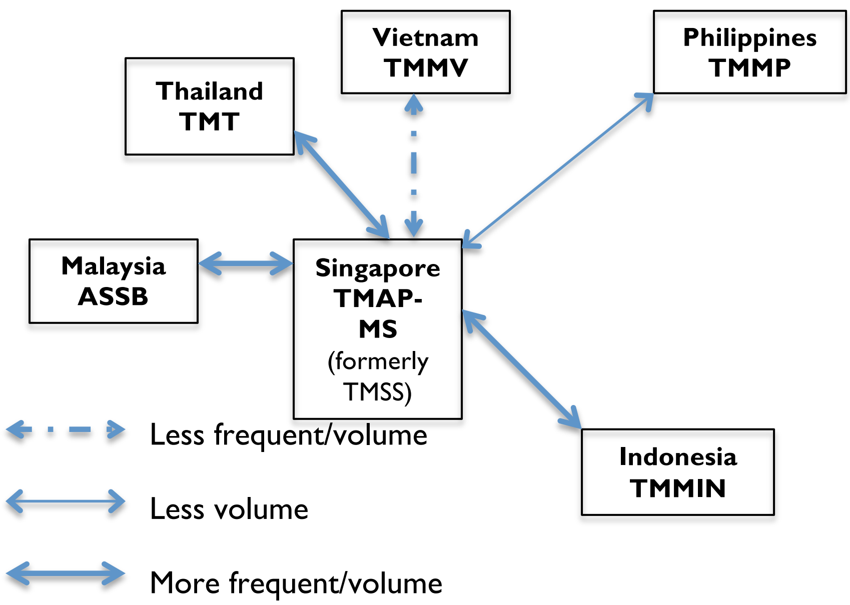
[96] In 1990, responding partly to the ASEAN brand-to-brand complementation (BBC) scheme on the automotive industry under the 1988 BAAIC (Basic Agreement on ASEAN Industrial Complementation), TMC established Toyota Motor Management Service Singapore Pte. Ltd. (TMMS) in conjunction with the company's production expansion in Asia. TMMS is designed to be at the core of Toyota's brand-to-brand parts complementation scheme within the ASEAN region as the need for reciprocal supplies of parts within the region increased. Such a reciprocal parts supply system was created to enjoy tariffs benefits (resulted from ASEAN BBC Scheme under BAAIC) and lower costs through volume effects (economies of scale). The system in turn facilitated rapid expansion of multi-country logistics setups for parts and vehicles known as multi-source parts (MSP) and multi-source vehicles (MSV). In the years that follow, as this system was being developed as a global business, in 2002 TMC set up a project for the international division of roles for vehicles sold exclusively in overseas markets. The project –which was then termed as IMV (Innovative International Multipurpose Vehicles)— has resulted IMV series vehicles (consisting of three types of pick-up trucks, minivan and SUV/sports utility vehicles) and a common platform that is based on such a reciprocal parts supply system (Toyota Global Website: 75 Years of Toyota, 2012).

[97] In these two countries, the market launch of IMV series vehicles began in 2004 as the U-IMV (Under IMV) Project –a joint initiative undertaken with Daihatsu Motor Co. Ltd. for compact IMV series vehicles production and sales of Avanza (or Xenia under Daihatsu brand) in Indonesia— was also kicked off (Toyota Global Website: 75 Years of Toyota, 2012).

(TMT) and Indonesia (TMMIN), i.e. Innova and Fortuner (in MPVs segment) and Yaris and Vios (in Passenger Cars segment). Thus, the platform determines specific types of component and parts relating to those products and its transfers between these two subsidiaries. As the other types of vehicles are manufactured under the same platform, movement of components and parts has also been conducted correspondingly.

With regards to logistics and delivery of products and parts and components among Toyota subsidiaries in Southeast Asia, Toyota Motor Asia Pacific Pte Ltd (TMAP-MS) (formerly Toyota Motor Management Service Singapore Pte. Ltd. or TMSS) has been taken a role as Toyota OHQ (operational head quarter) in the region. It plays a pivotal role by serving as a processing/procurement center for almost all parts and components transferred among Toyota subsidiaries in Southeast Asia. The following Diagram 3.10 illustrates its role and indicative volume of component and parts transfers among Toyota subsidiaries in ASEAN5:

Diagram 3.10: Toyota Logistical Process in ASEAN5



Source: Author's assessment, based on Takeno (2017)

Under such a process/mechanism, cost of delivery and other related logistical costs are optimized by preventing double/multiple costing incurred among subsidiaries. It ensures outbound shipments volume is in the same volume of its inbound one, to and from Singapore (TMSS). Shipments of certain volume of diesel engines and other parts and components from Toyota Thailand (TMT) to other subsidiaries, for example, are in the same volume of shipments of other parts and components from other subsidiaries. TMMS therefore serves as the central logistical and procurement center that is not only covering delivery of products among Southeast Asian subsidiaries, but also delivery between Southeast Asia and Japan, Taiwan, China and sometimes India[98].

3.3. Toyota ASEAN IMV Project

Having described basic features and production network of Toyota and its two key 1st-tier suppliers (Denso and Aisin Seiki) in Southeast Asia as previously presented, this section aims at further elucidating an embedded element of their production networks, i.e. production shifts. The case on Toyota IMV Project in Southeast Asia is offered to provide more detailed description on the movement and transfer of products, components and parts among Toyota, Denso and Aisin-Seiki subsidiaries in the region under the said project. Toyota IMV project in Southeast Asia has its specific historical context as it could be traced back to Toyota operations in Thailand, i.e. when it commenced its first plant (in 1958) for car assembly, engine parts assembly and large scale engine casting blocks (1980s), and

[98] The assessment on Toyota logistics mechanism in Southeast Asia is made based on the interview with Takeno (2017).

finally all parts and components production (1990s). Toyota used those accumulated manufacturing capability at local sites to kick off its IMV project in the region. Toyota IMV project is also an extended version of once "uncompleted" Asian car project endeavored by several Japanese car makers (such as Honda, Toyota, Mitsubishi and Nissan) which was ceased due to Asian monetary crisis of 1997[99].

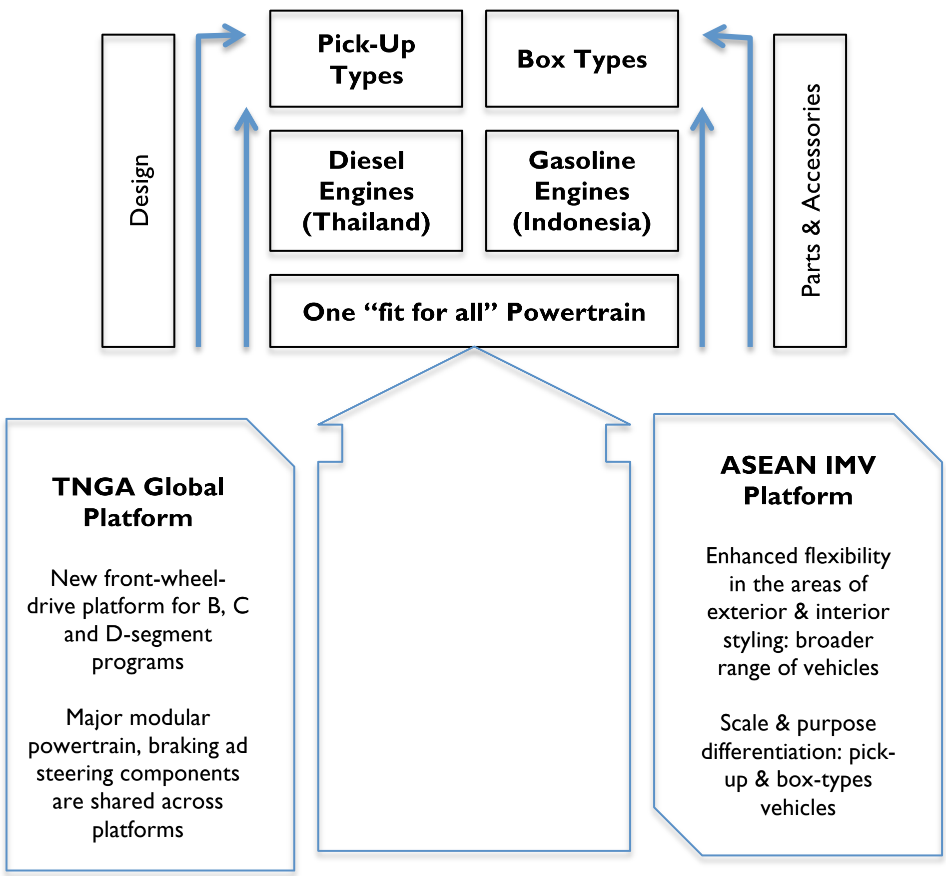
As indicated earlier, the project –whose production and marketing debut in Southeast Asia was marked by the launching of Hilux Vigo (a 1 ton pick-up truck type) in Thailand in 2004 and Avanza (a small MPV type) in Indonesia in 2005[100]— was the pioneer/pilot type of TNGA. Its platform has been the leading model for global TNGA. Southeast Asian car types under Toyota IMV project are developed under the Toyota R-type IMV. This type is one of the 4 car types Toyota developed globally (R-type IMV, Compact Car, Small/Medium Car and Lexus type). Development of Southeast Asian IMV is to include parts and accessories, i.e. by involving car parts makers (1st to lower tiers suppliers).

Toyota IMV project in Southeast Asia aims at creating a universal type of vehicle manufacturing for the region, i.e. by developing a "common platform" that is fitted to variety of car models with identical manufacturing needs. Therefore, core element of the project common platform is a "fit for all type" **powertrain**[101] that is developed to the need of manufacturing of pick-ups (long nose types) and box (short nose

[99] Previously, under Asian car brands, Honda exported its compact car type in October 1996 and also Toyota exported similar car types (especially to India) in 1997 from the two companies Thailand factories/plants.
[100] Launching of cars manufactured under Toyota IMV project was in 2004 (from Thailand plants) and 2005 (from Indonesian plants), exported to global markets.
[101] In a modern automobile, powertrain or power plant (the mechanism that transmits the drive from the engine of a vehicle to its axle) comprises engine (with exhaust system), transmission, drive shafts, suspension, differentials and the wheels. It describes the main components that generate power and deliver it to the road surface. This definition and description is based on, verified and adapted from various sources: Wikipedia: The Free Encyclopedia (https://en.wikipedia.org/wiki/Powertrain), English Oxford Living Dictionaries (https://en.oxforddictionaries.com/definition/power_train) (accessed August 13th 2017), Happian-Smith (Ed) (2002), and Crolla (Ed) (2009).

types) passenger vehicles. Those two vehicle types are therefore composed from the same type of powertrain (which is manufactured in Thailand) and assembled with two types of engines, i.e. gasoline engines (where production center is located in Indonesia) and diesel engines (where production center is located in Thailand).

Diagram 3.11: Platform for Toyota IMV Project in Southeast Asia



Remarks: (1) The image is a Toyota Fortuner powertrain, one of its MPVs type that is based on IMV platform; (2) Toyota car segment programs are in line with the classification by the Commission of the European Union where B refers to "small cars" (normal small size cars, e.g. Sienta, Probox, Vios, Etios, Vitz, Yaris, Starlet), C refers to "medium cars" (universal/small family cars, e.g. Corolla, Prius, Matrix), and D refers to "large cars" (larger family cars with a sufficient level of comfort for rear passengers and improved drive-ability, e.g. Premio, Lexus IS). Meanwhile, Toyota Fortuner is categorized under J segment: "sport utility cars" or SUVs (sport utility vehicles).

Source: interpreted, adapted from and based on Toyota Global Website/TMC-1 (2017), Seng (2016), and Takeno (2017)

The above Diagram 3.11 depicts the IMV platform that has been developed by Toyota in Southeast Asia. As part of TNGA Global Platform (with shared major modular powertrain, braking and steering components), ASEAN IMV platform has an enhanced flexibility in the areas of exterior and interior styling as way to accommodate local preferences for pick-up and box-type vehicles. By so doing, Toyota ASEAN IMV project applies scale and differentiation purpose of localized product specification while benefitting from its shared TNGA global platform.

3.3.1. Accumulating Local Production Capacity

As indicated earlier, Toyota ASEAN IMVs suggest a distinct historical account in the region where Toyota subsidiaries/affiliates (and later its key 1st–tier suppliers) have accumulated capacity of their local manufacturing/production plants. The following Table 3.11 recapitulates manufacture/production capacity of each ASEAN Toyota plant by presenting timeline and specific remarks of its local production activity:

Table 3.11: Timeline of Toyota Local Production in ASEAN

	Activity (Vehicle Types, Starting Year)	Remarks
Thailand	Sales (1957-1962), Production: Assembly-CKD (Corona, Stout, 1964), Production: Assembly-CKD (Corolla, 1972), Production: Assembly-CKD (Hilux, 1975), Production: Stamped Parts (under TAB) (Hilux, Corona, Corolla, 1978), Production: Engines for domestic (under STM) (Diesel and Gasoline, 1989), Production: Cylinder Blocks (under STM) (Pick-Up Trucks, 1994), Production: Engines for export (under STM) (Gasoline, 1996), Production: Preparation and Launch for Asian type Passenger Car (Soluna, 1996 & 1997), Production: Engine (under STM) (Corolla ZZ and Corona, 1997; Camry AZ, 1999), Production: CKD Parts (Hilux, 1998 – transfer from South Africa plant), Production: Full (Hilux, 1998 – transfer from Japan for Australian market), Production: Full (Camry, 1999), Production: Engine (under STM) (Hilux 2KD, 2001), Production: Propeller Shift (under STM) (Pick-up Trucks, 2001), Production: Full (Corolla and Corolla Altis, 2001), Production: Engines (under STM) (NNZ for NBC5 and	▪ Debut sales were undertaken by Toyota Motor Sales Co. Ltd. (TMS) branch in Bangkok until TMT was founded in 1962 for CKD production of Hilux ▪ TMS and TMT merged in 1967 and sales & production were integrated under TMT ▪ TMT 2nd Plant (Gateway) was built in 1996 in addition to the 1st Plant (Samrong) ▪ TMT 3rd Plant (Ban Pho) was built in 2007 ▪ Corona production discontinued in 1999 ▪ Wish production ended in

	1KD for Hilux, 2002), Production: Full (Soluna Vios, 2002), Redesigned Camry and Vios (successor of Soluna), 2002; Wish, 2003), Production: Engine (under STM) (1KD and TR for IMV, 2004), Production: Full under IMV1 and IMV3 for pick-up truck series (Hilux Vigo, 2004), Production: Engine (under STM) (2KD for Hiace and NZ for Yaris, 2005), Production: Full under IMV4 for SUV series (Fortuner, 2005), Production: Full (Yaris, 2006), Production: Full (Complete Redesigned Corolla Altis, 2008), Production: Full under IMV2 for pick-up series (Hilux, 2008), Production: Full (Camry Hybrid, 2009; Prius, 2010).	2009
Indonesia	Sales (1971), Production: Assembly – with 19% local content (LC) (Kijang* 1st Generation, 1977), Production: Assembly – with 30% LC (Kijang 2nd Generation, 1981), Production: CKD-Assembly-Stamped Parts (Full Pressed Body) – with 44% LC (Kijang 3rd Generation, 1986), Production: Assembly-Stamped Parts (Compact Body) – with 53% LC (Kijang 4th Generation, 1997), Production: Assembly (Camry, 1999), Production: Full – under U-IMV Project (Avanza and Xenia, 2003), Production: Full – with 80% LC, IMV5 (Kijang 5th Generation or Kijang Innova, 2004), Production: Full – IMV4 (Fortuner, 2006), Production: Full – under IMV for SUV (Rush and Terios, 2006), Production: Full-CKD (Etios Valco, Yaris, Vios, 2013), Production: Full – with 85% LC, IMV minivan (Kijang 6th Generation or New Kijang Innova, 2014). *Kijang (stands for *Kerjasama Indonesia-Jepang* or literally means Cooperation between Indonesia and Japan) is the Indonesian version of the 1st emerging market MPV initiated in the Philippines by Toyota (Tamaraw).	▪ Sales were undertaken by TAM (TMC local partner) ▪ Production had also been under TAM until 2003 (i.e. when it is renamed to TMMIN which since then take production activity of Toyota in Indonesia, whereas TAM focuses on sales and after-sales activity) ▪ Toyota Casting Plant (under TAM) operation began in 1991, 1st Karawang Plant construction began in 1998 in addition to Sunter 1st Plant (1973) and 2nd Plant (1977) (under TAM), 2nd Karawang Plant is built in 2011, and new 3rd Karawang engine plant is built in 2016 (under TMMIN) ▪ Avanza-Xenia and Rush-Terios production is under ADM
Malaysia	Sales (1967), Production: Assembly-CKD (Corona and Corolla, 1968), Production: Assembly-CKD (Corolla, 1982), Production: Assembly-CKD (Corolla, Camry and Hiace, 1998), Production: Full-CKD (Vios, 2003), Production: Full-CKD – under IMV1 and IMV3 (Hilux, 2005), IMV4 (Fortuner, 2005), IMV5 (Avanza and Innova, 2005).	▪ Debut sales was undertaken under a local distributorship agreement between TMC with Borneo Motors in 1967, then by Champion Motor (a TMC subsidiary) in 1968 until 1973 (i.e. when it was changed to ASSB) ▪ Camry production ended in 2006
The Philippines	Sales (1956-1962), Production: Assembly (Tiara, 1962), Production: Assembly – for 1st emerging market MPV (Tamaraw, 1976), Production: Assembly-CKD (Crown, Corolla, Liteace, 1989), Production: Provisional (TUV-Toyota Utility Vehicle, 1991), Production: Transmission (under TAP) (Type G, 1992), Production: Gear (under TAP) (1993), Production-Joint (under TAP) (CVJ, 1996; Wide-angle CVJ, 2000), Production: Full-CKD – IMV5 (Innova, 2005), Production: Full-CKD (Vios, 2007), Production: Transmission (under TAP) (R-type, 2008).	▪ Debut sales was undertaken by TMS branch in Manila until Delta Motor (a local company) was granted a license to distribute and assemble for the Philippines market in 1962, then TMP was founded in 1988 ▪ TAP was founded in 1992 ▪ Sales division of TMP was transferred to GT Tower in 2002 ▪ TUV & Corolla production discontinued in 2004 & 2007
Vietnam	Sales (1997), Production: Assembly-CKD (Hiace, Corolla, 1996), Production: Assembly-CKD (Camry, 1997; Land	▪ TMV was established in 1995 and started a

Cruiser, 2000), Production: Stamping (2003), Production: Full-CKD (Vios, 2003), Production: Full-CKD – IMV5 (Innova, 2006), Production: Full – IMV4 (Fortuner, 2009).	temporary plant until 1996 ▪ TMV own plant started in 1997 ▪ Sales that was directly managed by TMV began in 1997 ▪ Land Cruiser production ended in 2007

Notes: (1) Overtime, typical stages of Toyota's local subsidiary activity is assembly (i.e. to include CKD), engine parts assembly, stamping and casting engine blocks production, and other parts and components manufacturing; (2) Full production means that those four stages have been acquired which allow local plants to procure almost all parts and components from its own plants and/or adjacent regional plants.
Source: TMC-1 (2017), TMC-2 (2017), TMMIN (2017).

Referring to the above Table 3.11, local production capacity of each subsidiary/plant has been developed along its acquired production stages, from assembly, engine parts, stamping and casting engine blocks, and finally to manufacturing of other parts and components. The Toyota Thailand plants (under TMT and STM) characterize the most advanced production capacity development where all production stages have been acquired. Particular attention is to be put on the ASEAN IMV project full application that was undertaken in 2004-2005. These were also the commencement years of the production of IMV vehicles in the Toyota Indonesia, Malaysia and the Philippines plants. Toyota Vietnam plant started it in 2006.

For its full application in Thailand, IMV1 and IMV3 (for pick-up trucks types) have been taken as the model with Hilux and its variants as the core lineups. In Indonesia and Malaysia, the models taken are IMV4 (for SUVs type) with Fortuner as the leading lineups and IMV5 (for minivans or MPVs types) with Innova and Avanza as the primary lineups. In the Philippines, Toyota has focused on the production of IMV5 model (i.e. for Innova only). While the decisions on IMV model selections for local production were partly based on the domestic and regional market demands and preferences, accumulated production capacity in each plant has also played a major role.

Toyota Thailand experience in initiating the production of and developing locally designed Hilux pick-up trucks (which dates back to the early Toyota years in Thailand) had its first critical mass during its expansion (via TAB) for local manufacturing of stamped parts (commenced in 1978). The second and third critical masses have been acquired through local production of engines and of cylinder blocks and CKD parts (via STM) which commenced in 1989, 1994 and 1998 respectively. Local production of engines for both gasoline and diesel (for pick-up truck types) were initially designed for domestic market, however by 1996 STM has produced gasoline engine for export, then by 1997 it began to produce gasoline engines for passenger cars (Corolla ZZ, Corona and Camry).

Along with Corona and Corolla types, Hilux local production and its local content increased quite significantly thanks to the locally manufactured stamped parts, engines, cylinder blocks and CKD parts. Hilux is peculiarly distinct in terms of its local content (if compared to those two passenger cars type). Reasons are two-folds. First, in the way of its local content was accumulated in which it was acquired in line with the Thai government local content requirement (LCR)[102]. Under this LCR policy, Hilux secured the most dominant production and sales performance with highest local content ratio among the pick-up trucks category. Second, in the way it

[102] Government of Thailand implemented a policy regulating the local content requirement (LCR) of automobile assembly for almost 25 years since 1975 before it was fully abolished in 1999. The policy which is part of rationalized industrial policies had forced car makers to procure auto parts locally. Car assemblers had to achieve local content ratio for certain car types, i.e. pick-up trucks and passenger cars. For passenger cars, the LCR ratio was 25% in 1975-1979, then gradually increased to 30% (1980), 35% (1981), 40% (1982), 45% (1983-1986), 50% (1987), and 55% (1988-1999). For gasoline engine pick-up trucks, the regulation was applied in 1988 with an LCR ratio of 55%, then increased to 65% (1989), before slightly decreased to 60% (1990-1999). The diesel engine pick-up trucks gained the highest ratio since this regulation was adopted for these types in 1990 up to 1999, i.e. 70% (Techakanont 2011).

was manufactured within Toyota ASEAN IMV Project. Hilux represents an accumulated set of local production capacity in its fullest sense where manufacturing structures and expertise are added and expanded overtime.

In a slightly different feature, Kijang Innova in Indonesia suggests an accumulation of local production capacity in resemblance to that of Hilux in Thailand. Manufacture of Kijang[103] which was the Indonesian version of Tamaraw (the 1st emerging market MPV initiated in the Philippines by Toyota) began in 1977 with a 19% local content[104]. Having a successful kick-off of this early MPV type, TAM persistently continued Toyota Kijang production with a focus on gradually increasing its local content in line with the LCR regulation. Local contents of Toyota Kijang have increased drastically (i.e. by reaching to 44%) since the introduction of stamped parts manufacturing in 1986. By then, the so-called "full pressed body chassis" that was implanted in Toyota Kijang indicated the first critical mass of an MPV type local production by TAM.

Production of the 4th generation of Toyota Kijang (1997) –with a more aerodynamic (capsule shaped) chassis and more locally manufactured stamped parts reaching a 53% local content— marked an achievement of TAM and Toyota in Indonesia in further developing locally oriented MPV. It was the Toyota localization's second critical mass in Indonesia. The 3rd critical mass was acquired at the same time as the launch of Toyota ASEAN IMV Project which –in the case of Toyota operation

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[103] Kijang stands for *"Kerjasama Indonesia-Jepang"* which literally means "Cooperation between Indonesia and Japan." It is an early collaborative initiative between TMC and TAM to begin manufacturing locally oriented MPVs by utilization of existing local production capacity and expertise. We shall return to more elaboration on the case of Kijang in Chapter 4.

[104] Following Government of Thailand's measure on LCR, Government of Indonesia began to implement its version of LCR measures in 1976 with a promulgation of an Industrial Minister Decree *(Surat Keputusan or SK Menteri Perindustrian)* No. 307 on the Obligation of the Usage of Local Component in the Assembly of Commercial Motor Vehicles. The measures marked an official end of previous practices on the CBU (completely built-up) motor vehicle importation and a reaffirmation of the CKD (completely knocked down) motor vehicle assembly industrialization which had been introduced since 1969. It was known as a "deletion program" with an ambitious target (and detailed scheduling) of LCR that had to be met by vehicle assemblers. We shall return to detailing these measures in Chapter 5 for an assessment of its policy implications and outlook.

in Indonesia— was applied in its IMV5 type, i.e. the Kijang Innova or the 5th generation of Toyota Kijang launched in 2004 with an observed 80% local content. The production of Kijang Innova marked an end of Toyota Kijang's old platform and chassis, i.e. to be replaced by Toyota IMV platform (see Diagram 3.11) which is also shared by other IMV types such as Avanza and Fortuner. By 2014, Kijang Innova has gained an 85% local content which is in close similarity to Hilux local content ratio in Thailand.

In the rest of Toyota's Southeast Asian sites, i.e. in Malaysia, the Philippines and Vietnam, accumulation of local production capacity is undertaken less comprehensively due to a variety of reasons. In the case of Malaysia, circumstances lingering to the national car policy of Proton[105] had affected Toyota local production activity by focusing more on CKD assembly. In much lesser scale, however, Toyota IMV project in Malaysia was applied for all IMV types since 2005 which was preceded by local production of Vios in 2003. By then, the Malaysian national car of Proton had somewhat been less influential due to declining trends of its domestic sales and as its "sister company" of Perodua (founded in 1993) began to surpass its sales performance. The adoption of AFTA and other regional economic liberalization schemes under AEC had also affected such a performance as competition became more open and much stiffer among OEMs operating in the country.

In the Philippines case, as indicated earlier, Toyota initiated manufacturing of locally oriented MPV which was the 1st type specifically designed for emerging market, i.e. the Tamaraw in 1976. However, unlike its twin type of Kijang in Indonesia, Tamaraw which was then assembled under Toyota local key partner

[105] Government of Malaysia's national car project dates back to 1982, i.e. when the Mahathir Mohamad's administration approved a decision that led to the founding of Proton *(Perusahaan Otomobil Nasional* or National Car Company) in 1983. We shall return to discuss on it more thoroughly in Chapter 5 for its policy implications and outlook.

company (Delta Motors) has been developed as a "basic utility vehicle" (BUV), instead of a future modern type MPV. It has therefore not been the case for Toyota in the Philippines to accumulate production capacity in specific car types such cases as in Thailand (for Hilux) and Indonesia (for Kijang). Rather, as in the cases in Malaysia and Vietnam, accumulation of Toyota local production capacity in the Philippines has been undertaken particularly via its ASEAN IMV Project (i.e. for IMV5-Innova production) which only started in 2005. Similar cases in Malaysia and Vietnam (for Toyota ASEAN IMV Project) have been undertaken since 2005 (in Malaysia for IMV1 and IMV3 – Hilux, IMV4 – Fortuner and IMV5 – Avanza and Innova), 2006 (in Vietnam for IMV5 – Innova) and 2009 (in Vietnam for IMV4 – Fortuner).

3.3.2. Localized Production Processes

Having explored local production capacity accumulated by Toyota in those 5 (five) ASEAN countries, this sub-section presents localized production processes endeavored by Toyota in each country. The processes consists of three parts, i.e. the establishment stage (in which foundation of localized production was set up in the form of assembly activities, i.e. to include CKD and SKD/semi knocked down ones), the critical masses stage (where parts manufacturing was locally initiated in the form of large scale engine, stamped parts and other parts and accessories in-house production), and the finale stage (as Toyota integrated those accumulated activities under its ASEAN IMV Project). Each of those five ASEAN countries experienced different ways in entering and going through those three stages.

Toyota entered in the Philippines and Thailand for sales activities at the very early years, i.e. 1956-1962 in the former and 1957-1962 in the latter. Both countries local partners of Toyota (in the case of the Philippines) and local partners and subsidiaries of Thailand (in the case of Thailand) had been involved in assembly activities (for CKD and SKD) also in similar period of time, i.e. during 1970s and early 1980s. The difference is that, in the case of Thailand, Toyota began for setting up parts manufacturing activities (and was ready to enter critical masses of its production stages) as early as of 1978, whereas in the Philippines parts manufacturing had only initiated in 1992 (i.e. under TAP for Type G transmissions manufacturing). A more than one decade difference would mean a lost decade of the 1980s of the overall automotive production in the Philippines. As Thailand enjoyed large-scale investment of essential automotive parts manufacturing during 1980s, the Philippines had misplaced them and only began to regain in the early 1990s.

In other ASEAN countries, production paths undertaken by Toyota have been quite similar to the ones applied in Thailand. The most resembled case is Indonesia where critical masses stage of production started in 1986 marking manufacturing of stamped parts for the production of the 3rd generation of Toyota Kijang. In this Indonesian case, however, localized casting plant and engine production had not been the case until 1991 (i.e. when TAM operated its first casting plant) and much later in 2011 (i.e. when TMMIN kicked off its newest engine production facility). In Malaysia, Toyota had not put its focus on large-scale parts manufacturing (especially for lower vehicle body parts such as engine, powertrains and other related parts). Instead, it has made Malaysia as the bases for manufacturing of upper vehicle body parts, especially for the electrical ones. In Vietnam, Toyota has remained in its CKD and SKD assembly activities, whilst recently in 2003 it started stamping parts manufacturing under its ASEAN IMV Project.

The following Table 3.12 recaps and maps out those Toyota localized production processes in the five ASEAN countries:

Table 3.12: Toyota Localized Production Processes in ASEAN5

	Prelude	Stage 1: Establishment (CKD Assembly)	Stage 2: Critical Masses (Large-Scale Parts Manufacturing)	Stage 3: Finale (ASEAN IMV Project)
Thailand	Operation began in 1957: sales and marketing subsidiary, Production began in 1964 (assembly)	1960s (Corona), 1970s (Corolla and Hilux)	1970s (Stamped Parts for Hilux, Corona and Corolla), 1980s-present (Casting-Cylinder Blocks and Engine for Hilux and Soluna), mid 1990s-early 2000s (Pre-IMV: Soluna and Vios)	2004-present (IMV1 and IMV3 – Hilux Vigo, IMV4 – Fortuner, and IMV5 – Innova), 2008-present (IMV2 – Hilux)
Indonesia	Operation began in 1971: sales and marketing partnership with TAM, Production began in 1977 (assembly)	1970s-1980s (Toyota Kijang 1st – 3rd Generation), 1990s (Toyota Kijang 4th Generation)	1980s (Stamped Parts for Kijang 2nd and 3rd Generation), 1990s (Casting-Engine for Toyota Kijang 4th Generation and others), 2003-present (Pre-IMV: U-IMV for Avanza and Xenia)	2004-present (IMV4 – Fortuner), 2006-present IMV5 – Toyota Kijang Innova, IMV4 – Rush and Terios)
The Philippines	Operation began in 1956: sales and marketing partnership with Delta Motors, Production began in 1962 (assembly)	1960s (Tiara), 1970s (Tamaraw), end of 1980s (Crown, Corolla and Liteace)	Early and mid 1990s-present (Casting-Type G Transmission, Gear, CVJ and wide-angle CVJ Joint)	2005-present (IMV4 – Fortuner), 2007-present (Vios), 2008 (R-type Engine)
Malaysia	Operation began in 1967: sales and marketing partnership with Borneo Motors, Production began in 1968 (assembly) underTMC subsidiary (Champion Motor/ASSB)	End of 1960s (Corona), Early 1980s (Corolla), End of 1990s (Corolla, Camry and Hiace)	End of 1990s and Early 2000s (Electrical Parts), 2003 (Pre-IMV: Vios)	2005-present (IMV1 and IMV3 – Hilux), IMV4 – Fortuner and IMV5 – Avanza and Innova)
Vietnam	Operation began in 1995: production	1996-present (Hiace,	2003 (Stamping for Pre-IMV/Vios)	2006-present (IMV5 – Innova), 2009-

under a temporary plant with TMC subsidiary (TMV), and sales began in 1997	Corolla), 1997-present (Camry), 2000-2007 Land Cruiser)		present (IMV4 – Fortuner)

Source: author's assessment

3.4. Recaps on Production Shifts and Localization of Production

The following Table 3.13 offers summary of previous assessment on the production shifts and localization of production of Japanese automotive firms operating in Southeast Asia (as particularly represented by Toyota operations in 5 hosting ASEAN countries where the company's operations are mainly located).

Table 3.13: Toyota in Southeast Asia, Features of Production Shifts and Localization of Production

Host	Major Features	Remarks
THA	▪ IMV Project: Production of Hilux pickup trucks and Fortuner SUVs (Sport Utility Vehicles) ▪ Development of a compact car platform: Production of Yaris hatchback and Vios sedan (until 2013) ▪ Production of Camry and mid-level sedan Corolla ▪ Establishment of an R&D facility (in 2003)	▪ Developed based on a similar platform and directed at emerging markets (ASEAN and the Middle East), but Hilux is also exported to Europe and Australia ▪ Directed at emerging countries, and by using this platform, versions for Europe, North America, and Japan have slight differences in design and specifications ▪ Only exported within ASEAN ▪ Local engineers develop solutions for tough road conditions in ASEAN and other emerging countries
IDN	Under Toyota Brand ▪ Production of IMV models: Fortuner SUV and Innova multipurpose vehicle (MPV) ▪ Production of all Vios models	▪ Exported within ASEAN and to the Middle East ▪ Used to be imported from Thailand
	Under Daihatsu Brand ▪ Production of popular compact MPV Xenia and its sister model, Toyota Avanza. ▪ Production of compact sedan Ayla and its sister model Toyota Agya (since 2013) ▪ Assembly of Terios SUV and the rebadged version of Toyota Rush	▪ With the exception of the brand logo, these two models are identical, Avanza is exported to ASEAN, South Africa, and some countries in the Middle East ▪ These two vehicles are also identical, and Agya is exported to the Philippines (from February 2014), both vehicles conforms to the Indonesian government LCGC (low cost green car) policy ▪ Daihatsu trails Toyota in terms of market share, but because it is part of the Toyota group, Daihatsu produces and sells main models in cooperation with Toyota
MYS	Under Daihatsu Brand ▪ Co-production with Perodua (Daihatsu rebadged sedan)	▪ Sold domestically for Malaysian market
PHI	▪ Production of Vios and Innova MPV	▪ Much smaller scale (than in Thailand and Indonesia), sold for domestic market only
VNM	▪ CKD assembly for IMV models and Corolla, Camry and Vios	▪ Mainly for domestic market

Source: Kobayashi (2014), TMC 2 (2017)

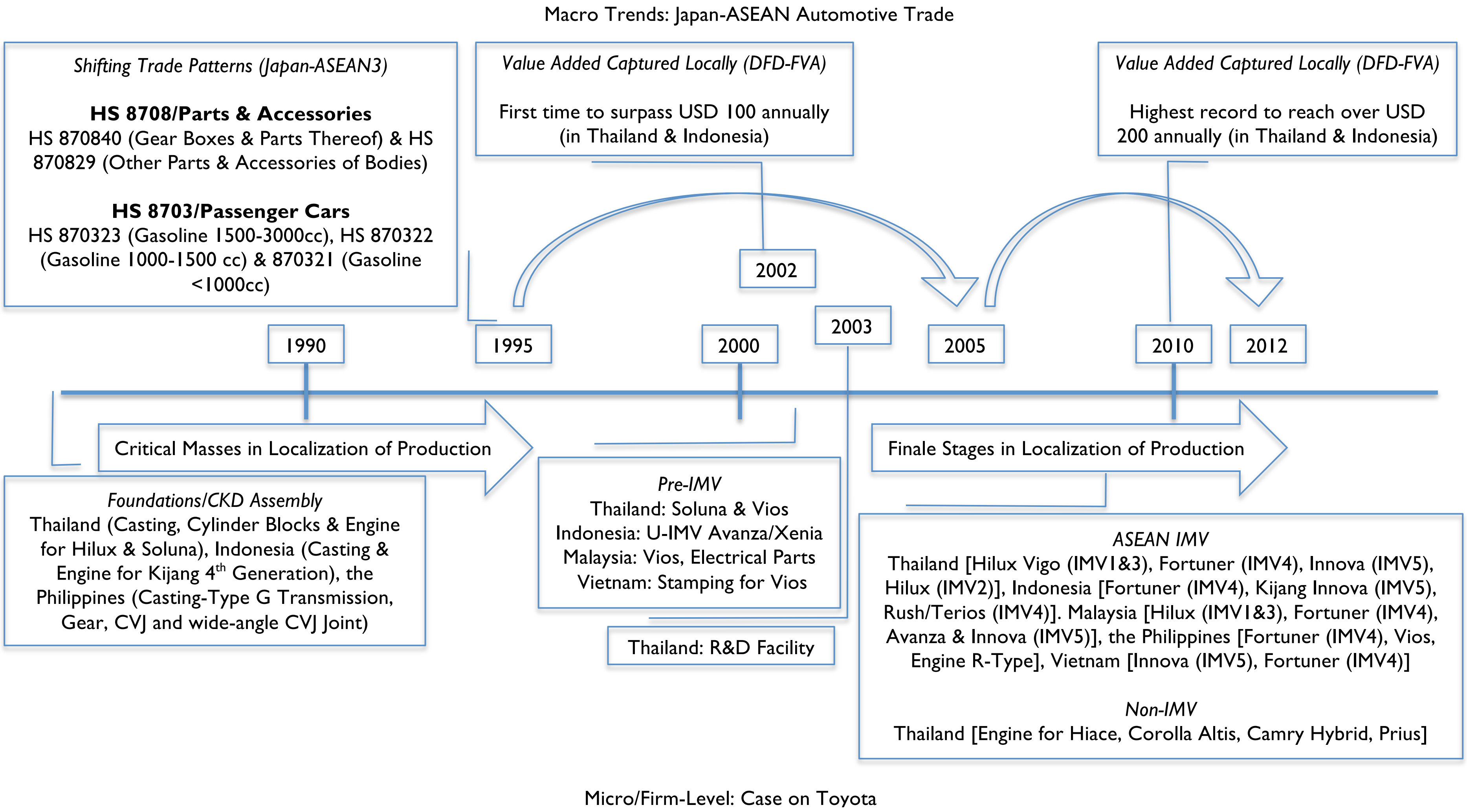
3.5. Timeline of Regional Production Network Formation: Case of Toyota Production Shifts and Localization of Production in Southeast Asia

This section offers a stylized summary of typical Japanese automotive production network formation in Southeast Asia as exemplified by Toyota's experiences in its production shifts and localization of production in the region. It is presented by referring to the "macroscopic time series" (available in and based on the analysis conducted on trade patterns (1988-2016) and trends in value added (1995-2011) of Japan-ASEAN automotive trade, as previously presented in Chapter 2) as well as the "microscopic outline" (available in and based on the assessment of selected firms under Toyota group operation in Southeast Asia, as have just been presented in the earlier parts/sections of this Chapter3).

The macroscopic time series cover highlights in the Japan and ASEAN3 trade in especially these 2 key automotive products, HS 8703/passenger cars and HS 8708/automotive parts and accessories[106], and trends in value added of Japan-ASEAN automotive trade under SITC C34T35. Meanwhile the microscopic outline includes key milestones in the case of Toyota operations in Southeast Asia indicating major transfer or movement of key automotive products (production shifts) and efforts by the company and its 1st tier suppliers, local subsidiaries and partners in localizing manufacturing activities (localization of production). In outlining the milestones of production shifts and localization of production, Toyota ASEAN IMV project is the main reference.

[106] Please refer to elaboration and discussion in Chapter 2 (Section 2.3.4 and 2.3.5, especially under Fig. 2.13, 2.14, 2.15 and 2.16) for the shifting patterns of Japan-ASEAN3 trade in these two key product categories.

Diagram 3.12: Timeline of Macro Trends of Japanese Automotive Trade and Toyota Production Network Formation in Southeast Asia



Chapter 4

Japanese Automotive Value Chains in Southeast Asia:

Case on Toyota Upgrading Strategy and Local Productive Capacity

As outlined and assessed in the previous chapter, Japanese automotive production networks in Southeast Asia has impacted on the production shifts and localization of production activities in the host countries of particularly the ASEAN5 (Indonesia, Malaysia, the Philippines, Thailand and Vietnam). In the case of Toyota, vibrant production shifts and deepened manufacturing localization in the host countries are centered around the corporation's ASEAN IMV Project. Toyota (along particularly with its key 1st tier suppliers, i.e. Denso and Aisin Seiki) manages to go through activities which reflect accumulating processes of localized production and regional supply chains. The processes are spanned across the value chains that have been developed through combined activities of both in green and brownfield FDIs, regional procurement and supply chains, locally developed research and development (R&D) centers and reinforced subsidiaries and local partnerships.

Resulted from deepened localization of manufacturing processes and vigorous production shifts, those accumulating production and business activities of Toyota, Denso and Aisin Seiki (along with their subsidiaries and local partners in Southeast Asia) have led to value chains upgrading within and along Toyota production network. Areas of upgrading include manufacturing facilities and processes, product development, R&D and design, sales, after-sales and after-market activities. Served as one of Toyota global major platforms, the ASEAN IMV Project has led to enhanced product specification and progressive vehicle design engineering at local manufacturing sites (with more and more locally-developed car specification and types).

Under the Toyota ASEAN IMV project, engine casting, machining and stamping have been more locally undertaken (by Toyota subsidiaries and partners particularly in Thailand, Indonesia, and the Philippines), whilst more parts and components and automotive electronics module products are locally manufactured (by particularly Toyota 1st-tier suppliers subsidiaries, e.g. particularly Aisin Seiki and Denso, in Thailand, Indonesia, Malaysia, and the Philippines). Those production activities have relied on standards, design engineering and specified needs which are locally and regionally developed. Toyota's R&D and Design –set up adjacent to Toyota Thailand manufacturing plants and facilities— has been undertaken in collaboration with local institutions, and being utilized internally for information and staff exchanges among Toyota subsidiaries and partners in Southeast Asia. Denso's in-house engineering design facilities are available inside plants or manufacturing sites managed by each Denso subsidiary in ASEAN.

Although post-production activities have been the areas of expertise conducted by Toyota local partners, these areas have also been subject to collaboration involving not only Toyota as a lead firm, but also its subsidiaries, especially in the Philippines, Thailand, Indonesia and Vietnam. Toyota subsidiaries in these countries have directly or indirectly been involved in marketing, such as for commercial packages, merchandises, brand management, and after-sales activities, such as for educational purposes, automotive clubs activities and research, particularly in the past 15 years. Denso and Aisin Seiki's after-market sales which valued substantially have driven these two companies to conduct bold marketing activities and brand management among their subsidiaries in ASEAN, i.e. in collaboration with Toyota local partners as the main users/clients of after-market parts and components (often as the sole agent or dealer).

With such deepened localization of manufacturing processes and production shifts that spanned across the pre-production, production and post-production stages, the Toyota case represents typical Japanese automotive value chains operating in Southeast Asia. It suggests that TMC serves as a lead firm in a conventional hierarchical network (see Box 4.1 below).

Box 4.1: Hierarchical Automotive Production Network: Case on TMC

In the automotive sector, lead firms have a common tendency maintaining and moving upward to hierarchical network structure. This has been evidenced particularly in the areas of design, R&D and manufacturing (i.e. in assembly) (Watanabe 2015; Kohpaiboon, Tanaka, Sapta, Pongoh 2016). The 1st tier suppliers have mostly served the captive roles in the chains. Companies such as Denso Corporation and Aisin Seiki are few instances of 1st tier captive suppliers that have been serving lead automotive firms such as Toyota Motor Company (TMC). The 2nd tier, 3rd tier suppliers and so on are mostly relational and modular ones, while almost none performs the market network type (Watanabe 2015). Being subsidiaries/affiliates of the lead firms, local partners (which in most cases are local lead firms/conglomerates) tend to serve hierarchical roles in governing the value addition in some upstream-manufacturing activities for automotive sector. Most local partners in automotive sector are active in downstream (especially in logistics and marketing) activities, i.e. by benefitting from their hierarchical governance value chain type.

Apart from TMC robust global corporate profile and stable financial performance that is aspired to "making ever better cars", intra-firm coordination and inter-firm partnerships have been conducted via joint ventures and subsidiarity with local partners, and solid business relations with suppliers, particularly at the 1st and 2nd tiers (Watanabe 2015, Mitzuta, Okabe, Tanaka, Sapta, Pongoh, Prasetiyani 2016). In terms of upstream value chains activities, Toyota case offers expansion of manufacturing sites, introduction and application of self-reliance mechanism for ensuring product quality (i.e. by world-widely applied, standardized instruments and procedure, and further implementation of low cost automation machineries). Toyota downstream value chains activities incorporate mobilized and active local partners, especially in the area of personnel training or human resource development, after sales services and brand management. With such value chains activities, value added-ness in the case of Toyota is defined in terms of its both upstream and downstream activities (for the lead firm), more on upstream and less on downstream (for suppliers), and less on upstream and more on downstream (for local partners/subsidiaries).

The remaining content of Chapter 4 is therefore presented in line with the following objectives. By emphasizing the company's upgrading strategy and local production capacity in Southeast Asia, it assesses the structure of Toyota value chains representing typical regional value chains of Japanese firms operating in the region. The assessment is based on the strategies of Toyota and its major 1st-tier suppliers (Denso and Aisin Seiki) in upgrading and localization of production that are implemented in the region. Consequently, this chapter also aims at assessing local production capacity by having specific reference to a couple of its essential aspects, i.e. in the formation/accumulation of manufacturing capacity and technical skills. Formation of manufacturing capacity at local sites is observed by presenting comparative cases on *Kijang* in Indonesia and *Hilux* in Thailand.

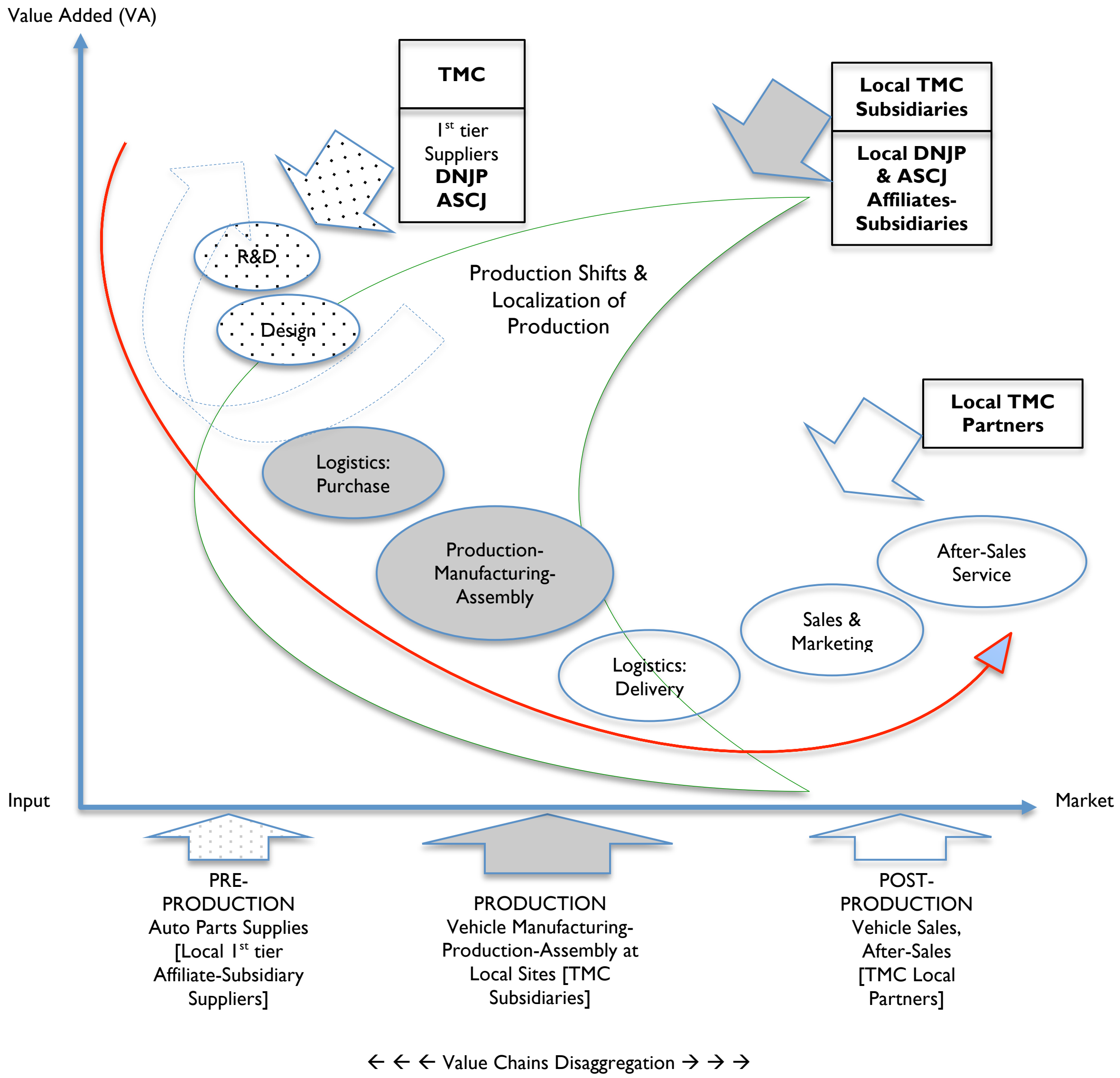
Based on those objectives, the content of Chapter 4 is outlined as follows. It consists of three main sections. Toyota value chains structure in Southeast Asia is to be presented in the first section, i.e. to offer general description and systematic techniques on how the company establishes its overall value chains structure along its regional production network. It is under such a structure that the second section of this chapter presents the upgrading and localization of production strategy of Toyota Group in the region. Given its central role in the company's regional value chains, upgrading and localization of production strategy of Toyota has also facilitated formation and accumulation of manufacturing capacity and technical skills at local sites. The last section of the chapter therefore offers comparative cases in those technical formation and accumulation by presenting, as previously indicated, comparative cases on manufacturing capacity formation/accumulation of *Kijang* (in Indonesia) and *Hilux* (in Thailand).

4.1. Toyota Value Chains Structure in Southeast Asia

Referring to the structure and spatial linkages of Toyota Production Network in Southeast Asia (as previously described in Chapter 3/Diagram 3.6), TMC –along with its suppliers, local partners and subsidiaries— undergo efforts to capture value added (VA) in the following typical stages: pre-production (i.e. research, development (R&D) and design), production (i.e. logistical procurement and supply of parts and component, manufacturing and assembly) and post-production (i.e. final products logistics and delivery, sales and marketing, after-sales services). As also discussed in Chapter 1 (in Section 1.3.3. Adopting GPN 2.0 Framework), the stages represent a "skewed" smiley curve depiction of Toyota value chains disaggregation in the region where value added is captured more at the pre-production stage (which mostly taken place in the home country) than the actual and post-production ones (which have mostly been shifted and localized in the host countries).

Such a "skewed" smiley curve of Toyota value chains in Southeast Asia signify the importance of production shifts and localization of production in the region's automotive industry whose further effects are depicted in the following Diagram 4.1. Pre-production stage is preoccupied mainly by TMC and its 1st tier suppliers (Denso/DNJP and Aisin Seiki/ASCJ) involving mostly capital-intensive R&D and design activities with large amount of accumulated knowledge, technical know-how and technology. This provides the most value added (VA) captured if compared to the remaining production/post-production processes up to final products consumption. Production shifts and localization of production are minimally achieved in this particular stage. The pre-production stage hence offers the least VA captured at local manufacturing sites if compared to production and post-production stages.

Diagram 4.1: Effects of Production Shifts and Localization of Production on Toyota Value Chains in Southeast Asia



Legend:

Overall VA Trend

Pre-Production VA Trend

Localized Production VA Capture

Source: author's assessment, adapted from Shih (1996), Gereffi (2016), Mudambi (2008), Rabellotti (2014), Ye, Meng & Wei (2015).

A number of local production sites of both TMC subsidiaries and its 1st tier suppliers (particularly DNJP local affiliates and subsidiaries), however, have been equipped with facilities for limited and localized R&D and design activities. TMC local manufacturing sites located at its subsidiaries in Thailand, Indonesia and the Philippines are mostly equipped with R&D and design facilities (Watanabe 2016, Sapta 2016, Iwadare 2016). In the Thailand case, the facilities have been linked to and conducted in collaboration with local automotive research and training centers, such as Thailand Automotive Institute (TAI) and Thai-Nichi Institute of Technology (TNI) (Limjeerajarus 2016, Kohpaiboon 2016, Techakanont 2016, Jirathiyut 2016). Denso local manufacturing sites in Thailand, Indonesia and Malaysia have also developed in-house R&D and design center for product development (DNJP 2017, DIAT 2017, DNTH 2017, DNMY 2017, DNIA 2017). Such trends of limited application of R&D and design at local manufacturing sites have been one of the highlighted features in TNGA local application (Takeno 2017).

Production shifts and localization of production have been mostly performed and accomplished during the production stage. Toyota production stage in Southeast Asia represents series of core tasks undertaken by Toyota Group/TMC companies, their specialized divisions, 1st tier suppliers (especially Denso and Aisin Seiki), TMC local partners (along with their local networks), TMC, Denso and Aisin Seiki local subsidiaries/affiliates, and a large number of lower-tier suppliers. Toyota Production System (TPS) has been at the heart of such long production processes and is the main reference for optimizing manufacturing costs, lead time and lean production (Just in Time/JIT on pull system, continuous flow processing, takt-time) and efficiency at all production management lines. In TPS, as value added (VA) is incurred in efforts to reduce unnecessary works/waste *(muda)*, unstable or fluctuating things *(mura)*, overload/overburden or overwork condition *(muri)*, locally-captured VA have been mostly intangible but with significant effects on overall reduced production costs and more efficient manufacturing processes (Takeno 2017 and Tangkas 2009).

As also shown in the above Diagram 4.1, under Toyota global strategy, post-production activities have been collaboratively undertaken and arranged by TMC and its local partners and subsidiaries/affiliates. This stage covers wide areas of activities, ranging from logistical delivery, marketing and sales of final products and after-market products to after-market services (which include advertisement and various brand awareness programs, consumer and public relations). Local partners and subsidiaries/affiliates play a crucial role in formulating, initiating, executing and more importantly maintaining those activities. TMC long and robust relations with them have contributed to value added (VA) being created in this particular stage. Locally captured VA in the post-production stages has therefore been typically performed as inseparable part of the production stages indicating discrete relations between TMC and its local subsidiaries and partners.

In the next sub-section, in light of such a redefined and "skewed" value chains curve, a more detailed assessment is offered to review how Toyota value chains in Southeast Asia are operated beyond the conventional smiley curve model. The assessment is based on GVC spatial modeling[107] covering not only intra-firm level production chains, but also inter-firm ones which transcends and crosses national borders via regional production networks. As previously indicated in Chapter 1 (see the sections on Literature Reviews and Applying the Framework), the following

[107] This particular modeling embarks from a reasoning that positions of home and host countries in the GVCs (i.e. in terms of backward and forward linkages of the chains) affects how values are distributed and how the smiley curves are shaped overtime. See detailed reviews on the works of Mudambi (2008), Koopman et al (2010) and Banga (2013) for further elaboration on the model in Chapter 1 (on the sections of Literature Review and Applying the Framework). Japanese automotive value chains in Southeast Asia and its smiley curve are hence assumed as shaped in line with the changing positions of backward and forward linkages of key industries/industrial sectors in both home (Japan) and host (ASEAN) countries automotive production network.

works are employed, i.e. Banga (2013) on how to measure global value chains/GVCs, Koopman et al (2010) on how to trace value added in global production chains, Ye, Meng & Wei (2015) on how to measure smiley curves in GVCs, Mudambi (2008) on how to locate value chains disaggregation, and Escaith (2013) on how to measure benefit gains and distributional value added rate.

Referring to the above-mentioned GVC spatial modeling, Toyota value chains in the region are structured in accordance with the following flows of argument. Toyota represents typical Japanese automotive firms operation and production network in Southeast Asia with a significant share of home country participation in the regional automotive value chains which also implies significant portion of forward linkages (much higher DVA/domestic value added) and relatively small portion of backward linkages (lower FVA/foreign value added)[108]. The larger DVA portion a country has, the larger share of medium and high tech manufacturing it has, which implies that Toyota's home country (Japan) is dominantly adept to medium and high tech manufacturing and that Toyota's host countries (ASEAN) is less adept to such medium and high tech manufacturing[109]. Within Toyota production network in Southeast Asia, intra and inter-firm trade (for production procurement activities and supply chains) represents decomposition of exports which entail DVA and FVA that is created via pre, during and post-production activities among Toyota Motor

[108] Referring to Banga (2013), in the case of Japan and ASEAN, home and host countries asymmetrical participation in the GVCs (i.e. in terms of share in total value added created by GVCs) is existed where (as of 2013) Japan captured 4.5% (with share in forward linkage reached to 6.1% and share in backward linkage is only up to 2.8%), while the ASEAN5 (Thailand, Indonesia, Malaysia, Singapore and the Philippines) captured less than 1% each.

[109] Referring also to Banga (2013), in the case of Japan and ASEAN, home and host countries also differ in shares of low tech manufacturing in total foreign value added (FVA) in gross exports where (as of 2013) Japan's share was approximately 2%, while average share of ASEAN countries was 20%. Japan's share of medium and high tech manufacturing in total FVA therefore was up to around 98%, and its ASEAN partners had around 80% on average.

Corporation/TMC (as principal or lead firm) in and its 1st-tier suppliers in the home country and their local subsidiaries and partners in the host countries[110].

The following sub-subsections (4.1.1.1 to 4.1.1.3) offers further assessment on Toyota value chains structure in the region, i.e. by identifying: (1) DVA and FVA structure (referring to Ye, Meng & Wei (2015) who macro-empirically measure the smiley curve of Japanese automotive export value chains (i.e. in terms of DVA) and of foreign participants in the Japanese automotive value chains (i.e. in terms of FVA); (2) Locational structure (referring to Mudambi (2008) who disintegrate value chains based on their locational structure); and (3) Distributional structure (referring to Escaith (2013) who measure distributional impacts of value added rate).

4.1.1. Value Added Structure

The following Diagram 4.2 presents the structure of DVA (Domestic Value Added) [111] and FVA (Foreign Value Added) [112] of Toyota Group operations in Southeast Asia. Referring to Ye, Meng & Wei (2015), changing position of key industrial sectors that link to automotive production network is depended upon value added rate (the Y axis) and distance to consumer (the X axis). The V-shape smiley curves have been identified in the cases of: (1) value chains for Japanese

[110] Based on Koopman et al (2010), decomposition of gross exports for both home and host countries are conceptually performed as follows. Gross exports are decomposed into domestic value added (DVA) and foreign value added (FVA). DVA is then decomposed as: (1) direct value added of exports (consisting of exported in final goods and exported in intermediate goods absorbed by direct importers), (2) indirect value added of exports (in the form of exported in intermediate goods re-exported to third countries), and (3) exported in intermediate goods that return home. FVA is decomposed and become other countries DVA in intermediates. Trends of both direct value added exports DVA and indirect value added exports DVA, and FVA of Japanese automotive trade with key Southeast Asia partners (which are presented in details in Chapter 2) affirm those decomposed features of Japanese firms intra and inter-firm trade in its exportation for parts and components transfer/procurement among lead firms/principal OEMs, 1st–tier suppliers and their local subsidiaries and partners.

[111] DVA is domestic value added embodied in foreign final demand (FFD-DVA).

[112] FVA is foreign value added embodied in domestic final demand (DFD-FVA).

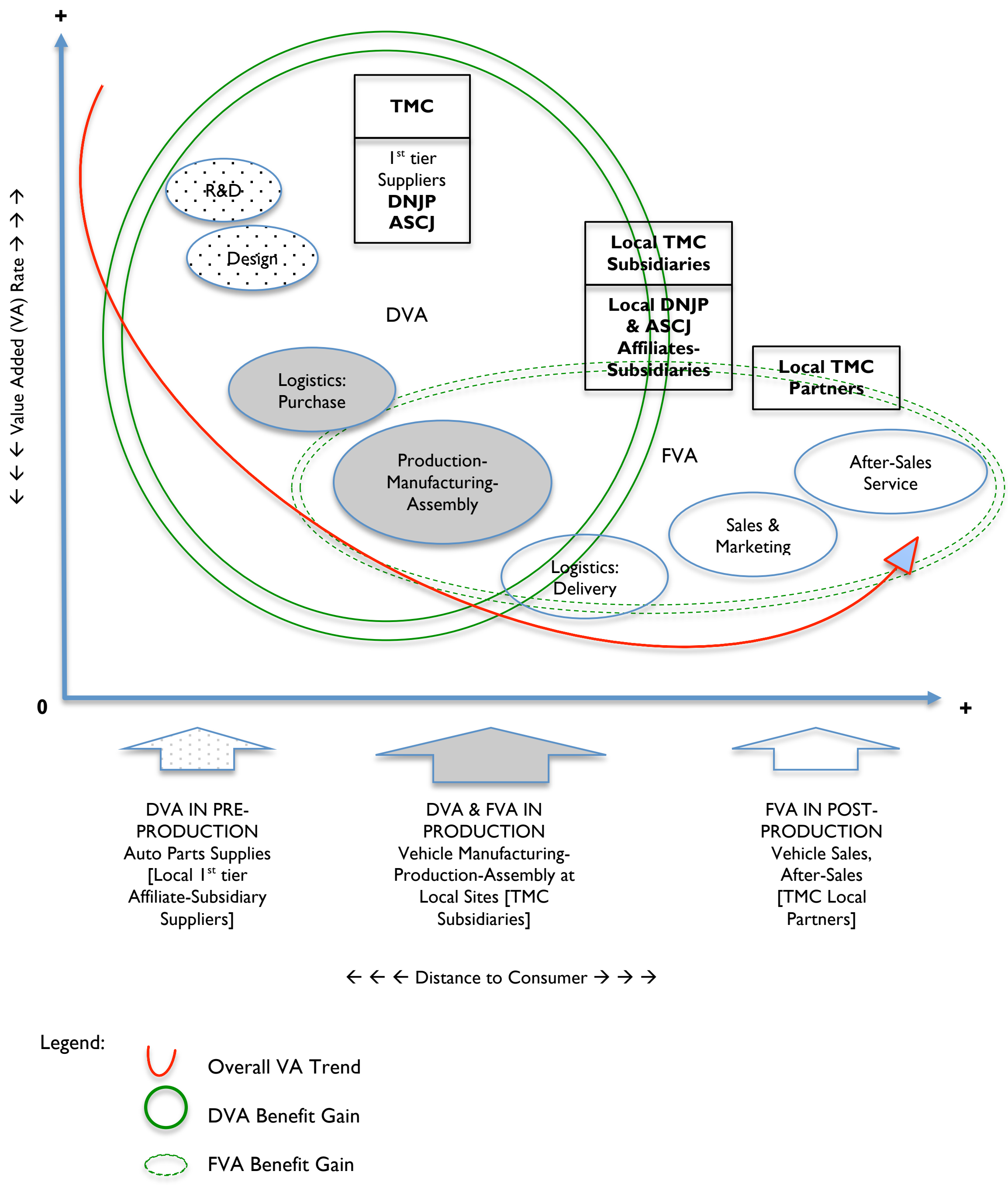
automotive exports (signifying DVA values/benefit gains and trends)[113], and (2) foreign participants in the Japanese automotive value chains (signifying FVA values/benefit gains and trends)[114].

As shown in Diagram 4.2 and referring to Ye, Meng & Wei (2015), there have been much more DVA benefits gains than FVA ones. TMC and its 1st tier suppliers (Denso and Aisin Seiki) create value added through DVA benefit gains which are captured mostly in the pre-production stage and some during the production stage. These DVA benefit gains are also shared by their local subsidiaries and affiliates in Southeast Asia. Meanwhile local TMC partners who solely undertake activities in the post-production stage capture value added through FVA benefit gains that are also shared by local TMC and 1st tier Suppliers (Denso and Aisin Seiki) affiliates and subsidiaries.

[113] According to Ye, Meng & Wei (2015), in the case of Japanese automotive exports value chains (measuring DVA values and trends), the following features illustrate overtime changes in the chains smiley curves for the year 2005 and 2011. The 2011 V-shape smiley curve looks much deeper and wider than that of 2005 indicating that value chain for cars produced in Japan and consumed abroad has more production stages on average than the pre or post-production ones and that more intermediary (including imported) inputs are required than primary ones in the process of producing a unit of car. Overtime (between 2005 and 2011), Japanese large automotive firms/OEMs have expanded their benefit gains (through DVA values) for approximately twice as much. Japanese domestic industries were the most benefitting participants in the pre-fabrication (pre-production) stages of the value chain for both years (2005 and 2011). However, differences in value added rates across domestic industries increased remarkably as the value added rate for most domestic manufacturing industries decreased between 2005 and 2011. The most likely reason of such changes was the competitive pressure from foreign participants in the pre-fabrication stage of this value chains, e.g. in chemical and electrical and optical equipment industries, which have involved in the Japan auto value chains with a relatively low value added rate, making them more competitive than equivalent industries in Japan should the price of intermediate inputs and technology is the same.

[114] Referring to Ye, Meng & Wei (2015), in the case of foreign participants in the Japanese automotive value chains (measuring FVA values and trends), the following features illustrate changes in the chains smiley curves for the year 2005 and 2011. For both years, the V-shape smiley curve for foreign participants in the Japanese automotive value chains (FVA) looks even much deeper and wider than those curves of the value chains for Japanese auto exports (DVA). It suggests that FVA offers much more varied foreign participants who capture value added than those of offered through DVA (for domestic participants) albeit with much lesser values/benefit gains.

Diagram 4.2: DVA/FVA[115] Benefit Gains and Trends of Toyota Operations in Southeast Asia



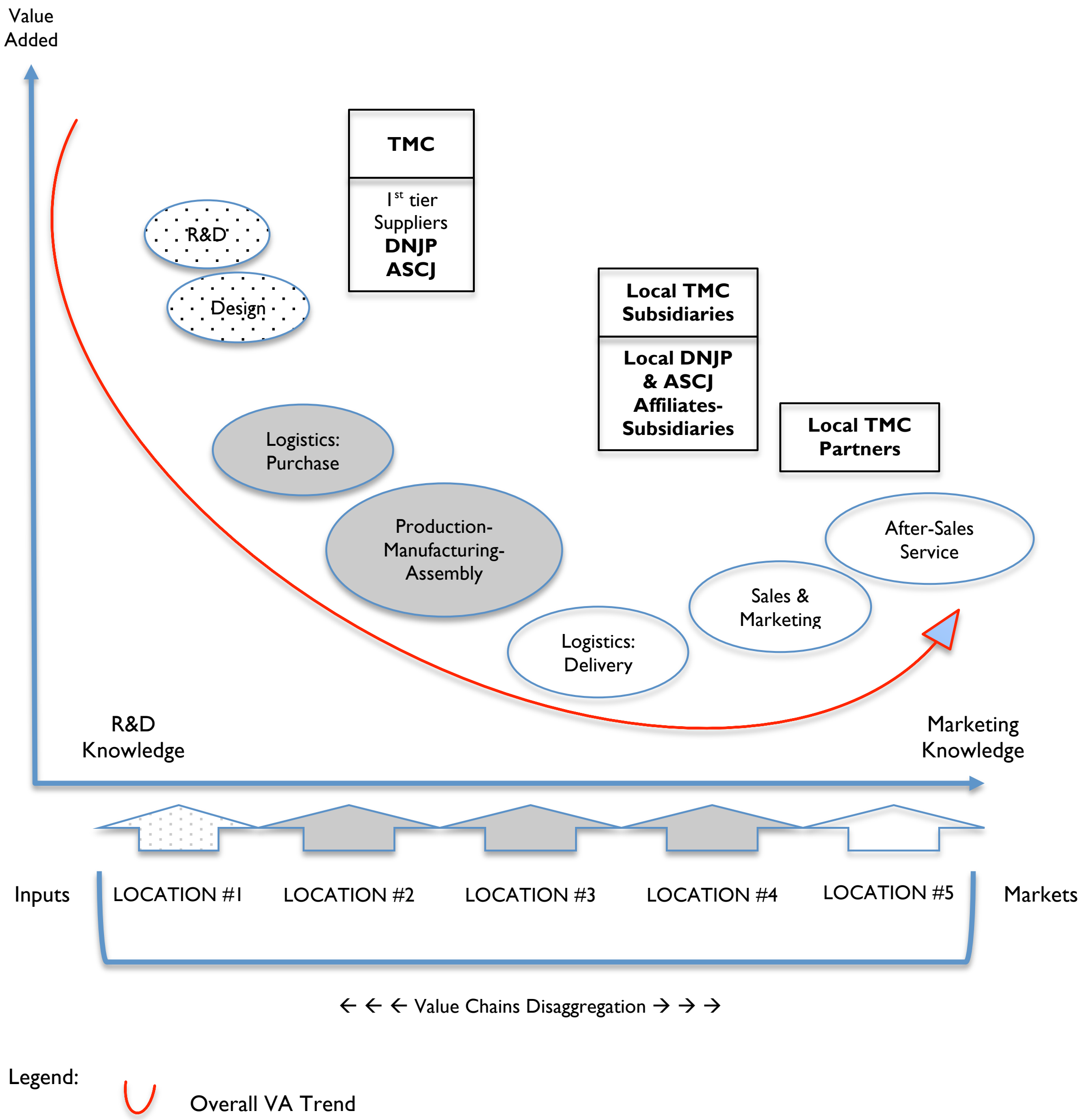
Source: author's assessment, adapted from Ye, Meng & Wei (2015).

[115] Please refer to Chapter 2 (Section 2.4. Value Added of Japan Automotive Trade and Footnote #12) for more elaboration and description on DVA and FVA.

4.1.2. Locational Structure

The following Diagram 4.3 depicts locational structure of Toyota value chains in Southeast Asia. Referring to Mudambi (2008), the following features of value chains spatial or locational structure are applied for the Toyota Group operations in Southeast Asia:

Diagram 4.3: Locational Structure of Toyota Value Chains in Southeast Asia



Source: author's assessment, adapted from Mudambi (2008).

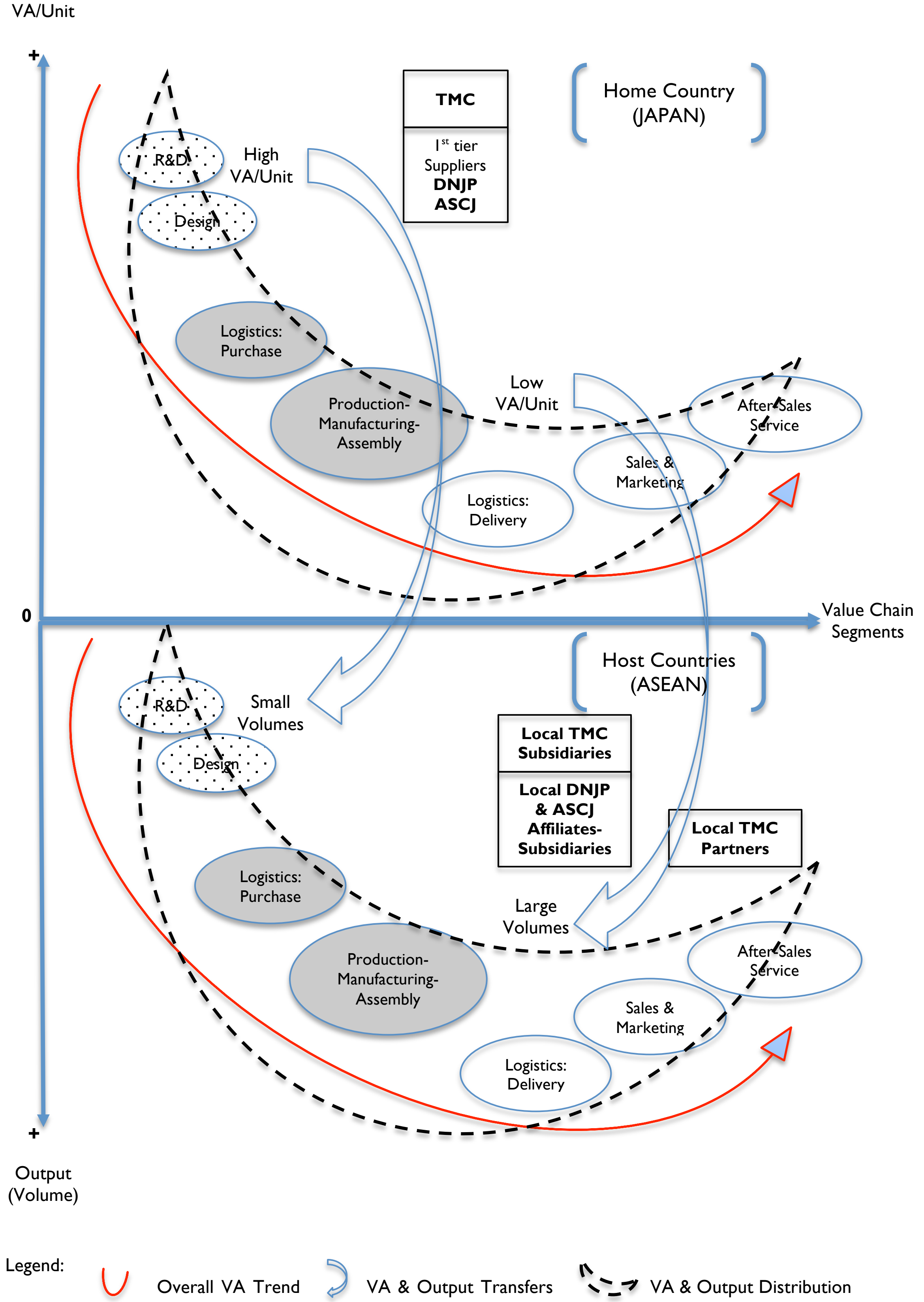
As shown in the above Diagram 4.3, in Location #1, activities are mostly based in the home country (TMC) with scores of initiatives/best practices in the host countries/lead firm and 1st–tier suppliers (Denso and Aisin Seiki) subsidiaries and TMC local partners. In Location #2, 3 and 4, activities have mostly been relocated to and based in the host countries/ASEAN where TMC and its key 1st-tier suppliers have shifted most of production/manufacturing facilities, transferred some of technical formation and skills, and localized production of key engine machining, stamped parts and components, and pertained high tech (light and non-bulky) parts and components to be imported from the home country. In Location #5, almost all activities have been undertaken in the host countries by TMC/1st-tier subsidiaries and local partners with rigid supervision from TMC and 1st-tier supplier-firms (Denso and Aisin Seiki) regional head quarters (operational head quarters/OHQs) for day-to-day management and hierarchical policy making guided by TMC/Denso/Aisin Seiki headquarter in the home country for strategic business decisions.

4.1.3. Distributional Structure

By adhering to Escaith (2013) who proposes the so-called "double smiley curves" of value creation[116], two features represent distributional structure of value chains (i.e. benefit gains and distributional value added rates). The following Diagram 4.4 illustrates distributional structure of Toyota value chains in Southeast Asia:

[116] Referring to Escaith (2013), the double smiley curve offers understanding of value chains as having two dimensional value added rates, i.e. the value added per unit (VA/unit) and the output (i.e. in terms of volume) itself. With such an understanding, firms capture or create: (1) high or low value added rates that are based on their VA/unit, and (2) small or large volume of value added based on overall output. Such an understanding also implies that: (1) high VA/unit results in small volumes of value added output, and (2) low VA/unit results in large volumes of value added output.

Diagram 4.4: Distributional Structure of Toyota Value Chains in Southeast Asia



Source: author's assessment, adapted from Escaith (2013).

As shown in the above Diagram 4.4, the first feature reveal that TMC and its 1st-tier suppliers (Denso and Aisin Seiki) mother companies or manufacturing sites in the home country (Japan) mostly produce high VA/unit parts and components that result in small volumes of value added output (i.e. to be transfer to their subsidiaries or local partners in the host countries manufacturing sites). The second feature suggests that TMC, Denso and Aisin Seiki subsidiaries and local partners in the host countries (along with their 2nd and up-tier suppliers) produce low VA/unit parts and components that result in large volumes of value added output (i.e. manufactured and assembled locally in the host countries).

The market size, meanwhile, determines distributional value added (i.e. especially in terms of volume) at the domestic part of value chain (i.e. at local manufacturing sites in the ASEAN host countries). Indonesia's large domestic market size, for example, implies larger output volume than other ASEAN countries. In a similar token, production size determines distributional value added of particularly VA/unit term. Having the largest production capacity, TMC subsidiaries in Thailand capture larger VA/unit than subsidiaries in other ASEAN countries.

4.2. Upgrading and Localization of Production Strategy

In Southeast Asia, Toyota overall upgrading strategy[117] is undertaken by and applied mainly within the domain of one of its subsidiary companies, i.e. Toyota

[117] In line with the conceptual framework on firms strategy for value added (as outlined in Chapter 1), firms upgrading strategies are identified in terms of: (1) strategy to cope with changes in production network, (2) strategic relations with suppliers (in particular with the local ones, including the Small and Medium Size Enterprises or SMEs), and (3) efforts in technical capacity building and HRD (human resource development). Such stakes characterize responses by firms and other key players/stakeholders in the production network as they formulate strategic decisions at firms-level

Motor Asia Pacific Pte Ltd (TMAP). Initially founded as TMSS in Singapore (May 1990), TMAP has currently 2 affiliate companies, i.e. TMAP-MS (which replaced TMSS in April 2001) and Toyota Motor Asia Pacific Engineering & Manufacturing Co. Ltd. (TMAP-EM) located and based in Bangkok (which has also changed its name and core function into Toyota Daihatsu Engineering & Manufacturing (TDEM) as of April 3rd 2017). TMAP organizational structure consists of a management team led by a CEO (chief executive officer) who co-worked with a CTO (chief technical officer) based in TMAP-MS in Singapore and is aided by a DCEO (deputy chief executive officer) who is based in TMAP-EM (or now TDEM) in Bangkok. The management covers their works and responsible for 2 main areas: Asia (to which Southeast Asia belong) and Middle East & North Africa (including Central Asia) (TMAP 2016, TDEM 2017, Bloomberg 2017, TMC 1 2017).

Since 2001, i.e. in light of its organizational restructuring, TMAP has been expanding functions to not merely as an OHQ (operational processing procurement center), but also towards supporting the application of TPS at local manufacturing sites, i.e. to support manufacturing and design development of certain localized vehicle types. Fields of support include basic TPS management, production-related aspects, R&D and design, and sales. These functions have been expanded gradually and are followed these sequential stages overtime (TMAP 2016):

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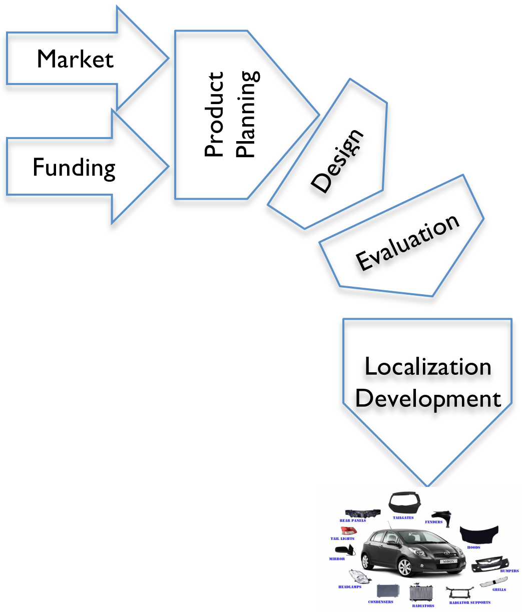
and as the host governments design industrial development policies and capacity building schemes to acquire added values at its wider context. Under those 3 (three) stakes, issues and challenges (confronted by firms and other key stakeholders) are discovered in the areas of: (1) production facility (i.e. decisions over location sites, such as whether expansion, reallocation, delocalization, or re-localization), (2) product quality (i.e. how to develop products that meet consumer and market demands, especially in terms of cost-efficiency, improved productivity, technology-driven and organizational monitoring scheme), (3) reorganizing the chains (i.e. relations with local partners/subsidiaries to cope with challenges in new product development, quality control along the supply chains), (4) technological development (i.e. recent changes in technology aiming both at product development and production processes), (5) connecting to local suppliers/SMEs (i.e. need to connect the existing production network with wider industrial development to the benefit of the least vulnerable in the chains) and (6) technical capacity building and HRD (i.e. demands for technical capability to cope with technology development and need to develop technical and other supporting personnel).

- Modest sales function (1997-2000): logistics and commercial delivery of products are the main features of activity (under TMSS);
- Advanced sales function involving assessment on products pricing, supply and demand and customer service (since 2001, i.e. the starting date of newly-restructured TMSS and TMAP-MS establishment);
- On top of those modest and advanced sales functions, R&D and design activity is commenced (in 2003-4) with the establishment of technical centers which became the embryo of TMAP-EM in Bangkok (founded in April 2007);
- Full operation of TMAP-EM marked the start of production-related functions of TMAP, i.e. in manufacturing techniques and procurement of parts and component, supply chains (since 2007), production support (since 2008) and planning (since 2009), vehicle (such as IMV) project planning (since 2012) and "Z" features support for development of 4-piston engine vehicle (since 2013-2014).

In the area of R&D and design which is undertaken mainly by the Technical Center (TC) of TDEM (or formerly TMAP-EM), its main activity is vehicle engineering and evaluation (which in 2003 was still under TTCAP (Toyota Technical Center Asia Pacific) in Australia, but then started from 2007 has been under TMAP-EM/TDEM). Vehicles parts that have been engineered and evaluated in the TC include Vigo C-Access Door (2008), Corolla CNG (2010), Vigo CNG (2012) and REVO (2015).

The following Diagram 4.5 shows flows of TC-TDEM RD&D processes as it also demonstrates technical capability of the center:

Diagram 4.5: R&D and Design Technical Capability and Flows at the TMAP/TDEM Technical Center

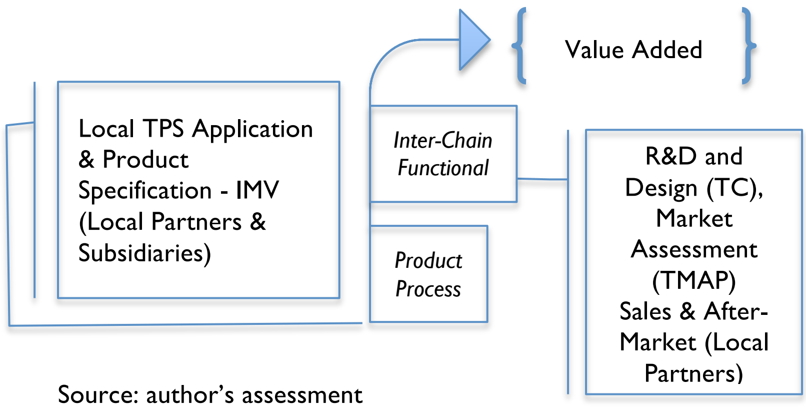


Source: TMAP (2016)

As shown in the above Diagram 4.5, upon assessment on the market and funding, the first stage is products planning which involve variety of managerial as well as technical expertise. The second stage is design, i.e. ability to interpret the products plan into a product prototype by usage of detailed engineering drawings which met with technical aspects and other consideration. The third stage is evaluation, i.e. a post-design (and post-production) activity to evaluate performance or result of a designed (or manufactured) product. The fourth stage is localization development where assessment is made to develop local manufacturing sites capability for optimum usage of local parts and components, engineers, engineering techniques and other production managerial tasks.

Referring to TMAP's business range and its wide geographical coverage of its activity (including especially RD&D under its Technical Center), TMC efforts to capture value added in its Southeast Asian operations have focused mostly on "functional" and "inter-chains" upgrading. The efforts is in addition to TMC's continuing endeavors for value added via "product" and "process" upgrading which has been the hidden forces of TPS/Toyota Way cultures such as *kaizen* (continuous improvement), *hansei* (relent-less reflection), *genchi genbutsu* (solving problem by seeing oneself what is really going on). These two-layered upgrading efforts (as shown in Diagram 4.6) are featured by inter-connectedness among TMC and its 1st tier suppliers, local partners & subsidiaries in areas of pre, during and post-production activities.

Diagram 4.6: TMC Two-layered Upgrading in Southeast Asia



Source: author's assessment

The following Table 4.1 recapitulates details of activities undertaken by TMC and its production network in Southeast Asia which indicate upgrading efforts along its value chains. The assessment offers micro-level analysis on upgrading strategy and other related measures in value added creation of the lead firm (TMC or Toyota Group), its 1st tier suppliers, local partners and subsidiaries/affiliates operating in the region. Features include process upgrading, product upgrading, functional upgrading and inter-chain upgrading[118].

Table 4.1: Toyota Upgrading Activities in Southeast Asia

	Features	Remarks
PROCESS UPGRADING	▪ TPS application at local manufacturing sites: organizational scheme (TMC) (Hida 2014 and Watanabe 2016) ▪ Low cost automation (All Local Partners & Subsidiaries) (Iwadare 2016, Utomo 2016) ▪ Robotic engineering and semi-automation machinery application (Sapta 2016) ▪ Toyota Suppliers Quality Control (for 2nd tier or Lower): Regular Business Meeting, Audit/Plant Inspection, Regular Vocational Training on TPS (Mizuta 2016, Prasetiyani 2016)	▪ Official organizational scheme is conducted via Self-Reliance Division or Development Dept. to ensure quality and standardized process of manufacturing ▪ Flexibility in adapting to local manufacturing facilities conditions and technological stage has put an option of applying and utilizing existing facilities with limited adjustment (case on Toyota Kijang) ▪ Full (robotic) and semi automation are adopted when the market demands require rapid expansion of the facilities (case of new installed plants in Indonesia and Thailand) ▪ Solid suppliers relations are essential for full application of TPS at local manufacturing sites
PRODUCT UPGRADING	▪ ASEAN IMV Project-Platform-Powertrain: 1 Ton Pick-Up Trucks, Small MPVs, LCGC (TMC, STM, TMMIN) (TMC 1 2017, Takeno 2017) ▪ Local Consumer-Driven Products (Watanabe 2016)	▪ Despite usage of shared platform and powertrain in IMV models, product variety and specification remains in consideration to add value of products ▪ Specific and unique additional features are installed in IMV cars (e.g. mini refrigerators for Thai consumers, cup holders for US consumers in 1 ton pick-up trucks)
FUNCTIONAL UPGRADING	▪ RD&D and Market Assessment (TC TMAP) ▪ Local R&D Centers (TDEM in Thailand and ADM in Indonesia): aim at Development of Small IMVs in Collaboration with Daihatsu (TDEM 2017, Hayato 2016) ▪ In house R&D engineering center (1st tier Suppliers, Case of Denso Corporation)	▪ TC TMAP takes the leading roles in activity relating to engineering development and market intelligence functions by regularly link its works and businesses to other subsidiaries/affiliates, e.g. TMMIN regularly in consultation with TC TMAP with regards to RD&D aspects of production (Sapta 2016) ▪ ADM collaborates with an automotive research center at Binus University

[118] This upgrading typology is based on Humphrey and Schmitz (2002) where process upgrading refers to efforts (by firms and other related stakeholders in the value chains) to add value by upgrading production process; product upgrading signifies the upgraded quality, performance and variety of product; functional upgrading focuses on acquiring new functions and skills, and changing mix of activities; and inter-chain upgrading emphasizes on the creation of and capturing multi-diverse functions and skills. Process upgrading is typically undertaken in the upstream business activity, while inter-chain upgrading is in its downstream side. See also Chapter 1/Applying the Framework.

INTER-CHAIN UPGRADING	▪ Sales, Marketing and After-Market Services (TMC, TMAP and Local Partners/TAM, TMT, TMP, TMV) ▪ Active participation and engagement in activities, programs and events organized by local automobile assemblers or OEMs associations, and automotive research institute or centers (Jirathiyut 2016)	▪ Local partners are actively engaged in brand awareness campaign and connect to local users and consumers through various Toyota Clubs activity (TAM 2017, TMMIN 2017, TMT 2017, TMP 2017, TMV 2017) ▪ Major events regularly participated by TMC local partners and subsidiaries are automotive shows and annual conferences

Source: author's assessment

As shown in the above Table 4.1, in terms of process upgrading, Toyota Production System (TPS) is at its core which guides the entire production or manufacturing processes. The ASEAN IMV Project has been the central reference in the Toyota product upgrading activities. Meanwhile, Toyota functional upgrading has focused on R&D and design activities. Last of all, Toyota inter-chain upgrading has continued to be in sales and marketing, and after-market services.

4.3. Technical Formation and Accumulation at Local Sites

As previously discussed (in Chapter 3), accumulation of Toyota production and business activities and its 1st-tier suppliers in Southeast Asia –along with their subsidiaries and local partners— has been resulted from deepened localization of manufacturing processes and production shifts. It has then led to value chains upgrading within and along Toyota production network, especially in the areas of manufacturing facilities and processes, product development, R&D and design, and sales, after-sales and after-markets.

Full and/or semi automation and robotics techniques are applied in the areas of manufacturing facilities and processes. In the area of product development, Toyota ASEAN IMV Project serves as one of global major platforms and have lead to enhanced product specification and progressive vehicle design engineering at local manufacturing sites (with more locally-developed car specification and types). R&D and design facilities feature the need to support localization of production and manufacturing activities. Post-production and manufacturing activities have eventually been the areas of expertise conducted by Toyota local partners in ASEAN3 countries.

Those accumulating Toyota production processes have eventually led to technical formation and accumulation at local sites across the region of Southeast Asia. Toyota activities in Thailand and Indonesia offer good practices and examples of both technical formation and technical skills accumulation. The following comparative cases of *Kijang* in Indonesia and Hilux in Thailand offer typical examples of Toyota's technical formation that has been accumulated in the region.

The cases reveal efforts initiated by TMC subsidiaries and local partners in Indonesia and Thailand for technical formation in the full manufacture and production of locally developed vehicles. In Indonesia, PT Astra International, PT Toyota Astra Motor (TAM) and PT Toyota Motor Manufacturing Indonesia (TMMIN) are TMC local partner/subsidiaries that have been long lastingly in the production of *Kijang* since 1977. In Thailand, Toyota Motor Manufacturing Thailand (TMMT) and Siam Toyota Motor (STM) are TMC subsidiaries for historically marked production of Hilux (since early 1970s) which have been undertaken and conducted collaboratively under the Toyota Group.

In terms of technical formation[119], both *Kijang* and Hilux are resulted from Toyota strategic decisions to persistently: (1) locate manufacturing and production facility

[119] Assessment on technical formation of *Kijang* and Hilux is based on findings of the study with regards to firms strategic decisions. The findings suggest that tackling challenges in decisions to locate production and manufacturing facility, firms are relying on existing production facility to maintain

where accumulated engineering machineries, tools, and technical know-how are readily and soundly available; (2) maintain product development and quality; (3) reorganize value chains activities in a regular manner; (4) catch up with technological development; (5) connect and link to local suppliers, including SMEs; (6) carry out technical capacity building and human resource development (HRD). Through those persistent measures, value addition activities have been taken as *Kijang* and Hilux transform, i.e. in terms especially of product development and manufacturing technology usages and as the two products achieve local content (LC) for its basic machinery and parts and components' assembly, manufacturing/production, and its global market reach.

The following Diagram 4.7 comparatively depicts transformation of *Kijang* and Hilux which is observed mainly through its LC rate representing accumulation of technical expertise and engineering capability of TMC subsidiaries and local partners in Indonesia and Thailand. *Kijang* is observed since its 1st *Kijang* Generation (1977-1980) to the newest/6th Generation of Multi Purpose Vehicle (MPV) *Kijang* Innova under Toyota ASEAN IMV Project (since 2015). Hilux meanwhile is observed since

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and/or expand production capacity (Iwadare, Kimura 2014; Nakanishi, Ikebe 2015). In dealing with constraints in product development and quality, firms consistently applied regular monitoring system, personnel training, introduction of low cost automation machinery for manufacturing (Hida, Handoyo & Leonardo, Iwadare 2014). In order to reorganize the value chains activities, firms authorize local subsidiaries in the procurement of parts and components, in mobilizing local partners and suppliers to various areas of production processes, including product design, research and development (Hida, Iwadare, Kimura 2014, Ikebe Nakanishi 2015). Catching up recent technological development, firms maintain and advance the application of latest technology for efficient energy, safety conformity and better performance cars (Iwadare, Kimura 2014, Nakanishi, Ikebe 2015). Connecting to local suppliers/SMEs, local partners are keen to have closer relations with lead firms, especially in product quality controls and personnel training. Local SMEs involvement in product designing and locally invented product quality controls and testing is also observed (Iwadare, Handoyo and Leonardo 2014). For technical capacity building and HRD, it is learned that –among lead firms, local partners/subsidiaries and local suppliers or SMEs— initiative to have in-house training centers are existed quite matured and abundantly. It combines supervision from the lead firms and technical assistance and consultants provided by the home (Japanese) government due to limited numbers of technical colleges or training centers adjacent to and available near the manufacturing sites (Iwadare, Hida, Handoyo and Leonardo 2014, Liman, Pongoh, Larosa 2015).

its 1st Generation of Hino Briska that was manufactured by Hino Motors (1961) to the newest Generation of 1 ton Truck Hilux (since 2015).

As shown in the following Diagram 4.7, *Kijang* in Indonesia and Hilux in Thailand was each initiated in different manufacturing context and platform. The former emerged locally as a 1st generation vehicle manufactured in particular manufacturing and market context of Indonesia (and also the Philippines). The latter emerged not in a local context, but more in a global one, i.e. by following Toyota global market strategy for light trucks which transformed to 1 ton trucks. Hilux manufacturing strategy by TMT or STM in Thailand followed the existing platforms, i.e. the light truck platform in the case of its 5th and 6th generations, and the 1-ton truck (under Toyota ASEAN IMV) platform for its 7th generation.

Diagram 4.7: *Kijang* and Hilux Transformation

Toyota *Kijang*	**Toyota Hilux**
TOYOTA ASTRA MOTOR/TAM (INDONESIA) 1st Generation (1977-80): Basic Square Shape, Sub-Compact Car, 1.2 L 3K Engine, 19% Local Content (LC), Domestic Market 	TOYOTA MOTOR THAILAND/TMT (THAILAND) 5th Generation (1988-91): N80-110, RN85R Cab Chassis, 1.8-2.8 L Engine, Domestic Market 
TAM (INDONESIA) 2nd Generation (1981-85): Chassis KF20-30, 1.3-1.5 L 4K Engine, 30% LC, Domestic Market 	SIAM TOYOTA MOTOR/STM (THAILAND) 6th Generation (1997-2005): N140-170, 2.0-3.0 L Engine, Domestic Market, Worldwide Market 
TAM (INDONESIA) 3rd Generation (1986-96): Curvier Shape, Full Pressed Body MPV, KF40-50, 1.5-1.8 L 4K Engine, 44% LC, Domestic Market & Export (9 Destination Countries) 	TMT (THAILAND) 7th Generation (2004-2015): AN10-30, Single and Double Cabin 1 Ton Truck (under Toyota ASEAN IMVB Project), Domestic Market, Worldwide Market 
TAM & TOYOTA MOTOR MANUFACTURING	

INDONESIA/TMMIN (INDONESIA)
4th Generation (1987-2004): Capsule Shape, KF60-80, Compact MPV, 1.8-2.4 L 7K-1RZ-2RZ Engine, 53% LC, Domestic Market & Export (3 Destination Countries)

TMMIN (INDONESIA)
5th Generation (2004-2014): Branded as *Kijang* Innova (under Toyota IMV Project for Medium MPV Class), 80% LC, Domestic Market & Export (22 Destination Countries)

TMMIN (INDONESIA)
6th Generation (since 2015): All New *Kijang* Innova (Upper Middle MPV Class), 85% LC, Domestic Market & Export (29 Destination Countries)

Chapter 5

ASEAN Automotive Regional Value Chains: Policy Outlook

Having presented and assessed both the macro setting (in Chapter 2) and micro setting (in Chapters 3 and 4) of the dynamic contemporary changes of Japan automotive production networks in Southeast Asia, this chapter is to identify key policy issues worth noted in light of foreseeing the emergence and development of regional value chains in the automotive sector. The issues are addressed both at domestic or national as well as international or regional levels through particularly existing ASEAN integration institutional schemes. The study observes that the value chains structure applied by Toyota (as outlined in the previous Chapter 4) offers possibility for adoption under ASEAN automotive FDI promotion scheme and industrial development policy both at national and regional levels. Such an adoption is a way to link more deeply to the automotive RVCs (such as the one employed by Toyota in Southeast Asia) and to benefit from value added that is captured/created locally through the company's spatial and distributional structures embedded in its supply chains and production network

This chapter aims therefore at presenting a policy outlook of the Japanese automotive value chains operating in Southeast Asia by overviewing key ASEAN countries industrial and governments' policy setting in the automotive sector. It also aims at offering policy notes on upgrading and localization of production in Southeast Asia, especially seen from public (government) and private (firm) combined perspectives with specific reference to issues on local backward linkages (i.e. how local productive capacity in ASEAN host countries should be linked to the regional value chains in the automotive industry) and on moving-up the value chain (i.e. how local subsidiaries, partners of Toyota and its 1st-tier suppliers, and other supporting local firms move up to higher value chains in the overall regional automotive production network).

Keeping in mind those objectives, this chapter's content is outlined as follows. The first section presents overviews of key ASEAN countries (Indonesia, Malaysia and Thailand) automotive industry and its host governments' policy setting of automotive sector. The second section addresses major challenges faced by ASEAN host countries in dealing with local automotive industry's backward linkages which cover issues on local supporting industries and SMEs in the automotive sector. In the last section, a discussion is offered to bring up the notion of moving-up the value chain by local firms and other related stakeholders in the automotive sector. Two levels of discussion are offered, i.e. at: (1) national/domestic level to comprehend common policy platform in developing automotive R&D and design, and human resource development (HRD) and vocational training; (2) international/regional level to acknowledge notion of regional industrial cooperation focusing on the existing ASEAN schemes and RVCs best practices in ASEAN automotive sector.

5.1. Overview of ASEAN Automotive Industry and Policy Setting

ASEAN governments attempt to devise their respective policies of FDI promotion and industry in response to the dynamic changes in the surrounding GPNs, including particularly the automotive sector, as previously addressed in Chapter 2, 3 and 4. In parallel to the previous assessment, specific country cases of ASEAN3 (Indonesia, Malaysia and Thailand) policy setting on automotive-related manufacturing sectors are presented. Case on Indonesia (presented in the next sub-section 5.1.1) features typical FDI promotion and industrial policy with domestically driven value chains. Case on Malaysia (presented in the next sub-section 5.1.2) indicates integrated FDI and industrial policy schemes by benefitting from adjacent geographical proximity of Singapore to capture value added-ness. Case on Thailand (presented in the next sub-section 5.1.3) offers concerted efforts by relevant governmental agencies and stakeholders in the two sectors to value chains immersion in FDI promotion and industrial policy.

5.1.1. Indonesia

Indonesia automotive sector hosts approximately 700 automotive suppliers that are ranging from the 1st tier to the lower tier ones (Sapta 2016). The 1st tier suppliers consist of chiefly subsidiaries of Japanese and other foreign principals and their directly linked vital parts and component suppliers (which are also sometime categorized under the 2nd tier ones), such as Aisin Seiki, Denso, KYB, Aoyama, etc. The 3rd tier and lower ones are typically local by origin, i.e. home grown local companies/SMEs (Soerjono, Tandiele 2016). This type of suppliers is supported and supervised on a regular basis by the Ministry of Industry/MOI (Directorate General of SMEs Industry), Ministry of Cooperative and SMEs, and several supporting agencies, such as Indonesia Automotive Center and Indonesia Automotive Industry Association (GAIKINDO).

The industrial zones in which Japanese-related automotive firms and production network mostly located are centered around Jakarta, Bogor, Depok, Tangerang and Bekasi (the so-called *Jabodetabek* greater area) and a newly developed industrial zone of Karawang (about 60 km east of Jakarta) [120]. The zones in *Jabodetabek* and Karawang area where most of Japan automotive production bases are located spread over in as many as 23 different locations: 4 in Jakarta, 2 in Bogor, 5 in Tangerang, 4 in Bekasi, and 8 in Karawang (Yamashiro 2016) [121].

The following Table 5.1 presents list of the zones hosting Japanese automotive firms/original equipment manufacturers (OEMs):

Table 5.1: Indonesia's Industrial Zones hosting Japanese Automotive Firms/Original Equipment Manufacturers (OEMs)

Zones	Japanese Automotive OEMs
East Jakarta Industrial Park (EJIP) Cikarang Bekasi	Suzuki, Mazda, Mitsubishi (Assemblers)
Jababeka Industrial Park Cikarang Bekasi	Isuzu Astra (Engines)
Jakarta Industrial Estate Pulogadung (JIEP) Jakarta	Mitsubishi Fuso (Engines/Parts)
Kawasan Berikat Nusantara (KBN) Cakung Jakarta	Suzuki (Power Train)
KBN Tanjung Priok/Sunter Jakarta	Toyota (Engines, Parts), Astra Daihatsu/Toyota
Kawasan Industri Indotaisei Kota Bukit Indah (BIIA) Cikampek Karawang	Hino, Toyota, Suzuki (Parts, Assemblers)
Kawasan Industri Mitrakarawang (KIM) Karawang	Honda (Engine, Parts, Assembler)
Karawang International Industrial City (KIIC) Karawang	Toyota (Engines, Parts) Astra Daihatsu (Engines, Isuzu/Casting)
Kota Bukit Indah Industrial City Cikampek Karawang	Honda (Parts)
MM 2100 Industrial Town Bekasi	Toyota Sugity Creatives (Parts)
Suryacipta City of Industry Karawang	Astra Daihatsu, Toyota (Parts)

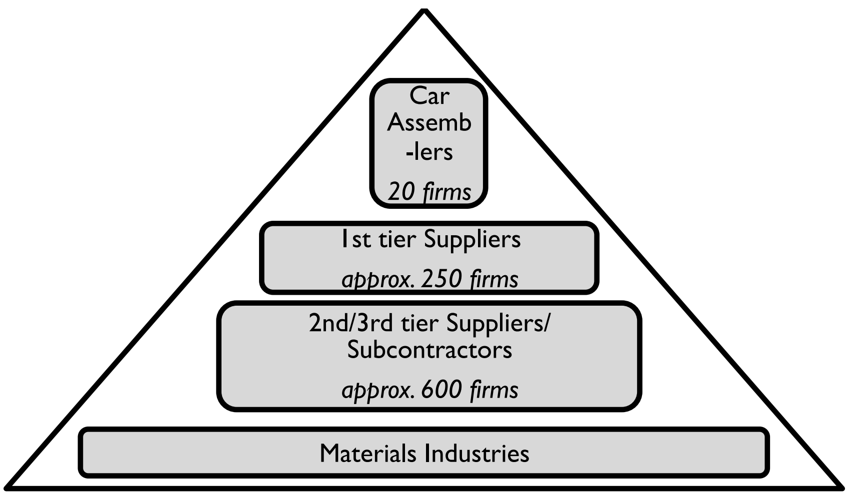
Source: author's assessment, compiled from various sources

[120] *Jabodetabek* industrial zones comprises Bekasi International Industrial Estate (BIIE) in Bekasi; CCM Baturaja Industrial Estate in Tangerang; Cibinong Center Industrial Estate (CCIE) in Bogor, East Jakarta Industrial Park (EJIP) in Cikarang, Bekasi; Greenland International Industrial Center (GIIC) in Delta Mas Karawang; Jababeka Industrial Park in Cikarang, Bekasi; Jakarta Industrial Estate Pulogadung (JIEP) in Jakarta; Kawasan Berikat Nusantara (KBN) Cakung in Jakarta; KBN Marunda in Jakarta, KBN Tanjung Priok in Jakarta; Kawasan Industri Indotaisei Kota Bukit Indah (BIIA) in Cikampek, Karawang; Kawasan Industri Cikupa Mas in Tangerang; Kawasan Industri Kujang Cikampek (KIKC) in Karawang; Kawasan Industri Mitrakarawang (KIM) in Karawang; Karawang International Industrial City (KIIC) in Karawang; Kota Bukit Indah Industrial City in Cikampek, Karawang; Lippo Cikarang Industrial Park in Delta Silicon, Cikarang, Karawang; Millennium Industrial Estate in Tangerang, MM 2100 Industrial Town in Bekasi; Modern Cikande Industrial Estate in Tangerang; Pasar Kemis Industrial Estate in Tangerang; and Suryacipta City of Industry in Karawang.

[121] With such rigorous progression and expansion of the growth zones, most Japanese companies investing or having business operations in Indonesia –according to recent survey conducted by JBIC (Japan Bank for International Cooperation)— consider Indonesia as the most attracting destinations for investment and/or business along with India, Thailand and Vietnam (Yamashiro 2016).

In the case of Japanese carmakers, as indicated earlier, Indonesia holds at least 3 major local subsidiaries which typically used to be the sole agent or single brand holders of particular brand/carmaker: Astra Group mostly for –but not limited to- Toyota and Daihatsu brands (i.e. Toyota Astra Motor, Toyota Motor Manufacturing Indonesia, Astra Daihatsu Motor, Isuzu Astra Motor, & Astra Nissan Diesel Indonesia), Indomobil Group (Suzuki Indomobil Motor, National Assemblers and Nissan Motor Indonesia), Krama Yudha Group (Mitsubishi Motor Indonesia), plus 3 smaller subsidiaries (Honda Prospect Motor, Hino and Isuzu). Japanese carmakers/brands have been the frontrunners in the country's automotive industry since 1970s onward[122]. The following Diagram 5.1 presents the structure of Indonesian automotive industry which is basically resembled that of and followed the Japanese one (see Diagram 3.1 in Chapter 3):

Diagram 5.1: Structure of Indonesian Automotive Industry



Source: Natsuda and Otsuka 2014

[122] The leader is Toyota (29.4% share of total car sales in Indonesia, 2015). Other major Japanese brands (by share of the country total car sales, 2015): Daihatsu (17.7%), Honda (16.2%), Suzuki (14.4%), Mitsubishi (9%), Nissan (5.7%), Isuzu (2.4%), Hino (2.3%) and Mazda (0.9%). American brands, Ford and Chevrolet get only 0.2% respectively. Other brands are totaled for 1.7% share (GAIKINDO – Husin, Sapta 2016). Toyota Motor Company (TMC) is a principal in the production network and supply chains under the name of Toyota Indonesia. It assigns two major subsidiary companies, i.e. PT TMMIN (Toyota Motor Manufacturing Indonesia) for manufacturing and PT Toyota Astra Motor (TAM) for sales and marketing.

There have been key concerted efforts by Indonesia's automotive stakeholders that is aimed at reconfiguring the country's automotive supporting industries in the wake of fortified market and production capacity since its successful escape from effects of the 2008 global financial meltdowns. With staggering annual sales of more than 1 million cars (one third of the total ASEAN sales) and annual production capacity reaching beyond 2 millions cars in the past 5 years (Gaikindo 2017), Indonesia is trailing behind Thailand's success story of automotive supply chains and production network. Key efforts have been focusing on attracting more automotive FDIs (both for brownfield and greenfield ones), including particularly those enabling and strengthening local supporting industries (Husin 2016).

Dominated by Japanese carmakers (with Toyota-Daihatsu in the lead, securing almost 40% of the total production capacity annually), Indonesia has been far behind Thailand, i.e. in terms of local supporting industries. Quantity wise, Indonesian supporting industries relating to automotive industry is only a third of those of Thai (Government of Indonesia's Ministry of Industry 2016) indicating genuine manufacturing capacity gaps. Quality wise, the gaps would be even much wider, especially in terms of related infrastructural aspects such as technical capacity within the manufacturing industry, labors, skills and technological capabilities of human resources in the industry relating to automotive, and policy incentives that are designed in support of the manufacturing and automotive industry.

Those focused attempts to enable and strengthen domestic automotive supporting industries are –for the most part— hindered by lacking of policy coherence regulating and facilitating this particular sector. The following Box 5.1 summarizes contemporary setting of Indonesia's policy on the automotive sector as it confronts with ambiguity despite current production capacity that reach nearly 1.2 million units of vehicle (in 2016). Lack of boldness and clear guidance into how the industry linked to the surrounding regional and global production networks is marked among relevant institutions.

Box 5.1: Value Chains Ambiguity: Indonesia Automotive Policy Setting

Indonesia FDI promotion and industrial policy schemes, especially for industrial sectors which are under or within regional or global production networks such as the automotive, reflect dispersed vision in terms of lacking integrated and coherent industrial development policies. Its large domestic market further complicates its policy measures. It eventually leads to domestically oriented value added as also described in the previous section on Trends in Value Added (implying that the country is oriented more on domestic than foreign content orientation of its value added).

The country's automotive FDI promotion and industrial development policy is designed and implemented under the Ministry of Industry (MOI) and the Ministry of Trade (MOT) along with the Investment Coordinating Board (ICB) whose mandate is to coordinate works and functions of related government agencies responsible for investment services. MOI and MOT have also particular directorates that are designed to support value addition activities and upgrading for national or local players in the automotive industry –and in the case of SMEs, in coordination and collaboration with Ministry of Cooperatives and SMEs.

Policy for value addition activities of the automotive sector is within the authority of the MOI's Directorate General of Metal, Machinery, Transportation Tools and Electronics Industries, in terms particularly of products and parts and components standards, production processes and licensing. The MOI's Directorate General of Small & Medium Industries is in charge of supporting and upgrading 2nd or 3rd and lower tier SME suppliers in addition to the ones provided by Ministry of Cooperatives and SME.

Major landmarks of Indonesia's automotive policy include: Import-Substituting Industrialization (ISI)-type localization (1969-1992) which includes importation of completely built-up (CBU) vehicles (since 1969), prohibition of CBU vehicles importation (since 1974), and local content requirement (LCR) or "mandatory deletion program (MDP)" (since 1976) via assembly of CKD (completely knock down) vehicles, New Protectionist Policy which include National Car Program (1993-1998) and was ended by the WTO Dispute over the program, and After Liberalization (1999-present) through e.g. Low Cost Green Car (LCGC) incentive schemes, etc. (Natsuda & Otsuka 2014).

5.1.2. Malaysia

In the case of Malaysia, the first attempt to connect with foreign investments were initiated by the state of Penang in 1971 when its proposal on Free Trade Zones (FTZs) development was supported by the Federal Government and enacted as the Free Trade Zone Act 1971. The proposal is modeled after the success of implementation of FIZs (Free Industrial Zones) in Taiwan and Korea. FIZs are home for approximately 1800 electronics related companies that make up the Malaysian E&E (Electrical and Electronics) industry encompassing a wide range of products and activities including computer and peripherals, optics, telecommunications products as well as providing services such as design of integrated circuits and prototyping (Yeow and Ooi 2009).

The FIZ transformation began in 1970s which marked the beginning of nation-wide semiconductor manufacturers with simple assembly operations capability and labor-intensive feature (abundant low cost female workers), but with significant effect to the entire Malaysian manufacturing industry. Bayan Lepas FIZ marked the on-set of Malaysian electronics industry as pioneered lead firms set up bases for their manufacturing plants which later known as Malaysia's Silicon Valley. These pioneering firms established joint local subsidiaries and made up the first wave of FDIs in electronics industry in the country. A Japanese firm is among them, i.e. Hitachi Corporation via Hitachi Semiconductors Sdn. Bhd.

The next waves of electronics FDIs in Malaysia came during major expansion of FIZs across the country in 1980s[123]. The 1980s have witnessed expansion and moving up value chains of manufacturers with integrated circuits (IC) packaging capability and capital-intensive feature (via automation to generate advanced semiconductor packages: flip chip, organic land grid array (OLGA) packages, field programmable gate array (FPGA) and multi-leaded chips). The 1990s has further seen supporting high technology industrial development with IC wafer fabrication capability and

[123] Malaysia currently has 18 FIZs and over 200 industrial estates The list is as follows (Yeow and Ooi 2009, Wulandari AMRC *not dated*): (1) Penang (2 FIZs)–Bayan Lepas (Phase I, II, III, IV) and Prai; (2) Malacca (5 FIZs)–Peringgit I, II, III, Tanjung Kling and Batu Berendam; (3) Selangor (4 FIZs)–Teluk Panglima Garang, Sungai Way, Hulu Klang; Pulau Indah; (4) Perak (2 FIZs)–Kinta and Jelapang II; (5) Johor (4 FIZs)–Pasir Gudang, Tanjung Pelepas I, II, III; (6) Sarawak (1 FIZ)–Sama Jaya (opened in 1991).

technology-intensive feature (via setting up R&D and design centers, outbound overseas training of Malaysian engineers to world information communication technology (ICT) centers in Japan, the US and Europe, SME suppliers full automation, deepened semiconductor packaging development, manufacturing process development and design activities)[124].

Apart from such a bold integrated policy in the E&E sector, Malaysia's policy in the automotive is fond for its national car policy which is designed under the country's New Economic Policy (NEP) following the racial tension that erupted into a bloody riot in 1969. Under NEP, affirmative action programs to the Malay ethnic group were introduced in almost every sector of political economic and social life (the so-called *Bumiputera*[125] Policy). Strategic economic sectors and/or industries were then defined to include in the programs.

Automotive sector is no exception under which such a policy corporate sector ownership is targeted to be composed of 30% for Malay, 40% for non-Malay groups (predominantly Chinese and Indian), and 30% for foreign by 1990 (Tanaka 2016). The Malaysian foreign economic policy and its investment regulation has however so far attracted leading multinational companies, particularly those of Japan origin since the promulgation of Investment Incentives Act (IIA) of 1968 and the establishment of the

[124] Responding to such rapid changes, some electronics and electrical (E&E) sub sectors moved up in the value chains, some others adapted by and integrated with the cluster/zones inter-sectoral upgrading, while the remaining others stayed in the conventional medium and low-end electrical and electronic products (*interview 2016*: Negara, Tanaka). The Kulim Hi-Tech Industrial Park (KHTP) in the northern state of Kedah –set up in 1996— was the first hi-tech industrial park. KHTP was home to 24 MNCs and 37 SMEs (2011) seeking for higher value added in the industry (Wulandari *not dated*). Beyond the 2000s, the development of value added activities in RD&D includes the prominent Japanese and Korean lead firms, the strengthening roles of various types of local subsidiaries and suppliers in the E&E production network, and the bold industrial policy framework designed by the Malaysian federal and states government in collaboration with other supporting agencies from the academic, research and policy circles.

[125] The term Bumiputera itself denotes to Malay's ethnic group who is predominantly Moslem and also indigenous ethnic groups in both West (peninsular) and East (Sabah-Sarawak states) Malaysia (Rosli 2006).

Federal Industrial Development Authority in 1967 (called currently as MIDA/Malaysia's Investment Development Authority) (Tanaka 2016).

The following Box 5.2 showcases Malaysia's biased policy vision and strategies on its automotive industry which –in large part— due to a "split" between its National Car Program legacy and contemporary schemes that partially liberalize the sector.

Box 5.2: Split Vision on Value Chains: Malaysia Automotive Policy Setting

Malaysia (along with Singapore) pioneers efforts to connect their industries to GPN in Southeast Asia via particularly electronics sector. Technological advancement of electronics industry in the 1990s that was coupled with worldwide information communication technology revolution has affected the Malaysian electronics industry. The 2000s observed delivering bases of centers for value added activities in the areas of research, development and design (RD&D), brand development, virtual manufacturing, customer service which also include beginning of local companies/suppliers SME to go global for supports of tooling automation in other parts of the world, especially in China, the Philippines and Central America. Malaysia is currently witnessing the presence of leading electronics makers or brands operating their operational headquarters (OHQs) and international procurement centers (IPCs).

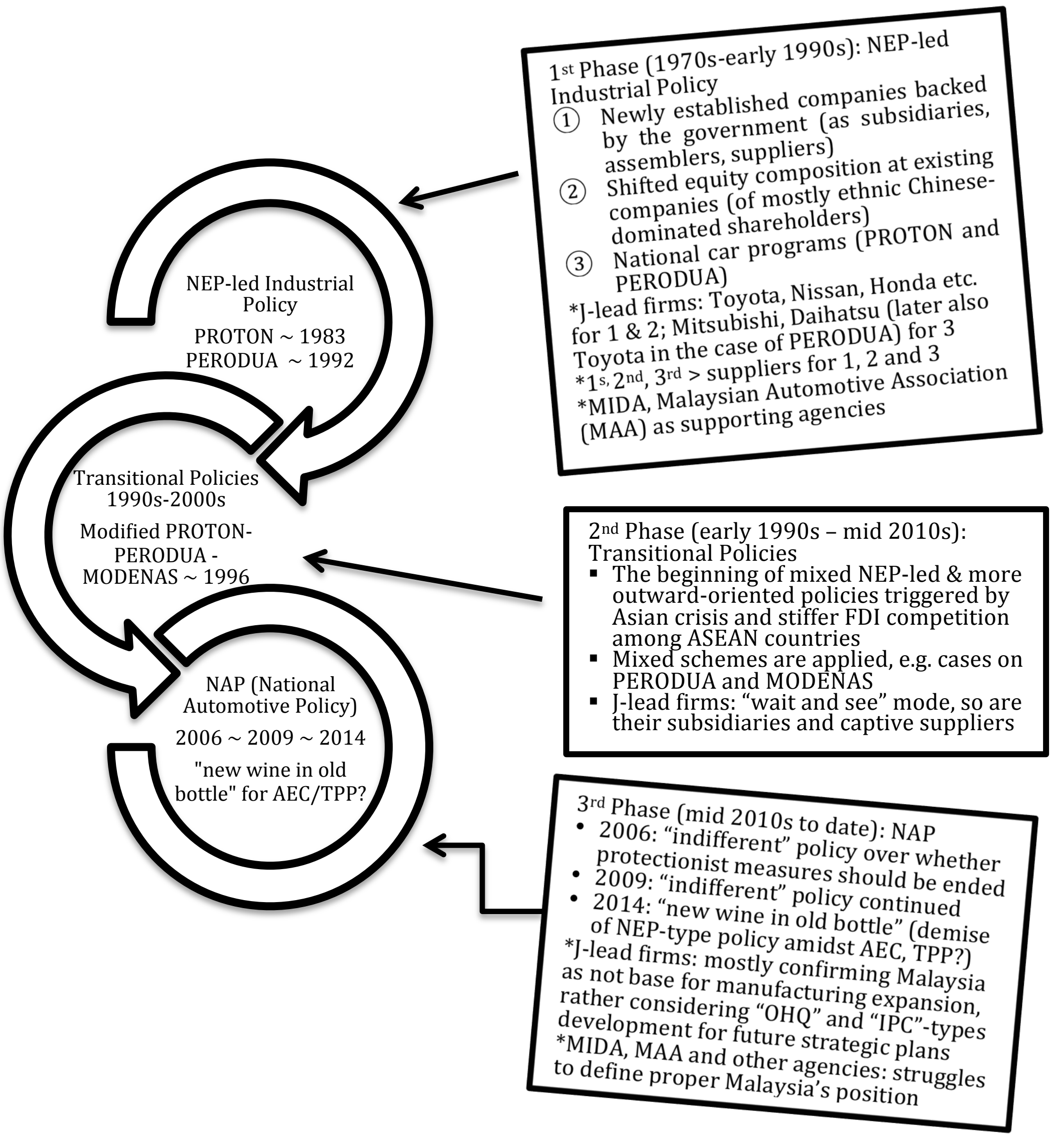
In automotive sector, Malaysia is fond for its national car policy following New Economic Policy (NEP) that has been successfully combined with sound FDI policy for the sector –side by side with the success of its electronics and wider manufacturing sectors. Prior to NEP, automotive assembly activities had been also the feature for both passenger and commercial car manufacturing and production during 1950s and 1960s. The industrial development thus followed the typical ISI (import-substituting industrialization) model. Major players were companies affiliated to or subsidiaries of American or European leading carmakers –and mostly owned by entrepreneurs belong to either Chinese or Indian groups.

NEP subsequently inquired the shift in corporate ownership structures. As a result, during 1970s, Malaysian automotive industry witnessed major changes where company manufacturers, assemblers, and dealerships then shifted. Major development of the country's industry then follows the commencement of its national car programs under the brands of PROTON in early 1980s. Entering the 1990s and facing the 1998 Asian monetary crisis, the industry's related stakeholders (including several key Japanese lead firms/OEMs, their local subsidiaries and suppliers, government agencies and other supporting agencies) respond to changes in production network and specific policy environment by reinforcing the need to greater use of their regional supply chains and production networks. It is in such a drastic change and responses that PERODUA was then initiated. By mid 2000s, Malaysian government introduced NAP (National Automotive Policy). See Diagram 5.2 below for more detailed elaboration on PROTON, PERODUA and NAP.

The following Diagram 5.2 illustrates the emergence, evolution and transformation of PROTON and PERODUA national car project in Malaysia's automotive industry since, during and after implementation of the NEP policy. It presents three phases in its development, i.e. the 1st Phase (1970s-early 1990s) in which a NEP-led industrial policy is the major reference, the 2nd Phase (early 1990s –

mid 2010s) for its transitional policies era, and the 3rd Phase (mid 2010s to date) in which the NAP (New Automotive Policy) has been introduced. It was in the 1st phase that PROTON project commenced under a strong direction and policy guidance of the then Prime Minister Mahathir Mohammad. While PROTON was a byproduct of early Malaysian ISI-type automotive industrial development policy, PERODUA (launched in the heyday of liberalization era in the region) was prompted as an early revised vision of PROTON in lights of stiffer challenges.

Diagram 5.2: PROTON and PERODUA in Malaysia's Automotive Industry



Source: Rosli (2009), NAP (2014), Tanaka (2016)

5.1.3. Thailand

If compared to Indonesia and Malaysia, Thailand offers much more progressive policy schemes in terms of linking its automotive industry to the surrounding regional production networks. The country's investment and its related industrial policy are administered mainly under the Board of Investment (BOI). Such policy scheme is aimed at defining industrial zones classification that is based on particular developmental stages. Some areas are classified under "special economic (development) zones" or SEZs and some other areas are classified as targeted special industrial clusters as outlined in the government/BOI Cluster Policy or the cluster-based special economic development zones (SEDZ)[126] policy.

The Thai government targets to develop two types of clusters: (1) the super clusters and (2) other targeted clusters. Automotive sector is within the first category, i.e. the super clusters, along with several other sectors such as food and medical hubs, digital-based cluster, and eco-friendly pharmaceutical and chemical cluster. The official term for the automotive sector is automotive and parts cluster (BOI 2015)[127]. The following Box 5.3 accentuates Thai government's super cluster

[126] SEDZ covers 2 main phases, i.e. the 1st phase which includes areas in Tak Province-Tak SEZ (Myanmar border), Mukdahan Province-Mukdahan SEZ (Laos border), Sa Kaeo Province-Sa Kaeo SEZ, Trat Province-Trat SEZ (both are in Cambodia border), and Songkhla Province-Songkhla SEZ in the southern part of Thailand; and the 2nd phase that includes areas in Chiang Rain Province-Chiang Rain SEZ (Myanmar and Laos borders), Nong Khai Province-Nong Khai SEZ, Nakhon Phanom Province-Nakon Phanom SEZ (both are in Laos border), Kanchanaburi Province- Kanchanaburi SEZ (Myanmar border), and Narathiwat Province-Narathiwat SEZ in the southern part of the country bordering with Malaysia. For those SEZ scheme, government offers various tax and fiscal incentives (under BOI's investment promotion measures/programs), additional corporate income tax deduction (offered by the Revenue Department), and other governmental measures to ease movement of foreign labors, to develop infrastructure and industrial estates, and to support for land leasing/proprietaries, plus other trade and business facilitation measures such as One Stop Service (OSS) Centers. (BOI 2015, *interviews* 2016: Pongpitak, Rattanpan).

[127] Super Cluster #1 Automotive and Parts covers 7 (seven) provinces, i.e. Ayutthaya, Pathum Thani, Chonburi, Rayong, Chachoengsao, Prachinburi, Nakhon Ratchasima. Super Cluster #2 Electrical

policy on automotive and parts industry by suggesting that the policy is an attempt to immerse the existing automotive industrial cluster into the moving up value chains in the regional automotive production networks.

Box 5.3: Value Chains Immersion: Thailand Automotive Policy Setting

Thailand has detailed plan and policy measures involving a variety of sectors and elaborating tax and other fiscal incentives to be offered to especially foreign investors. It is specified as "super clusters" encompassing prominently automotive and electronics sectors indicating high and advanced development stage of the covered areas. The country's major GPN stakeholders in the automotive industry benefit from government active and progressive roles in the past 20 years (Kohpaiboon, Abe, Okabe, Taguchi 2016).

Captive 1st or 2nd tiers automotive suppliers are struggling with competition from independent suppliers (which are more flexible in supplying non-leading brands but with good market segmentation). This has made leading brands and their local subsidiaries (plus few local suppliers) to engage in limited activities in R&D and design, sometime in collaboration with their Malaysian or Singaporean-based company headquarters (Kohpaiboon 2016).

Automotive industry in the country has strong supports from research and policy circles. Major supporting agency in automotive research, advisory, consultancy and policy advocacy is Thailand Automotive Institute (TAI). With such a solid backing from relevant stakeholders, Thai automotive industry deals with major changes in its surrounding supply chains and production network, both domestically/locally and internationally/regionally. In such a way, the industry hence benefits from the super clusters policy incentives.

Thailand automotive major stakeholders include Japanese lead firms/carmakers/OEMs that dominate car production capacity by more than 85% of the total car production capacity. In parallel the Thai government's bold move for value chains immersion, strong supports from research and policy circles (such as particularly TAI) have facilitated further localization in most manufacturing and production stages of the automotive industry.

Positions and accomplishment of Thailand automotive industry in the past two decades (which led to the Super Clusters policy schemes and Japanese firms dominant contribution, as previously described) are resulted from introduction of liberalization policy in the automotive sector. Initially implemented during 1991-1999, the policy lifted the ban on imports of completely built up vehicles (CBUs) and substantially reducing tariffs on both CBUs and CKDs. With such a policy,

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Appliances, Electronics and Telecommunication Equipment also covers 7 (seven) provinces, i.e. Ayutthaya, Pathum Thani, Chonburi, Rayong, Chachoengsao, Prachinburi, Nakhon Ratchasima. The fieldwork however only covers some of the areas in Chonburi and Rayong provinces, in addition to the Bangkok Greater Area (which includes traditional industrial zones in or around Bangkok, Samut Prakan and Nontha Buri).

investments for new establishments of assembly plants for passenger type vehicles were approved and foreign ownership in the automobile assembly industry was deregulated allowing 100% foreign ownership[128].

New Automotive Investment Policy[129] was then launched by BOI (in January 2002) aiming to develop Thailand as a regional center of the automotive industry in Southeast Asia. The policy was targeted pick-up truck production and related components as the first "product champion." It also aimed at functional upgrading by providing various tax incentives for the establishment of R&D and regional operating headquarter (ROH) functions (Natsuda and Thoburn 2011).

Responding to such policy scheme, international automotive manufacturers/OEMs (particularly the ones originated from Japan) began to further relocate their production bases to Thailand, such as Toyota and Isuzu. Toyota decided to relocate its global pick-up truck production base from Japan to Thailand, accessing Thailand's large pick-up truck market, commencing with its "IMV (Innovative International Multipurpose Vehicle)" project in 2002 (Natsuda and Thoburn 2011). The company also aimed to use Thailand as a global production base for its Hilux-level small size multipurpose vehicles, started producing two million units16 and exporting CBUs to over 90 countries, and CKD parts to 9 countries in 2004 (Shimokawa 2010, pp.254-256 as quoted in Natsuda and Thoburn 2011). Toyota even selected Thailand not only as a production base, but also as a product development base for the IMV project[130].

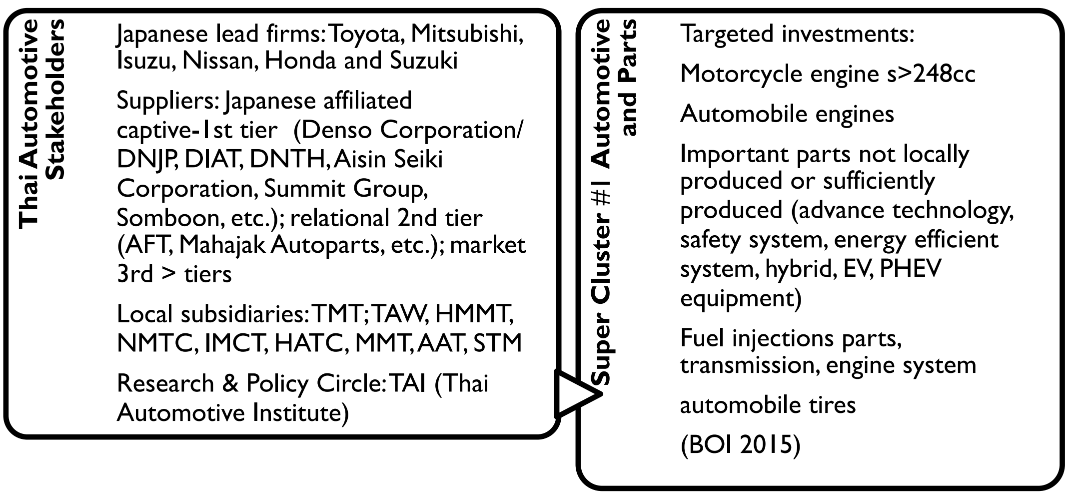
[128] Prior to this policy, Thai automotive development followed a typical East Asian pattern in which export is encouraged, thus expanding, but at the same time domestic market is highly protected (Natsuda and Thoburn 2011 quoted Chang 2002).

[129] The policy scheme provided exemption of import tariffs on machinery, and three years corporate tax exemption for related components producers in the case of comprehensive projects of over 10 billion baht, including suppliers (Fourin 2002, pp.214-215 as quoted in Natsuda and Thoburn 2011)

[130] In 2005, Toyota established its first R&D center in Thailand outside of North America and Europe (Staples 2008, p. 209 as quoted in Natsuda and Thoburn 2011). Toyota has also relocated most of its

The following Diagram 5.3 sketches out current state of play in the Thai automotive industry, particularly in dealing with major changes in its production network and how the industry benefits from the super clusters policy incentives. Thailand automotive major stakeholders include Japanese lead firms/carmakers that dominate car production capacity by more than 85% of the total car production capacity[131]. In parallel to such a bold move for value chains immersion, strong supports from research and policy circles have been gaining momentum since initiation and establishment of Thailand Automotive Institute (TAI)[132].

Diagram 5.3: Thai Automotive GPN Stakeholders the Super Clusters Policy



Source: author's assessment

Abbreviations: DNJP (Denso Corporation), DIAT (Denso International Asia Co. Ltd.), DNTH (Denso Thailand), AFT (Aoyama Fastener Thailand), TMT (Toyota Motor Thailand), TAW (Toyota Auto Works), HMMT (Hino Motor Manufacturing Thailand), NMTC (Nissan Motor Thailand Co Ltd), IMCT (Isuzu Motor Corporation Thailand), MMT (Mitsubishi Motor Thailand), AAT (Auto Alliance Thailand), SMT (Siam Toyota Motor), EV (Electric Vehicle), PHEV (Plug-In Hybrid Electric Vehicle).

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regional operating functions from Singapore to Thailand by establishing Toyota Motor Asia Pacific Engineering & Manufacturing (TMAP-EM) in 2007.

[131] Leading brands include Toyota, Mitsubishi, Isuzu, Nissan, Ford-Mazda (AAT-Auto Alliance Thailand), Honda, GM, Ford and Suzuki.

[132] TAI is established in 1998 based on the Cabinet Resolution (July 7, 1998) and the Ministry of Industry's Order No. 314/2541. The institute's roles are to recommend strategic plans and measures for the development of the automotive industry; support the operation of organizations in both private and government sectors to achieve the defined objectives; coordinate with related organizations for mutual operational support; and provide necessary services to manufacturers, such as product testing and inspection, training, and consultancy. Its scope of activities includes research, productivity improvement, product design, research and technology development, standard and product testing, human resources development and database.

The following Table 5.2 presents international automotive OEMs, their production capacity and manufacturing sites in Thailand:

Table 5.2: International OEMs and Thai Automotive Manufacturing Sites

OEMs	Annual Production (% of total), 2015	Sites
Toyota	790,000 units (25%)	Samutprakan, Muang, Chonburi-Amala Nakom, Bangpho, Plaeng Yao-Gateway City
Mitsubishi	510,000 units (16%)	Chonburi-Laemchabang Industrial Estate
Isuzu	400,000 units (13%)	Samutprakan, Bangkok-Latkrabang, Rayong
Nissan	300,000 units (10%)	Samutprakan
Ford-Mazda (AAT/Auto Alliance Thailand)	370,000 units (12%)	Rayong
Honda	280,000 units (9%)	Ayuthaya
GM	250,000 units (8%)	Rayong
Ford	150,000 units (5%)	Rayong
Suzuki	100,000 units (3%)	Rayong-Hemaraj Eastern Seaboard Industrial Estate (since 2009)

Source: Thai Auto Book 2015 and *interview* (2016) Okabe (JETRO)

5.2. Local Backward Linkages in ASEAN

Having previously outlined the key ASEAN countries automotive industry and policy setting (in Indonesia, Malaysia and Thailand), this section recapitulates how the Toyota Group (particularly under its lead firm/TMC and 1st-tier suppliers/Denso Corporation) accomplishes their production/manufacturing bases and market outreach, i.e. by setting up local/domestic backward linkages in ASEAN in the areas of supply chains (for procurement, delivery and other logistics), FDI activities, R&D and design, local business partnerships for sales and marketing and after-sales services. The next sub-sections (5.2.1 and 5.2.2) outline local backward linkages of Toyota and Denso in Southeast Asia.

5.2.1. Toyota Backward Linkages in ASEAN

The following Table 5.3 offers the summary of Toyota activities in several key ASEAN countries (Thailand, Indonesia, Malaysia, the Philippines and Vietnam):

Table 5.3: Toyota Backward Linkages in ASEAN

Supply Chains	FDI	R&D and Design	Local Partnership
Toyota's procurement, supply chains and other logistical activities in Southeast Asian –which have been conducted through its overseas coordinating company in Singapore (i.e. under Toyota Motor Asia Pacific Pte Ltd/TMAP-MS)— have pointed out the core role of TMAC-MS as a regional procurement center and operational headquarter (OHQ)	Toyota FDI activities in Southeast Asia have been focused on developing both the existing local facilities and new ones, particularly in Thailand and Indonesia of which Toyota foreign subsidiaries in both countries serve as the key players/stakeholders.	Toyota has developed local centers for R&D and design in Thailand and Indonesia, particularly in conjunction with the company's need for specification of vehicles marketed for local markets which have distinct consumer needs and preferences	Solid partnerships with its foreign subsidiaries and local partners have directed Toyota towards a coherence production scheme which is fully-adapted to local manufacturing needs of car production as shown in its partnerships in Thailand and Indonesia
	THAILAND Brownfield investments: focusing on manufacturing of pick-up and double-cabin type trucks, medium type passenger cars, and production of diesel engines and related parts Greenfield investments: focusing on manufacturing of compact type	THAILAND R&D activities are centered in/through Toyota Motor Asia Pacific Engineering and Manufacturing Co Ltd/TMAP-EM and in collaboration with several local research centers/institutions, such as TAI (Thai Automotive Institute) and TNI (Thai Nichi Institute of Technology)	THAILAND As the local manufacturing needs grow and are oriented towards exported cars and hub of regional supporting industries for car production, Toyota local partnerships have shifted towards capacitating local production facilities that are comparable to the ones located at the home country

	passenger cars, in collaboration with Daihatsu Thailand, a fully-owned subsidiary of Toyota		
	INDONESIA Brownfield investments: focusing on manufacturing of medium type passenger cars Greenfield investments: focusing on production of gasoline engines and related parts;	INDONESIA In addition to its internally-focused R&D and design centers developed by Toyota subsidiary (PT Toyota Motor Manufacturing Indonesia/TMMIN) and partner (PT Toyota Astra Motor/TAM), latest initiative for a design center was launched in 2016 in collaboration with Daihatsu Indonesia and a local university in Jakarta	INDONESIA Local partnerships have resulted in the evolving application of local content requirements for car production as replicated in the case of Toyota Kijang Innova manufacturing stages (which overtime shows the flexibility and adaptation of local partnerships to the changing regulation on local content requirement)
	THE PHILIPPINES The existing facilities are fully utilized for mostly domestic market, yet expansion is underway (as of 2016) as Toyota plans to respond the newly-launched government policy on Comprehensive Automotive Resurgence Strategy (CARS) program	MALAYSIA Recent development of Daihatsu collaboration with Perodua (as of 2015) shows future strategic move of Toyota in possibly concentrating on compact cars or EV vehicles manufacturing	VIETNAM Started manufacturing operation in 1995, Toyota's production activities are currently under a sensitive situation as the company struggles to keep its operation due to various reasons, including decreasing profit margins, local contents requirement/localization policy and unattractive tax and other incentive schemes offered by the government.

5.2.2. Denso Backward Linkages in ASEAN

In the case of Denso, with its much smaller size and value of investment and business operations, the company generally has been in line with Toyota strategy, i.e. by tagging into its overall plan to implement its ASEAN IMV project. Under the plan, Denso focuses on its supply chains and manufacturing operations, particularly in the ASEAN6 countries with the following conditions:

1. Denso existing investment in Southeast Asia is conducted under its subsidiary companies in ASEAN6 with expansion plan is underway (as of June 2017) in Thailand, Indonesia and Vietnam for the next two years:
   - The plan includes new plant in central Thailand, additional plant in Vietnam and extended existing plants in Indonesia;
   - New plant in Thailand is concentrated in production of automobile air conditioner parts, aluminium radiators, pumps and diesel injectors;
   - Additional and extended plants in Indonesia and Vietnam for production of air-conditioner compressors, airflow meters and oxygen sensors.
2. Denso supply chain management and its procurement scheme in ASEAN6 have been implemented by having its:
   - Singapore subsidiary (Denso Singapore Pte Ltd, holding company of 16 Denso subsidiaries in the Asia Pacific area) as a regional center for finance, logistics and after-market sales, not only among ASEAN6, but also for Asia-Pacific wide area;
   - Malaysia subsidiary (Denso Malaysia Sdn Bhd, established in 1980 and the largest automotive components manufacturer in Malaysia) as a specialized

manufacturer for and producing variety of thermal and electronics parts/products for local and export markets;

- Philippines subsidiary (Denso Philippines Corporation/DNPH, established in 1995 and having a design engineering center) as producer of instrument clusters, air conditioners and after-market products for local market;
- Indonesia subsidiary (PT Denso Indonesia, established in 1975 and having 3 plants) as producer of spark plug, car and bus air conditioners and 14 other products for local and export markets;
- Thailand subsidiary (Denso Group in Thailand, established in1972, consisting of 9 affiliate companies) as hub for automotive parts and components production for ASEAN-wide and producer of all variety of parts and components for local and export markets;
- Vietnam subsidiary (Denso Manufacturing Vietnam, established in 2001) as manufacturer of certain air controller, exhaust gas valve, linear solenoid for automatic transmission parts for local and export markets;

3. In terms of R&D and design centers, each of Denso subsidiary in ASEAN6 has internally-developed engineering design center which serves in-house advise for advancement of manufacturing and production techniques, including product development and quality standards;
4. Local subsidiaries are especially solid in countries with long history of Toyota manufacturing activities (i.e. in Thailand since 1972 and Indonesia since 1975), and in countries with sufficient automotive parts production capacity of either Toyota or other OEMs (i.e. in Malaysia since 1980 and the Philippines since 1995).

5.2.3. Strategic Measures

With those current statuses of Toyota and Denso's backward linkages in ASEAN, the following Table 5.4 summarizes the two companies strategic measures aiming to maintain such backward linkages in the areas of manufacturing facilities and processes, product development, R&D and design, and sales, marketing and after-sales services:

Table 5.4: Strategic Measures of Toyota and Denso Backward Linkages in ASEAN

	TOYOTA	DENSO
Manufacturing facilities and processes	Full automation and robotics are applied in newer plants, semi automation techniques are applied for the existing facilities and tools;	Semi automation and robotics are applied in the existing plants
Product development	ASEAN IMV Project serves as one of global major platforms and have lead to enhanced product specification and progressive vehicle design engineering at local manufacturing sites (with more locally-developed car specification and types)	Module electronics automotive products/parts and components to be supplied to Toyota and other OEMs are much more relied on standards, engineering design and specified needs being developed and manufactured by Denso, leaving wider rooms for product development in the hands of Denso R&D and Design team
R&D and Design	Fuller set of R&D and Design facility has been set up adjacent to Toyota Thailand manufacturing plants and facilities, in collaboration with local institutions, and being utilized internally for information and staff exchanges among Toyota subsidiaries and partners in Southeast Asia	In-house engineering design facilities are available inside plants or manufacturing sites managed by each Denso subsidiary in ASEAN
Sales, After-Sales, After-Markets	Although post-production activities have been the areas of expertise conducted by Toyota local partners, in the past 15 years or so these areas have also been subject to collaboration involving not only TMC as a lead firm, but also its manufacturing subsidiaries, especially in Thailand and Indonesia (i.e. as they directly or indirectly involve in marketing, such as for commercial packages, merchandises, brand management, and after-sales activities, such as for educational purposes, fans clubs activities and research)	After-market sales which valued substantially have driven the company to conduct bold marketing activities and brand management among Denso subsidiaries in ASEAN6, in collaboration with Toyota local partners as the main users/clients of after-market parts and components (often as the sole agent/dealer)

5.3. Towards ASEAN Automotive RVCs: Moving-up the Value Chain

A functioning regional value chain requires a well-developed FDI scheme to be planned and implemented in individual ASEAN country. However, when confronting with value addition challenges, certain FDI issues are elementary. In the case of Indonesia, for example, the question remains on how the country addresses on the exiting versus green fields FDIs (Husin 2016, Nagae 2016). It is thus on how the country sees the future look of its overall FDI schemes. In the case of Malaysia, the *bumiputera* policy legacies linger the country's FDI and industrial policy, on especially the automotive sector (Tanaka, Bin Elik, Amminuddin, Kerani 2016). It is a challenging question for the country on how the effect of its contemporary FDI promotion schemes would affect to its affirmative policy to local stakeholders. Nevertheless, the case of Thailand presents a policy measure that goes beyond conventional approach to FDI promotion and industrial policy (Techakanont 2016). The policy has made it possible to immerse and mix value chains activities among local subsidiaries and 1st or 2nd tiers suppliers.

The latest Thai strategic measure is centered on the "super clusters" policy in which promotion of FDI production and industrial manufacturing is to be shared among different industries. It is generally set up for intermediating roles of specific suppliers (such as in the digital-based cluster, e.g. digital GPS mobile equipment and application software) so that they could be plugged in multiple industries, such as the automotive. As a result of absence of such a measure, local electronic suppliers (that supply for automotive industry) in Indonesia have to make no easy option of whether to endure their conventional positions as Original Equipment Manufacturers

(OEMs) or alternatively to switch roles as Replacement Equipment After-Market Manufacturers (REMs) (Husin 2016). Super clusters scheme is also to anticipate abundant numbers in local automotive parts and component suppliers in Thailand (Kohpaiboon 2015, Techakanont, Wongwiwat 2016). A reverse situation applies to the Indonesian case where lacking numbers of local automotive suppliers is a major challenge for its future auto industry (Husin, Soerjono, Nagae 2016).

5.3.1. Common Policy Platform in R&D and HRD & Vocational Training

In order to sustain, ASEAN automotive RVCs need a common policy platform that goes beyond national borders and cut across different regulations. Malaysian case offers an effective pattern. As a result of the new automotive policy, the government (in response to its counterparts of Thailand and Indonesia) sets up a policy platform in common and parallel to existing GPN (Bin Elik, Amminuddin 2016). The country's local automotive suppliers therefore have to be adapted to frequent shift in quality standardization (Kerani 2016). Long before such a move, in the electronics industry, Malaysia local electronics suppliers have maintained their key roles in GPN, especially as part of the growing R&D and design centers and services activities which has began to cover also the automotive sector (Tanaka 2015, 2016). As the largest market in ASEAN automotive, Indonesian policy makers aspire to develop industrial clusters oriented towards RD&D (Gobel 2014, Pongoh, Larosa, 2015, 2016). The existing capacity is limited, but there are some good practices of local level R&D and design centers (Hayato 2016). Thailand auto industry is in its path for technical breakthrough by outsourcing prototype 3-D design to local parts and component manufacturers (Techakanont, Kohpaiboon 2016).

Setting up a common policy platform are quite challenging as ASEAN countries struggle to adjust existing vocational training and R&D and design schemes. Thailand is looking for possibility of integration of existing college/university level internships program to the super clusters policy need (Chaichanawong 2016). Indonesian stakeholders discusses on where to put emphasis when technical capacity of its automotive industry is to be developed (Pongoh, Larosa, Siswanto, Utomo 2016). The concern (which is also shared by their counterparts in Thailand) is whether to stay at current value chains automotive manufacturing or to have inter-sectoral value chains shift, i.e. to initiate a wider R&D and design orientation in its upcoming automotive industry.

If the former option is preferred (i.e. staying at pure manufacturing value chains), one possibility is to further link existing manufacturing technical know-how to current practices of HRD and vocational training undertaken by many Japanese lead firms and supported by Japanese government scheme. In the case of Indonesia, linking existing curriculum of vocational colleges with the current Japanese manufacturing network in home appliance electrical products seems to be much feasible, by utilizing good practices from "Kenshusei" alumni and widening scope of the existing HIDA (Japanese Overseas HRD and Industry Cooperation Agency) training scheme among others (Gobel 2014, Kadir 2015, Wada 2015, Hayato 2016). Typical ASEAN automotive industry (such as the one developed under Toyota IMV Project) capacitates engineers and workers at local firms, suppliers and subsidiaries by charting conventional style of management practiced by the lead firm (as in the case of Toyota in Thailand and Indonesia).

If the latter option is preferred (i.e. by shifting the value chains inter-sectorally), the policy platform shall be an open and inclusive one, i.e. to attain international/regional expansion of industrial expertise and technical capacity, and inter-industry collaboration and standard harmonization within the GPN. The Malaysian electronics industry integration to the automotive one puts forward an illustration where expansion of local companies/suppliers network in overseas training activities are participated by local engineers and managers acting as trainers for their overseas partners (Kerani 2016). Several Japanese lead firms production networks in ASEAN applies similar pattern where engineers are transferred among factories under AEC industry services-related harmonization schemes (Sapta 2016, Tijaja 2015). Adopting lead firm's production system (such as TPS/Toyota Production System) is also preferable, i.e. in designing on-the-job, in-house, vocational college graduate employees training in the wake of growing attractiveness of manufacturing employment (Watanabe 2016).

5.3.2. Regional Industrial Cooperation: ASEAN Schemes, RVCs Best Practices in Automotive Sector

In the context of institutionalizing current industrial collaboration practices, ASEAN devises several schemes in support of stakeholders' efforts to capture value added within the Japanese automotive production network and value chains in the region. Stakeholders are to take benefit from the schemes. Developed by ASEAN Secretariat in the framework of ASEAN integration monitoring (Tijaja, Bakhtiar 2016), the schemes offer the following possible utilization:

(1) Utilizing beyond MRA (Mutual Recognition Agreements), especially in engineering sector services where the two industries are mostly in need of regional technical and engineering capacity building exchanges;
(2) Benefiting from ASEAN Business Advisory Council (ABAC) activities and initiatives, especially for ASEAN Trade and Investment Centers (ATIC) which is initiated in the framework of ACIA (ASEAN Comprehensive Investment Agreement);
(3) Developing the contemporary trade facilitation (TF) model on standards harmonization and conformance as outlined in the ASEAN Guidelines on STRACAP (standards, technical regulations and conformity assessment procedures) - cosmetics sector as best practice;
(4) Advancing ASEAN regional economic connectivity scheme, especially through existing regional value chains (RVCs) and regional production networks (RPNs) – automotive and electronics as key examples;
(5) Connecting to national focal points established in ASEAN member states in the framework of TF and non-tariff measures agreement – a case of ASEAN Single Window initiative.

MRA in engineering sector services provides a feasible launch pad for future cooperation among stakeholders in the two industries, especially in HRD and technical capacity building training and exchanges. ASEAN governments and other related agencies are to design their training programs in parallel to the firms and suppliers actual need. Through ABAC whose memberships consist of prominent business and industrial representatives, impact of future industrial cooperation could go beyond conventional inter-firm relations. Initiative on ATIC further provides a platform for detailing regionally designed inter-firm relations at regional level that are adaptive to the current changes in the GPN.

ASEAN cosmetics industry is among one of the ASEAN Priority Integration Sub-sector (PIS) that offers best practice of regional industrial collaboration. In implementing harmonization and integration measures, the cosmetics industry stakeholders take the benefit of regionally integrated framework of product standards and regulation. They are at best utilizing the ASEAN member states harmonized framework in TF and other non-tariff measures via ASEAN Single Window. Electrical equipment and electronics is also among the ASEAN PIS that needs significant boost in its harmonization and integration measures given its dominating regional activities in RD&D, production, marketing, distribution and assembly of the many precision components that make up the final products. Although automotive is not in ASEAN PIS, the same effort should be at the stakeholders' top concern.

Conclusion

The study begins with three sets of questions which encompass, first of all, contemporary changes characterizing Japanese automotive production network in Southeast Asia and the country's automotive trade relations with ASEAN countries highlighting such changes. Secondly, it touches questions on production shifts and strategy of Japanese automotive firms driving further local production in the host ASEAN countries and signifying upgrading efforts in the region's automotive value chains. And last of all, it addresses questions on the notion of regional value chains (RVCs) in automotive sector (which been envisaged by firms and other related stakeholders in the Japan-ASEAN automotive production network), the host ASEAN governments responses to such efforts and the policy lessons for the host governments and other relevant stakeholders in the region's automotive value chains.

Upon offering a conceptual framework clarifying concepts on regional economic integration, global production network and global value chain (GPN/GVC), GPN 1.0, GPN 2.0 and value chains upgrading, the study proposes three major arguments on how changes in ASEAN automotive network led by Japanese firms have contributed to production shifts, localization of production, and transformations in upgrading strategy and local productive capacity of firms. These proposed arguments are derived from a theoretical comprehension signifying the importance of actor-specific (firm-level) strategy in organizing production network (GPN 2.0) and an endeavor to go beyond the conventional "smiley curve" model of value creation by presenting Toyota production and business operation in the region.

The first argument relates to dynamic changes itself (of the Japanese automotive production network in Southeast Asia) which are mostly driven by intra industry trade where parts and components are procured and transferred along the supply chains of its automotive lead firms. At its macro-level, the changes are characterized by specific patterns of trade and trends of value added trends in key automotive traded products (i.e. automotive parts and accessories, passenger cars, vehicles for the transport of goods and public transport type motor vehicles) confirming shifts of Japanese automotive firms production and manufacturing facilities to the region.

The second argument, therefore, touches the notion of production shifts as it results in deepened localization of production and upgrading activity. At its micro-level, the production shifts and localized upgrading strategy of Japanese automotive firms (exemplified by Toyota case in Southeast Asia) have deepened localization of manufacturing at their sites located in the host Southeast Asian countries. Centered around on the so-called Toyota ASEAN IMV (Innovative International Multi-purpose Vehicle) Project, Toyota manage to go through measures which reflect accumulating processes of localized production and regional supply chains. The processes are spanned across the value chains that have been developed through combined activities of FDIs (both green and brownfield ones), regional procurement and supply chains, locally developed R&D centers and reinforced subsidiaries and local partnerships.

Finally, on its third argument, the study maintains that offsetting a region-wide automotive value chains is subject to upgrading attempts in the existing value chains. The Toyota case represents a value chain structure in the region's automotive production network that is characterized by typical hierarchical networks with a distinctive "skewed" smiley curve indicating both locational/spatial and distributional structures. Such value chains structures applied by Toyota offers prospect for adoption within ASEAN countries automotive FDI promotion scheme and industrial development policy, i.e. by benefitting from value added that is captured/created locally through the company's spatial and distributional structures embedded in its supply chains and production network. Cases from ASEAN3 governments –as the study found— reveal different and varied responses and policy schemes in which the case on Indonesia presents domestically biased policies, the case of Malaysia offers split vision towards value chains upgrading, and the case of Thailand shows official endeavors to immerse policies for moving-up the value chains.

Summary on the Study's Major Findings

In line with those proposed arguments, the study has also presented its major findings which are categorized under the two assessment methods, i.e. micro and macro-levels, and are presented respectively in Chapter 2 (on the macro-level) and Chapter 3 and 4 (on the micro-level) and Chapter 5 (on its policy outlook). The following Table C-1 (Summary of Major Findings) summarizes those findings:

Table C-1: Summary of Major Findings

Level of Analysis	Content Reference	Structure of the Arguments		Findings
Macro-Level	RQ#1 – Chapter 2	Changes of the Japanese automotive production network in Southeast Asia	Changes signified by specific trade patterns	Japan-ASEAN trade patterns in key automotive products reflecting production shifts to the region ASEAN3 (Thailand, Indonesia & Malaysia) dependence (for imports) on specific products/parts of gearboxes and bodies/cabs, but less dependence on other varieties of parts and accessories (indicating increased local productions)

			Changes signified by trends in value added	Japan captures its value added much more domestically than internationally ASEAN3 (especially Thailand) captures more and more value added albeit its much lower values than that of captured by Japan
Micro-Level	RQ#2 – Chapter 3	Production shift and strategy of Japanese automotive firms	Production shifts resulting in deepened localization of production	Firms –as exemplified in the cases of Toyota, Denso and Aisin Seiki— manage to go through specific measures that reflect accumulating processes of localized production at local sites (in ASEAN3 and more recently in the Philippines) under shared regional supply chains and production network Adoption of Toyota ASEAN IMV Project in the region has led to enhanced product specification and progressive vehicle design engineering at local manufacturing sites which requires the accumulation of local production capacity
	RQ#2 – Chapter 4	Upgrading strategy of Japanese automotive firms	Localized production bringing about upgrading activity in pre (upstream) and during (mid-stream) production stages	Toyota value chains in Southeast Asia represent typical but distinct regional value chains of Japanese automotive firms operating in the region: (1) It is typical in its basic value creation model where value added is captured ("skewed") more in pre (upstream) and during (mid-stream) production stages (2) It is distinct in its locational and distributional structure where shares of 1st tier suppliers, local subsidiaries and partners are of significantly apparent in domestically-captured value added at local sites Under such value chains structure, the Toyota case offers a comprehension that firms upgrading strategy (as exemplified by TMC, DNJP and ASCJ) in the region has contributed to the formation/accumulation of manufacturing capacity and technical skills at their local sites
	RQ#3 – Chapter 5	ASEAN RVCs in automotive sector	Offsetting region-wide automotive value chains is subject to upgrading attempts in the existing value chains	ASEAN3 governments automotive FDI and industrial development policies have been adjusted variedly in light of such value chains structure Cases from ASEAN3 governments reveal different responses and policy schemes where Indonesia presents domestically biased policies, Malaysia tends to have split vision and Thailand endeavors to immerse

				its policies for moving-up the value chains
Policy Outlook	Chapter 5	ASEAN3 automotive industrial development	Forward-backward linkages in the ASEAN3 domestic automotive industry needs to being part of the regional production supply chains and production network	Backward linkages of leading automotive firms (as exemplified in the cases of Toyota and Denso) offer important impact in connecting domestic automotive lower tier suppliers and supporting industries in the ASEAN3 host countries to the firms supply chains and production network A need for common policy platform in R&D, HRD and vocational training that is set up transnationally among ASEAN countries automotive industry and its supporting industries crosscutting different regulations across borders
		ASEAN regional scheme	Toyota value chains as RVC best practices in regional automotive industry	Institutionalizing existing industrial collaboration practices under ASEAN cooperation schemes to support automotive stakeholders' in capturing value added within Japanese automotive production network in the region

Significance of the Study and Notes for Further Research

In line with the proposed argument reiterated earlier, contribution of the study is two-fold, i.e. both scholarly and practically. First of all, in terms of theoretical development, it plays a part in advancing alternative perspectives in the elaboration of topic on GVCs/GPNs and its related impacts to upgrading efforts by firms and other relevant stakeholders, localization of production, and local productive capacity building and industrial development. Within the study of international relations and international political economy, advancement of alternative perspectives –such as the one offered by GPN 2.0 framework— implies persistent endeavor in comprehending the very nature of economic integration (such as represented in the cases of ASEAN economic regionalization).

Thus, the study contributes in such an endeavor by offering a specific case involving an industrial sector (i.e. automotive) with a significant share in the region's integration to the GPNs/GVCs. By taking Japanese –and more specifically Toyota—experiences, the case also offers a comprehension as to how advanced economies (such as Japan) and a leading multinational firm (such as Toyota) partakes and defines distinct roles in economic regionalization or regional economic integration involving developing economies (such as ASEAN countries) and local firms (such as Toyota and its 1st tier suppliers subsidiaries and local partners operated in the host ASEAN countries).

Second of all, practical contribution of the study rest in its policy outlook, i.e. by proposing key issues that would be major concerns for policy makers, regulators and other automotive stakeholders in the upcoming development of the industry. The study outlines possible adoption of value chains structure that is typically applied by leading automotive firms such as Toyota within the existing ASEAN FDI promotion scheme and industrial development policy. By identifying policy impacts/implications of Toyota's local backward linkages and key issues in efforts for moving up to higher value chains, the study expect that ASEAN policy makers are well aware of details on strategic moves of firms in light of dynamic but intricate changes in the value chains.

An apparent example of such dynamic but intricate changes in the value chains is the most recent development of electric vehicles (EVs) of which Toyota has been very keen to adjust and prepare well in advanced. Toyota has committed that, by 2025, all Toyota car lineups are expected to be electric-based which include hybrid (HEVs), plug-in hybrid (PHEVs), battery-operated (BEVs) and hydro-based or fuel cell

(FCEVs)[133]. Such strategic move towards cars electrification manufactured within Toyota production network would mean upcoming changes in the company's value chain structure and would certainly influence its production bases in ASEAN.

Aside from its academic and practical significance and contribution, a couple of weak points are observed at some stage in conducting the study. The first shortcomings originate from the nature of the study's micro-level analysis which requires deep comprehension on how, at firm-level, certain strategic decisions on the allocation of production and manufacturing activities are actually taken and why those decisions are engaged by parties concerned within their supply chains and production networks. Such a comprehension is vital in light of the study's intention to uncover mechanics and actual process of production networks involving complex movement and procurement of parts and components prior to the final stages of car manufacturing or assembling[134].

Such an obstacle has a peculiar dimension as the study takes on Japanese firms as its key cases albeit being at a Japanese academic institution with strong supports and helps from the author's research supervisor and colleagues. The peculiarity has roots in lacking capacity to acquire much deeper data and information sources which require proficient Japanese knowledge, including mostly in terms of usage of Japanese as the working language at firms as well as academic and research circles. This study

[133] In its latest move, Toyota is planning to produce electric battery in cooperation with Panasonic with huge investment of US$13.3 billions by 2030. The company also indicates that production of electric-based cars in its manufacturing sites in China will be increased anticipating incentive schemes for EVs production offered under the latest Chinese government policy on EVs.

[134] The study hence puts a big deal of efforts to collect relevant data and information through series of in-depth interviews with pertinent resource persons at firms and other related agencies and institutions, company/factory site visits, and documentary surveys on applicable company profile, reports, websites and other primary and secondary sources on firm activities. Despite such efforts, major obstacle is exposed by the facts that firm-level data gatherings would require particular research capacity with regards to prior adequate knowledge and sufficient direct contacts or networks for actually getting "insider views" of the firms under study.

is certainly short of having the opportunity to dig deeper and taking much deeper analysis that is based on "first hand" observation that is available under such a distinctive setting.

For such a deficiency, this study takes the following notes should further research is conducted in a similar situation and setting. Adequate prior knowledge and skills, including in particular adequacy or proficiency in Japanese language, are perquisite for acquiring more pertinent data and information. Such prior capacity would devise studies on Japanese firms with more comprehension on their actual activities and motivations. In an absence of such capacity, however, one could basically rely on a scheme of co-authorships or collaborative research works with an acknowledged Japanese author or researcher who would complement the research works for his Japanese distinctiveness.

The second shortcoming of the study concerns with the study's determination to combine the macro-level of analysis and the micro/firm-level one. The study tries to link logical understanding between macro trends and patterns in the changes of production network (by utilizing automotive trade data analysis) with the actual allocation of production and manufacturing activities under a production network (by employing content analysis on firm strategies and decision making context). In doing so, it adopts the latest conceptual framework in GVC/GPN theorization (i.e. the so-called GPN 2.0) which results in a redefined model of smiley curve value creation.

However, since the GPN 2.0 framework is conceptually under developing stage, this study is lacking in solid theoretical grounding. Topic on automotive production network and value chains, in particular, is among understudied sectors or industries utilizing this specific framework as indicated by limited relevant references in the past ten years or so. As a result, the study adopts GPN 2.0 framework merely as a working framework where its default conceptual template (which is derived from sectors or industries different from the automotive in terms of its supply chains and production network complexity) is applied. One tangible fallacy –that might generate from such an application— is of course in the depth-ness of analysis which possibly neglect the intricacy and complexity of automotive production network not apparent in other sectors/industries.

Should future research is conducted in an analogous way, a small note for such a fault lies on how to setting up research methodology in the first place. It should cover a literature review which include works not conventionally listed under GVC or GPN-related topics, i.e. the ones that might appear in the form of working papers and presentation materials. Such sources are not necessarily presented in academic conferences, but could be in the gatherings, training and other functions organized by automotive firms or associations. They could be also informal correspondence, presentation materials or meeting minutes distributed among automotive business circles or firms executives.

By so doing, future research could amend such void in the methodology, i.e. by advancing conceptualization that is oriented towards understanding firms upgrading strategies in a dynamic changing environment of an automotive production network. A deeper comprehension on firm-level/actors-specific strategies is the core part of GPN 2.0 theoretical development. Without deepened analysis on how automotive firms reformulate their upgrading strategies in light of dynamic changes in the production network, future research on related topics (such as on the formation of automotive value chains) that is designed to adopt GPN 2.0 framework would be lacking in its theoretical grounding.

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ANNEXES

Annex 1
List of Minutes Summary:
In-Depth Interviews, Field Observations and Documentary Surveys

A. Academic Year (AY) 2014/15: Spring

A.1. In-Depth Interviews

A.1.1. Government of Indonesia (Jakarta, Indonesia)

May 12th 2014: Mr. Kasan, Director, Center for Foreign Trade Policy, Trade Policy Analysis and Development Agency, Ministry of Trade (on government policies, general regulations of trade, trade facilitation and other related trade and investment measures – case on Indonesia)

August 27th 2014: Ms. Titi Kanti Lestari, Head, Sub-Directorate of Export Statistics, Government of Indonesia's Central Bureau of Statistics (on firms-level data of trade and production activities, statistics)

A.1.2. Panasonic Corporation (Osaka, Japan)

July 4th 2014: Mr. Jun Sakai, Senior Coordinator, Corporate Planning Group, Corporate Strategy Division, Panasonic Corporation (on production network, manufacturing facilities, reallocation and other production issues confronting Panasonic Corporation and its global business strategy)

A.1.3. Panasonic Subsidiaries: Gobel Group (Jakarta & Bogor, Indonesia)

August 13th 2014: Mr. Rachmat Gobel, Owner and President, PT Panasonic Gobel Indonesia (PGI) and Mr. Bob K. Hernoto, Director, PT Gobel Internasional (on partner/subsidiary company's business strategy, manufacturing facilities, contemporary changes in electronics production network, market structure, national industrial policy and strategy)

August 29th 2014: Mr. Normanto Parman, Senior Manager, PT Panasonic Manufacturing Indonesia (PMI) (on production network, manufacturing facilities, reallocation and other production issues confronting PT PGI and PT PMI and its business strategy)

A.1.4. Toyota Subsidiaries: Astra Group (Jakarta, Indonesia)

August 25th 2014: Mr. Wisnu Handoyo, Senior Manager, Unit M/C Spec. and Testing Department Head, and Mr. Agustia Leonardo, Senior Manager, Technical Administration Department, Product and Quality Engineering Division, PT Astra Honda Motor/AHM (on production network, manufacturing facilities, reallocation and other production issues confronting PT AHM)

A.2. Field Observations: Factory Visits

A.2.1. Panasonic Subsidiary: PT PMI (Bogor, Indonesia)

August 29th 2014: Plant Tour

A.2.2. Toyota Subsidiary: Astra Group/PT AHM (Jakarta, Indonesia)

August 25th 2014: Plant Tour

A.3. Documentary Surveys

A.3.1. Japan External Trade Organization (JETRO) (Jakarta, Indonesia)

May 13th 2014: Latest studies and documents on Japan-related automotive and electronics companies operating in Indonesia

A.3.2. Jakarta Japan Club (JJC) (Jakarta, Indonesia)

May 13th 2014: Contacts of Japanese companies in Indonesia (latest list of JJC member, document obtained: Corporate List/*Meibo*)

A.3.3. Center for Strategic and International Studies Library (Jakarta, Indonesia)

May 13th 2014: Contemporary studies and development of theoretical and conceptual frameworks on regionalism, ASEAN+3 trade and manufacturing

A.3.4. Government of Indonesia's Ministry of Industry (MoI) (Jakarta, Indonesia)

August 28th 2014: Latest list of industries and participating domestic companies (documents obtained: Indonesia Industrial Tree 2014), brief interview with Mr. Wiratno, staff at the MoI Data of Industry Center

B. AY 2014/15: Fall

B.1. In-Depth Interviews

B.1.2. Nomura Research Institute (Tokyo, Japan)

October 8th 2014: Mr. Yoshihiko Iwadare, C.M.A. of Japan, Group Manager, Global Business Development Group, Global Manufacturing Industry Consulting Department, Nomura Research Institute (on recent development and current issues on regional production network of electronics and automotive)

B.1.2. Japan Society of International Economics (JSIE) (Annual Fall Meeting - Kyoto, Japan)

October 25th 2014: Mr. Fukunari Kimura, PhD, Professor, Faculty of Economics, Keio University and Economic Research Institute for ASEAN and East Asia (ERIA)'s Chief Economist (on latest conceptualization and theorization of global and regional production network, global value chains and East Asian cases)

B.1.3. Toyota Motor Corporation (TMC) (Toyota City, Aichi Pref., Japan)

December 9th 2014: Mr. Kazuhiko Hida, General Manager, Self-Reliance Development Department, Production Control Division, TMC (on product quality management, production network, manufacturing facilities, reallocation and other production issues confronting TMC)

B.1.4. Nakanishi Research Institute (Tokyo, Japan)

January 23rd 2015: Mr. Takaki Nakanishi, Analyst and CEO, Nakanishi Research Institute (on East and Southeast Asian automotive production network and its recent/current changes)

B.1.5. Nomura Group (Tokyo, Japan)

January 23rd 2015: Mr. C.H. Kwan, PhD, Senior Fellow, Nomura Institute of Capital Markets Research, Nomura Group (on East and Southeast Asian production network and its recent and current changes, roles and position of China)

January 23rd 2015: Mr. Daisaku Masuno, CFA, Managing Director, Head of Asia-Pacific Media and Internet Research/Japan Telecom Services Research, Deputy Head of Equity Research Department; Mr. Masaya Yamasaki, CFA, Managing Director, Head of Electronics Team; Mr. Yu Okazaki, CMA, Analyst, Electronics Team, Equity Research Department, Nomura Securities Co., Ltd., Global Research Division, Nomura Group (on East and Southeast Asian electronics production network and its recent/current changes)

B.1.6. JETRO (Tokyo, Japan)

January 26th 2015: Mr. Ryo Ikebe, PhD (in Economics), Director, Asia and Oceania Division, Overseas Research Department, JETRO (on Japan and its global, East and Southeast Asian production networks in automotive and electronics industries)

B.2. Field Observations: Factory/Showroom Visits

B.2.1. Toyota Motor Corporation (TMC) (Toyota City, Aichi Pref., Japan)

December 10th 2014: Plant tour at TMC Headquarter Office and Motomachi Plant

B.2.2. Panasonic Corporation (Osaka, Japan)

December 28th 2014: Visit to Panasonic Corp. Showroom for latest development in its product lines

B.3. Documentary Surveys

B.3.1. JETRO Library (Tokyo, Japan)

October 8th 2014: Contemporary studies and development of theoretical and conceptual frameworks on Southeast Asia and Japan automotive and electronics production networks

C. AY 2015/16: Spring

C.1. In-Depth Interviews

C.1.1. Toyota Partner/Subsidiary: Astra Group (Jakarta, Indonesia)

April 20th 2015: Mr. Yakub Liman, Director; Mr. Tonny Pongoh, Deputy Director; and Mr. Yanuarius Teoflius Larosa, Research and Product Development, Astra Manufacture Polytechnics (on the company's strategy of manufacturing and production, human resources development, technical skills, and technological capacity)

C.1.2. KOMPAS Newspaper (Jakarta, Indonesia)

April 20th 2015: Mr. Banu Astono, Journalist (desk on industries, manufactures, automotive), KOMPAS Newspaper/Indonesia's Morning Daily (on Indonesia's governmental policies on manufactures and automotive industries, its regional position, recent issues and development)

C.2. Field Observations: Factory Visits

C.2.1. Toyota Subsidiary: PT Toyota Motor Manufacturing Indonesia (TMMIN) (Karawang and Jakarta, Indonesia)

April 19th 2015 & April 20th 2015: Visits to PT TMMIN 1st Plant at Sunter Industrial Area (Jakarta) and its 3rd Plant at Karawang International Industrial Center (KIIC) (Karawang)

C.3. Documentary Surveys

C.3.1. JETRO Library (Jakarta, Indonesia)

June 11th 2015: On RIETI (Research Institute of Economy, Trade and Industry) Annual Report 2014, ASEAN Investment Report 2013-14 (FDI Development and Regional Value Chains), ASEAN Beyond AEC 2015

D. AY 2015/16: Fall

D.1. In-Depth Interviews

D.1.1. Chukyo University (Nagoya, Japan)

January 8th 2016: Mr. Takehiro Watanabe, Professor, Graduate School of Business Innovation, School of Management, Institute of Business Studies, Squash Circle, Chukyo University and Project General Manager, Production Control Division, Toyota Motor Corporation (TMC) prior to March 31st 2015 (on TMC self reliance department, production strategy, human resource development, regional case, i.e. on Southeast Asia)

D.1.2. Toyota 2nd tier Supplier: Aoyama Seisakusho Co. Ltd. Japan (ASJ) (Inuyama, Aichi Pref., Japan)

January 8th 2016: Ms. Yuki Mitzuta, Executive Secretary to the President Director, Aoyama Seisakusho Co. Ltd. Japan (ASJ) (on ASJ production facilities, manufacturing sites, corporate relations to TMC, human resource development)

D.1.3. Matsui Glocal (SME Business Promotion/Regional Development) (Kyoto, Japan)

January 7th 2016: Mr. Kazuhisa Matsui, Consultant, Facilitator, Catalyst, Matsui Glocal (on Indonesia and Southeast Asia experiences in *Kenshusei*/Japanese internship-related programs, especially in manufacturing industries)

D.1.4. Thammasat University (Bangkok, Thailand)

January 20th 2016: Mr. Archanun Kohpaiboon, PhD, Professor, Faculty of Economics, Thammasat University (on Southeast Asia electronics and automotive production network, recent development of Thai electronics and automotive industries, Japanese electronics and automotive lead firms operating in Thailand, human resource development, research and development (R & D) and design)

D.1.5. University of the Thai Chamber of Commerce (UTCC) (Bangkok, Thailand)

January 20th 2016: Mr. Prapanpong Khumon, PhD, Director, Academy of Public Enterprise Policy, Business and Regulation (APaR) and Lecturer, School of Law, UTCC (on current Thai policy on FDIs (foreign direct investments), roles of Thai Chamber of Commerce in FDIs promotion, R&D and human resource development, ASEAN Economic Cooperation (AEC) schemes in the region services agreement, Japanese corporate culture)

D.1.6. Government of Thailand's Board of Investment (BOI) (Bangkok, Thailand)

January 21st 2016: Mr. Thammart Rattanpan, Senior Legal Officer and Ms. Sudarat Pongpitak, Investment Promotion Officer, Investment Promotion Bureau 2 (Metals, Metal Products, Machinery and Transport Equipment), BOI (on current FDIs promotion schemes and incentives in Thailand, Japanese electronics and automotive firms responses, roles of JETRO and HIDA (the Overseas Human Resources and Industry Development Agency) in BOI, Super Cluster policy, incentives for R&D and design)

D.1.7. JETRO (Bangkok, Thailand)

January 22nd 2016: Mr. Ken-Ichiro Okabe, Representative, Business Support Center in Thailand (BSCT), JETRO Bangkok Office (on Thai automotive market and industry, latest Thai government incentives for "eco-car", local content policy, 1st car buyer subsidy)

D.1.8. Japan's Overseas Human Resource and Industry Development Association (HIDA) (Bangkok, Thailand)

January 22nd 2016: Mr. Yusuke Taguchi, Deputy Representative, AEM (ASEAN Economic Ministers)-METI (Japan's Ministry of Economics, Trade and Industry) Economic and Industrial Cooperation Committee (AMEICC) and Ms. Nathinee Tanyuvardhana, Coordinating Officer, AMEICC, HIDA Bangkok Office (on AMEICC-HIDA schemes of industrial cooperation, technical assistance, targeted policy for R&D and innovation, case on Toyota and other Japanese car manufacturers, AEC schemes for professional/skilled labors mobility in ASEAN auto and electronics industries)

D.1.9. United Nations ESCAP (Economic and Social Commission for Asia and the Pacific) (Bangkok, Thailand)

January 21st 2016: Ms. Mia Mikic, PhD, Chief, Trade Policy and Analysis Section, ARTNeT Coordinator, Trade and Investment Division; Mr. Masato Abe, PhD, Economic Affairs Officer, Business and Development Section, Trade and Investment Division; and Ms. Witada Anukoonwattaka, PhD, Economic Affairs Officer, Trade Policy Section, Trade and Investment Division, UNESCAP (on Japan-Southeast Asia automotive and electronics production network and regional value chains)

D.1.10. JETRO (Kuala Lumpur, Malaysia)

January 27th 2016: Mr. Tsuneo Tanaka, Senior Advisor, JETRO Kuala Lumpur Office (on Malaysian electronics and automotive industries, current development and issues, past histories and legacies, roles and positions of Japanese firms and suppliers in overall industries, human resource development and R&D, technological advancement, case on Toyota)

D.1.11. Government of Malaysia's Ministry of International Trade and Industry (MITI) (Kuala Lumpur, Malaysia)

January 28th 2016: Ms. Noraini Abrahim, Principal Assistant Director, ASEAN Economic Integration Division, MITI (on AEC Schemes of regional trade and industrial cooperation among member countries, Malaysian positions on the issues, regional production networks in automotive and electronics industries)

D.1.12. Yusof Ishak Institute of Southeast Asian Studies (ISEAS) (Singapore)

January 29th 2016: Mr. Siwage Dharma Negara, PhD, Fellow; Mr. Cassey Lee, PhD, Senior Fellow; and Dr. Deasy Simandjuntak, MA, Visiting Fellow, ISEAS (on Indonesia and Malaysia automotive and electronics industries and production networks, AEC schemes for the two industrial cooperation)

D.1.13. Toyota Subsidiary: PT Toyota Manufacturing Indonesia (TMMIN) (Jakarta, Indonesia)

February 2nd 2016: Dr. Ir. Adjie Sapta, M.Si., General Manager, Chief of Corporate Planning Office, Chief of Corporate Social Responsibility Office, PT TMMIN (on Toyota Corporation and PT TMMIN human resource development and training scheme, practices and application of TPS (Toyota Production System) at production sites, management levels, engineering division, and quality of Indonesian engineers in production, R&D and design, case on Kijang)

D.1.14. Toyota 2nd tier Supplier: PT Automotive Fasteners Aoyama Indonesia (AFD) (Karawang, Indonesia)

February 4th 2016: Mr. Shusei Goto, Vice President Director; Ms. Daysi Prasetiyani, Administration General Manager, Mr. Maman Suparman, Production Manager; and Mr. Irfan Tasrif, HR and GA Manager, AFD (on overall business scope of AFD, its relations to TMC, patented products and other specific products manufactured in Indonesia, human resource development and training, practices and application of TPS and other Toyota philosophies)

D.1.15. Toyota Partner: Astra Group Polytechnics of Manufacture (POLMAN) (Jakarta, Indonesia)

February 3rd 2016: Mr. Tony H. Silalahi, Director; Mr. Tonny Pongoh, Deputy Director; and Ms. Rida I. Fariani, Administrative Staff, POLMAN (on corporate culture, human resource development and training, technical skills, and technological capacity of POLMAN students and graduates, and Astra Group and other industries recruitments)

D.1.16. Japan Alumni Association in Indonesia (Karawang, Indonesia)

February 2nd 2016: Mr. Fuad A. Kadir, Chairman, Japan Alumni Community in Indonesia (KAJI), President Director, PT Yasa Kayana Indonesia, Sales and Marketing Director, Industrial Support Services Indonesia (PT ISSI) (on current Japanese electronics and automotive firms in Indonesia, production and manufacturing strategies, human resource development and training, Japan alumni roles and activities in the newly developed Karawang industrial zones)

D.1.17. HIDA (Jakarta, Indonesia)

February 3rd 2016: Ms. Dea Intan Wada, Manager, HIDA Jakarta Office (on current training schemes in HIDA, past histories on AOTS and JODC, good examples and practices by individual industry and firm in benefiting HIDA schemes, evaluation and monitoring)

D.1.18. JETRO (Jakarta, Indonesia)

February 10th 2016: Mr. Takenobu Yamashiro, Senior Director, JETRO Jakarta Office (on Japanese automotive firms operating in Indonesia, current conditions and situations, challenges of Indonesia's business climates and industrial policy, human resource development and training, case on Toyota)

D.1.19. Government of Indonesia's MoI (Jakarta, Indonesia)

February 10th 2016: Mr. Saleh Husin, Minister (on the blueprint and basic policies of Indonesia's industrial development, its strategy, priority sectors and efforts to further develop international cooperation and FDI promotion in industrial sectors) ~ conducted via telephone interviews and correspondence via social media/*whatsapp*

February 11th 2016: Mr. Soerjono, Inspector General; Mr. Yan Sibarang Tandiele and Mr. Andreas Alfredo Sigalingging, Staffs, Directorate of Maritime, Transport Equipment and Defense Industries, MoI (on Indonesian industrial policy in automotive industry, current development and issues, responses by the industrial major players, including Japanese lead firms, competing markets in the industry)

D.1.2.0. Government of Indonesia's Ministry of State Secretariat (Yogyakarta, Indonesia)

February 8th 2016: Mr. Pratikno, Minister (on the general background of Indonesia's industrial policies, its main challenges and how President Joko Widodo is targeting non-fossil fuels and other green energy strategies to upgrade the country's industries and promote green and environmentally friendly FDIs) ~ interviewed was conducted in his home town of Yogyakarta during his weekend break at his house

D.1.2.1. ASEAN Secretariat (Jakarta, Indonesia)

February 12th 2016: Ms. Julia Tijaja, PhD, Director, ASEAN Integration Monitoring Office (AIMO) (on ASEAN Mutual Recognition Agreement (MRA) in services, especially in manufacture industrial-related and manufacturing sectors, regional value chains, practices in Southeast Asia)

D.2. Field Observations: Factory Visits

D.2.1. Subsidiary of Toyota 2nd tier Supplier: PT Automotive Fasteners Aoyama Indonesia (AFD) (Karawang, Indonesia)

February 4th 2016: Plant tour at PT AFD (Kawasan Industri Mitra – KIM)

D.3. Documentary Surveys

D.3.1. JETRO Library (Jakarta, Indonesia)
February 10th 2016: On Indonesia's Automotive Major Stakeholders (Indonesia Automotive Center/IAC or Sentra Otomotif Indonesia/SOI and Indonesia's Automotive Industry Association/GAIKINDO) and Indonesia's automotive industry key challenges and efforts to quality standards for parts and components (Q SEAL or "Segel Mutu")

D.3.2. Bandung Institute of Technology (ITB) Library (Bandung, Indonesia)

February 6th 2016: On the Developing Countries and Cities Industrial Strategies, Transportation Development, Automotive Industry in Urban Setting; AEC Standards Harmonization in Automotive, Electronics and Health Sectors, UNECE Regulations for Automotive Sector/Vehicles, AEC Harmonization Principles for Electronics Sector

E. AY 2016/17: Spring

E.1. In-Depth Interviews

E.1.1. Thai-Nichi Institute of Technology (TNI) (Bangkok, Thailand)

June 7th 2016: Mr. Nuttapol Limjeerajarus, PhD. (a.k.a. Dr. Tek), Assistant Professor in Mechanical Engineering, Head of Automotive Engineering Program, Head of Research Center for Advanced Energy Technology, Faculty of Engineering, TNI (on Thai automotive industry, its local suppliers role in training and, design engineering, R&D activities, Thai government policy on special economic zones (SEZs), responses of auto Japanese firms to the policy, case on Toyota in value addition activities)

E.1.2. Thammasat University Business School (Bangkok, Thailand)

June 7th 2016: Mr. Suthikorn Kingkaew, PhD., Director, Thammasat Consulting Networking and Coaching Center, Thammasat University (on Thai automotive industry and the case of Thai Summit Autoparts as a leading automotive supplier in Thailand)

E.1.3. HIDA (Osaka, Japan)

July 22nd 2016: Mr. Kazuhisa Ogawa, General Manager, Kansai Kenshu Center, HIDA (on the role of HIDA as an industry-driven agency in assisting human resource and industrial development in developing countries through various schemes such as Overseas Development Assistance or ODA)

E.1.4. Nomura Research Institute (Tokyo, Japan)

August 19th 2016: Mr. Yoshihiko Iwadare, C.M.A. of Japan, Group Manager, Global Business Development Group, Global Manufacturing Industry Consulting Department, Nomura Research Institute (on latest development and current issues on regional production network of electronics and automotive, cases of both industries production networks in Southeast Asia, i.e. Malaysia, Thailand and Indonesia, especially with regards to Panasonic Corporation for electronics industry and Toyota Motor Company for automotive industry)

E.1.5. JSIE (Annual/Spring Meeting – Tokyo, Japan)

June 4th 2016: Mr. Eiichi Tomiura, PhD (Professor, Hitotsubashi University/Lead Discussant) (on Automotive and Electronics Value Chains Structures; Peculiarity of Japan Automotive Industry, Impacts of Host Countries FDI Promotion and Industrial Development Policies on the Automotive and Electronics Production Networks)

E.2. Field Observations: Factory Visits

E.2.1. TNI (Bangkok, Thailand)

June 7th 2016: Visit to TNI Automotive Testing and Laboratory Facilities

E.3. Documentary Surveys

E.3.1. JETRO (Bangkok, Thailand)

June 8th 2016: On Thailand's Export and Import of Industrial and Manufactured Goods (e.g. Plastic Chips, and Iron and Steel Products)

E.3.2. Kyoto University Center for Southeast Asian Studies (CSEAS) (Kyoto, Japan)

Spring/Summer 2016: Book Review (forthcoming/to be submitted) on Bruno Jetin & Mia Mikic (Eds.) (2016), *ASEAN Economic Community: A Model for Asia Wide Regional Integration?* (Hampshire UK: Palgrave MacMillan)

F. AY 2016/17: Fall

F.1. In-Depth Interviews

F.1.1. (Thailand) Electrical and Electronics Institute (TEEI) (Bangkok, Thailand)

October 26th 2016: Mr. Niwat Phansilpakom, Assistant Vice President, Industrial Development, and Mr. Supot Nakarat, Vice President, Administration Department (on background and general scope and works of TEEI, development and trend of Thai electronics industry, roles of Japanese electronics companies in the industry, key policy issues in the industry, such as SMEs and human resource development)

F.1.2. Thai-Nichi Institute of Technology (TNI) (Bangkok, Thailand)

October 26th 2016: Mr. Jintawat Chaichanawong (D.Eng.), Associate Professor, Director of Master Program in Engineering Technology, Faculty of Engineering; Mr. Niida Hiroo, Senior JICA Expert (Production Eng.); Dr. Watcharin Noothong, Lecturer, Faculty of Engineering; Ms. Sawanya Suwannawong, Lecturer, Faculty of Engineering (on TNI industrial networks with major (automotive) Japanese companies operating in Thailand, design of trainings and curriculum development, TNI academic collaborations with Japanese academic and research institutes)

F.1.3. United Nations ESCAP (Economic and Social Commission for Asia and the Pacific) (Bangkok, Thailand)

October 27th 2016: Mr. Masato Abe, PhD, Economic Affairs Officer, Business and Development Section, Trade and Investment Division (on latest development, issues and changes in global production network, trends of Japanese electronics and automotive FDIs in Southeast Asia, trends in their business networks and operations)

F.1.4. Government of Thailand's Bureau of Supporting Industries Development (BSID) (Bangkok, Thailand)

October 27th 2016: Dr. Plawut Wongwiwat, Engineer, Professional Level, BSID, Department of Industrial Promotion, Ministry of Industry (on the scope and works of BSID, Department of Industrial Promotion, Ministry of Industry, general background and issues of industrial policies, particularly in automotive industry, policy on SMEs, technical training and HRD)

F.1.5. Thailand SME Electrical Appliances Manufacturer: BN Superior Marketing Co. Ltd./Bella Vita Co. Ltd. (Bangkok, Thailand)

October 28th 2016: Mr. Hattachai Santicharoenlert, Sales Engineer, and Mrs. Katharine Ang, owner (on Thai SME in local electrical appliance manufacturer, production and marketing, its historical background, issues and challenges in local and regional manufacturing, production, marketing and distribution of dental-related electrical appliance products, procurement of parts and components, government supports)

F.1.6. Thammasat University (Bangkok, Thailand)

October 28th 2016: Mr. Kriengkrai Techakanont, PhD, Associate Professor, Faculty of Economics (on Thailand policies for technology transfer in automotive industry and other manufacture industries, comparisons among Thailand, Malaysia and Indonesia policies, nature, characteristics and roles of Japanese automotive companies in technology transfer, technical training and HRD)

F.1.7. Thailand Automotive Institute (TAI) (Bangkok, Thailand)

October 27th 2016: Mr. Vichai Jirathiyut, President (on the historical background and scope of works of TAI, initiation of TAI as one of Thai semi-governmental and industrial institutes, current roles and challenges of TAI, particularly with regards to the changes in regional production network, global supply chains and value chains of the automotive industry)

F.1.8. Japan International Cooperation Agency (JICA)-Jakarta/Indonesia Office (Jakarta, Indonesia)

November 3rd 2016: Mr. Tsutomu Nagae, MSc., JICA Expert on Industrial Development, Director General of Industrial Resilience and International Access Development, Government of Indonesia's MoI, and Mr. Yohei Igarashi, Project Formulation Advisor, JICA Indonesia Office (on status and roles of Japanese manufacturing companies and FDIs in Southeast Asian countries, especially in Indonesia, Malaysia and Thailand, general conditions of manufacturing industries in the three countries, contemporary issues and challenges faced by Indonesia manufacturing industries, SMIs (small and medium industries), if especially compared to those of Thailand and Malaysia)

F.1.9. Indonesia SME Automotive and Electrical Appliance Supplier: PT Shervin Tekno Perkasa (Tegal, Central Java, Indonesia)

November 5th 2016: Mr. Asep Saefudin, owner and director (on historical background and supply spans of the company, scope of the works, business trends of local SME suppliers, challenges faced by the company, experiences in handling those challenges, issues on governmental supports, and facilitation and supports by principal companies)

F.1.10. Indonesia Leading Home Grown Electrical Appliance Company: Polytron/PT Hartono Istana Teknologi (PT HIT) (Semarang, Central Java, Indonesia)

November 7th 2016: Mr. Herry Siswanto, Senior Staff & Lead Engineer/HRD Manager (herry.siswanto@gmail.com; +62-811-277275) (on the historical background of the company, the company strategies in product development, HRD, technology transfer, business expansion, engineering and technical trainings, supply chains, issues and challenges faced by the company, especially in production network, product distribution and marketing)

F.1.11. Toyota Partner: Astra Group/Polytechnics of Manufacture (POLMAN) and Toyota Institute (Indonesia Division) (Jakarta, Indonesia)

November 8th 2016: Mr. Tonny Pongoh, Deputy Director, POLMAN; Mr. Yanuarius Teoflius Larosa, Research and Product Development, POLMAN; Mr. Bambang Budi Utomo, Coordinator/Lead Senior Engineer, Good Manufacturing Practices at POLMAN, Shop Floor Training Department at Toyota Institute; Mr. Budi Hartono, Head of Human Resource and General Affair Dept. POLMAN; Mr. Bartholomeus Hari Dwi Nugroho, Head of Academic Relations, Student and Alumni Affairs Dept., POLMAN; Mr. Heri Sudarmaji, Program Secretary at Production Technics and Manufacturing Process, POLMAN (on POLMAN training design and curriculum development in the areas of manufacturing and production, human resources development, technical skills development, Astra Group, POLMAN and Toyota Institute collaboration and industrial linkages)

November 8th 2016: Mr. M. Chanafi S., Student/4th Semester, Automotive Engineering, Vocational High School Graduate; Mr. Akbar Wahyu, Student/4th Semester, Mechanical Engineering, Regular High School Graduate (Natural Science); Ms. A. Desi, Student/3rd Semester, Manufacturing Process Engineering, Regular High School Graduate (Natural Science); Ms. Renita Dewi, Student/3rd Semester, Automotive Engineering, Vocational High School Graduate (on the experiences and perspectives of students trained at POLMAN, especially how students assess their learning experiences as they perceive and plan their future careers in areas of manufacturing/automotive industries)

F.1.12. HIDA Jakarta Office (Jakarta, Indonesia)

November 10th 2016: Mr. Tanaka Hayato, Chief Representative (on the HIDA and AMEICC or AEM-METI (ASEAN Economic Ministers-Ministry of Economy, Trade and Industry) Economic and Industrial Cooperation Committee initiative, the roles of each HIDA office in ASEAN, including those at Bangkok (where the AMEICC Secretariat is located) and Jakarta, other initiatives within and among ASEAN countries in industrial and HRD cooperation that are supported by HIDA and other Japanese institutes)

F.1.13. Center for Strategic and International Studies/CSIS (Jakarta, Indonesia)

November 9th 2016: Mr. Yose Rizal Damuri, PhD., Head, Department of Economics, CSIS (on Indonesia's Intention to Join TPP/Trans Pacific Partnership in Light of the Country's Contemporary Industrial Challenges); Mr. Kiki Verico, PhD., Associate Director for Research, Institute for Economic and Social Research, Faculty of Economics and Business, University of Indonesia (on Indonesia's Position and Roles in the Regional Value Chains in Manufacturing Industries); Ms. Erica Novianti Lukas, Person in Charge, Undergraduate Business Economics Program, School of Business and Economics, Prasetya Mulya University (on Indonesia's Export Potentials in Manufacturing Sectors); Mr. Iman Pambagyo, Director General for International Trade Negotiation, Government of Indonesia's Ministry of Trade (on Indonesia's Major Policy

Challenges in Global Production Network and Value Chains, Regional and Mega Regional Economic Integration such as AEC, RCEP/Regional Comprehensive Economic Partnership and TPP)

F.1.14. JETRO (Kuala Lumpur, Malaysia)

November 24th 2016: Mr. Tsuneo Tanaka, Senior Advisor, JETRO Kuala Lumpur Office (on current situation of Malaysia's export and import in manufactured products, Japanese FDIs in such a context, especially those of electronics and automotive-related sectors; case on Panasonic's production of conventional air conditioners in Malaysia; comparative value added among ASEAN major countries in manufacturing industry, e.g. in skilled labor; roles of Japanese HIDA and its AMEICC initiative in regional HRD cooperation; case on Malaysia's Proton and Perodua and its comparisons to small cars production in Indonesia, such as in the cases of Daihatsu and its partnership with Toyota/Astra Group; R&D contemporary challenges in ASEAN automotive industry)

F.1.15. JICA (Kuala Lumpur, Malaysia)

November 25th 2016: Mr. Kojiro Matsumoto, Chief Representative, JICA Malaysia Office (on JICA Malaysia's main mission in technological cooperation between Japan and Malaysia, i.e. under South-South Cooperation scheme; case on MJIIT (Malaysia-Japan International Institute of Technology) where priorities are given to automotive R&D and upgrading industries; JICA roles in MJIIT; MJIIT as an advanced technology and HRD endeavors between both countries, e.g. in mechanical and electrical related industries; Malaysia's Government initiative in R&D and Innovation to escape from middle income trap)

F.1.16. Government of Malaysia's Investment Development Authority (MIDA) (Kuala Lumpur, Malaysia)

November 25th 2016: Mr. Mohd Harun Bin Elik, Deputy Director, R&D and Business Services; Ms. Hafizah Amminuddin, Deputy Director, Transport Technology Industry Division; Mr. Jona Anak Kerani, Senior Assistant Director, Foreign Investment Coordination Division; Mr. Afzanil Md Anuar, Senior Assitant Director, Electrical and Electronics Industry Division (on the general background and missions of MIDA, its major services (such as R&D and business) and divisions (such as transport technology industry, electrical and electronics industry, and foreign investment coordination); current major issues in Malaysia's FDI promotion policy and strategies, cases on automotive/Toyota and Honda (as compared to the case of Proton/Perodua) and electronics/Panasonic and Sharp, especially on how firms undergoes and respond to the Malaysian/MIDA's R&D, innovation and technologically driven FDI incentives); the notion of Bumiputera policy and how it affects to FDI promotion and industrial development policy, roles of MITI vis a vis MIDA)

F.1.17. Yusof Ishak ISEAS (Singapore)

November 22nd 2016: Mr. Siwage Dharma Negara, PhD, Fellow (on the fundamental function and roles of operational head quarters (OHQs) of some major multinational firms in Singapore, i.e. of the possibility to serve as integrated part of ASEAN initiative in regional industrial cooperation schemes; current actual practices in regional value chains, e.g. in automotive sector where value added are currently being captured more in small car industries; ASEAN host countries preparedness in such a situation, e.g. in skilled labor, automation of manufacturing industry, R&D and design, HRD standards and harmonization in competency standards among ASEAN countries; impacts of TPP and Trump Effect)

F.1.18. Chukyo University (Nagoya, Japan)

December 14th 2016: Mr. Takehiro Watanabe, Professor, Graduate School of Business Innovation, School of Management, Institute of Business Studies, Squash Circle, Chukyo University and Project General Manager, Production Control Division, Toyota Motor Corporation (TMC) prior to March 31st 2015 (on level of skills in automotive production, i.e. the so-called QCD/Quality, Cost and Delivery; how local context affects QCD implementation, such as in the case of 1st TMC overseas production facility in Detroit, USA; stages in localization of TMC production and manufacturing activities, i.e. ranging from its sales and marketing, production, machinery/automation and production preparation (including existing local suppliers/supporting industries), to the R&D and design division where "karakuri kaizen" (TPS shop floor skills) is much needed, i.e. in terms of optimum levels of automation, efficiency, use of existing tools, and shop floor wisdoms and creativity; localizing R&D and design, e.g. the case of cup holders in the US vehicle; intercultural skills/context of production and business, especially in terms of HRD and technical skills transfers, i.e. the dilemma of using TPS in TMC as a global company, e.g. issues of turn over or job hopping; the need of host government supports in basic HRD skills)

F.*2. Field Observations: Factory/Showroom Visits*

F.2.1. BN Superior Marketing Co. Ltd./Bella Vita Co. Ltd. (Bangkok, Thailand)

October 28th 2016: Visit to a Thai Electrical Appliance SME Workshop (Bella Vita Co. Ltd.)

F.2.2. PT Shervin Tekno Perkasa (Tegal, Central Java, Indonesia)

November 5th 2016: Visit to an Indonesian Automotive and Electrical Appliance Supplier SME Workshop (PT Shervin Tekno Perkasa)

F.3. Documentary Surveys

F.3.1. JETRO (Kuala Lumpur, Malaysia)

November 24th 2016: On Malaysia's Government Policy to Reduce Foreign Workers (i.e. in Accordance to the country's Vision of 2020)

F.3.2. HIDA (Jakarta, Indonesia)

November 10th 2016: On HIDA AMEICC Scheme and other HIDA Industry and HRD Cooperation Schemes

G. AY 2017/18: Spring

G.1. In-Depth Interview (Additional)

G.1.1. Nagoya Institute of Technology

June 13th 2017: Mr. Tadehiro Takeno, Professor (on Toyota production network in East Asia and its surroundings, including particularly Southeast Asia, its actual works, mechanisms and function, Toyota supply chains and its logistical aspects, Toyota accumulating production capacity, TPS as relating to production network, Toyota ASEAN and Global IMV Project, Toyota 1st tier Suppliers (especially Denso) production network in Southeast Asia)

Annex 2: Supplementary Resources on Methodology & Scope

Table A.1. Methodology and Methods of Analysis

	Phenomena	Concepts	Variables	Indicators/Parameters
				Chapter 2 Trade Setting
Macro-Level Analysis	Production network functioning at regional level: Japanese automotive production network in Southeast Asia	Global Production Network (GPN), Regional Production Network (RPN), Trade in Network Products	Changes in Production Network	*General Setting* • East and Southeast Asia in World Manufacture Trade • Trade Patterns ▪ Significance of Trade in Automotive-related Goods 1. Interregional Trade Patterns: ASEAN6 (Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) and East Asian countries (China, Japan and Korea), and Japan-ASEAN3 (Indonesia, Malaysia and Thailand) 2. Intraregional Trade Patterns: among ASEAN3 (Indonesia, Malaysia and Thailand) ▪ Method: statistical analysis on the United Nations (UN) Comtrade Database (1988-2016)/World Bank Integrated Trade Solution (WITS) (2009-2015) under HS Code 87-vehicle, other than railway and tramway • Trade in Value Added ▪ Significance of Trends in Value Added in Automotive-related Goods 1. Interregional Trends in Value Added: ASEAN6 and East Asian countries, Japan-ASEAN3 2. Intraregional Trends in Value Added: among ASEAN3 ▪ Method: statistical analysis on the OECD-WTO Trade in Value-Added (TiVA) Database, 1995-2011, under SITC C34T35 transport equipment) *Trade Patterns indicating Production Shifts* • Patterns of Japan-ASEAN3 Trade in 4 (Four) Key Automotive Products ▪ HS 8702-public transport type passenger motor vehicles (motor vehicles for the transport of more than 10 persons) ▪ HS 8703-motor vehicles for the transport of persons (except bus) (passenger cars or cars) ▪ HS 8704-motor vehicles for the transport of goods (motor vehicles for transporting goods) ▪ HS 8707-parts and accessories for motor vehicles (parts and accessories of the motor vehicles) • Method: statistical analysis on the UN Comtrade Database (1988-2016) for detailed Patterns of Japan-ASEAN3 Trade in HS 8703 (passenger cars) and HS 8707 (parts and accessories for motor vehicles, up to HS 6 digits level

				Chapter 3 Production Shifts & Localization of Production

	Localization of production signifying upgrading efforts by Japanese automotive firms in the host countries of ASEAN3	Global Value Chain (GVC), Regional Value Chain (RVC)	Production Shifts	• Japanese Automotive Firms Operation and Production Network in Southeast Asia
				  ▪ Production Bases in Thailand and Indonesia
				  ▪ Cases on Toyota and Denso in Southeast Asia
				• Toyota Production Network in Southeast Asia
				• Toyota ASEAN IMV Project
				
				• Methods: in depth interviews, documentary surveys and observatory fieldworks for gathering/collecting relevant information and data; content analysis and case studies (on Toyota Motor Corporation/TMC as a Japanese lead firm and Denso Corporation and Aisin Seiki Corporation as Japanese 1st tier supplier firms) for interpreting and deducting the collected data and information, systemizing evidence, and verifying proposed arguments based on systematized evidence

				Chapter 4 Upgrading Strategy & Local Productive Capacity

Micro-Level Analysis			Upgrading Strategy	• Japanese Automotive Firms Upgrading Strategy: Case of TMC in ASEAN3
				  ▪ Toyota-led Value Chains
				  ▪ Regional Automotive Value Chains Structure
				  ▪ Inter-Firm Relations: Subsidiaries and Local Partners
				• Local Productive Capacity and Skills Accumulation
				  ▪ Comparative Cases on *Kijang* in Indonesia and Hilux in Thailand
				
				• Methods: in depth interviews, documentary surveys and observatory fieldworks for gathering/collecting relevant information and data; content analysis and case studies (on *Kijang* in Indonesia as a best practice in accumulated productive capacity and skills at local sites and POLMAN and TNI as best practices of efforts to accumulate local talents in a collaborative academic and industrial environment) for interpreting and deducting the collected data and information, systemizing evidence, and verifying proposed arguments based on systematized evidence

Micro-Level Analysis	Automotive RVCs in Southeast Asia and ASEAN3 host countries FDI promotion and industrial policy in automotive-related sectors	RVC and Value Chains Upgrading	Industrial Cooperation	*Inter-sectoral Collaborations in Automotive Sector* • Inter-sectoral/Inter-chain Upgrading: Beyond the "Smiley Curve" Value Chains ▪ Exploration on value addition activities at industry level ▪ Methods of industrial cooperation Methods: in depth interviews, documentary surveys and observatory fieldworks for data gathering, content analysis and case study (on Toyota-led Value Chains) for examining (interpreting and deducting) the collected data and information, systemizing evidence, and verifying proposed arguments based on systematized evidence
			Policy Implications	*ASEAN3 Host Governments Foreign Direct Investment (FDI) Promotion and Industrial Development Policies* • Linkages of FDI Promotion and Industrial Development Policies ▪ Latest Setting of FDI and Industrial Development Schemes in ASEAN3 countries (with particular reference to automotive industry) ▪ Identification and Exploration of Key Policy Issues ▪ Analysis on Government-led Value Addition (Case on *Proton-Perodua* in Malaysia) ▪ Assessment on Local Suppliers Networks (Cases on Small and Medium Enterprise/SME Suppliers in Indonesia and Thailand) Methods: in depth interviews, documentary surveys and observatory fieldworks for data gathering, content analysis and case studies (*Proton-Perodua* in Malaysia, SME Suppliers in Indonesia and Thailand) for examining (interpreting and deducting) the collected data and information, systemizing evidence, and verifying proposed arguments based on systematized evidence

Source: author's summary/recapitulation and assessment

Diagram A.1. Research Scope

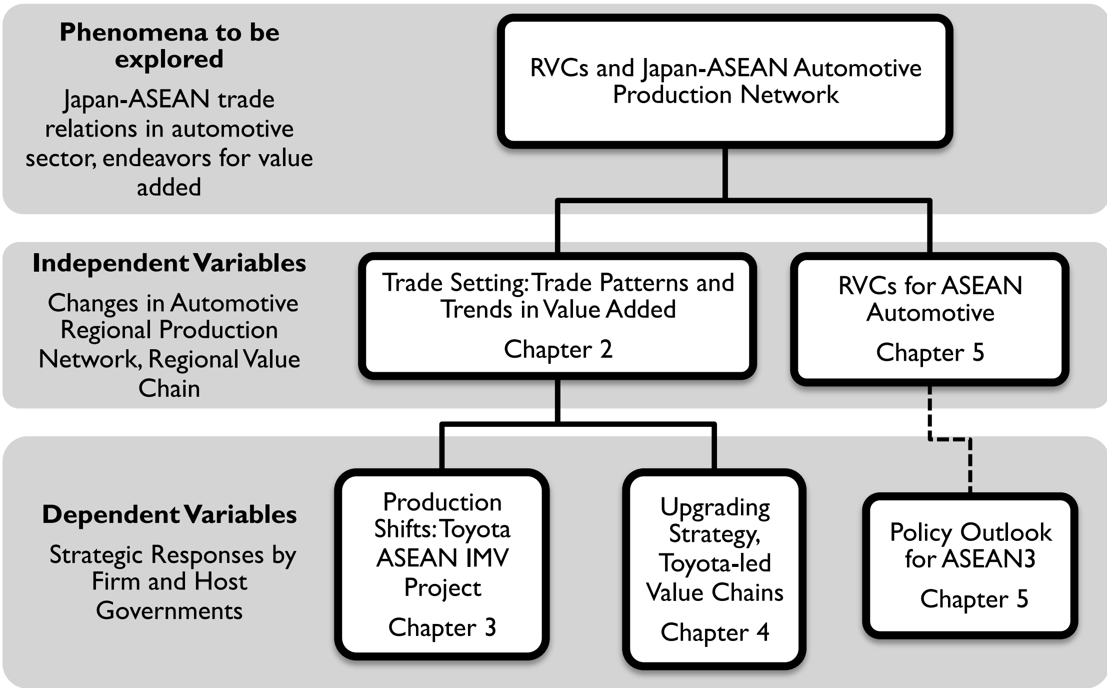
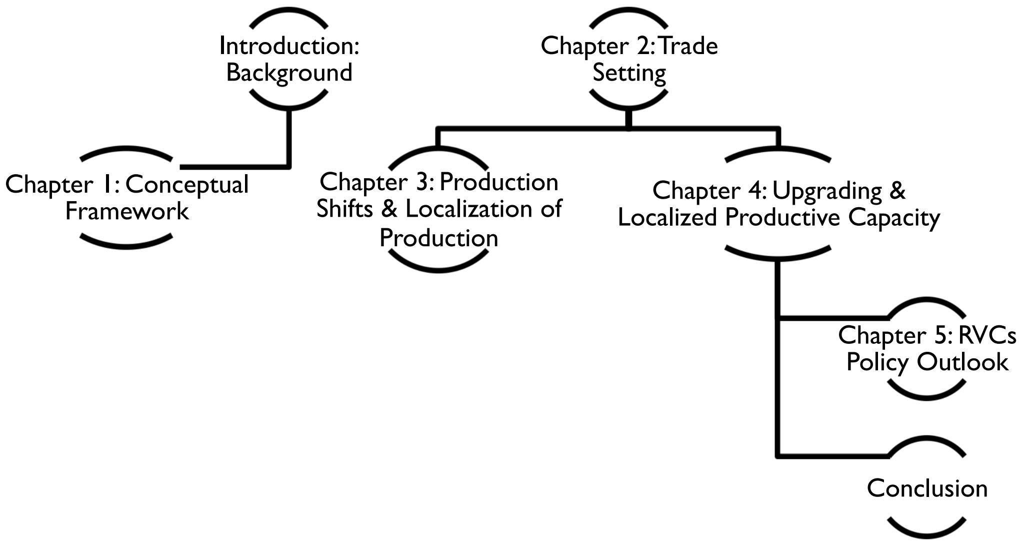


Diagram A.2. Structure of the Study



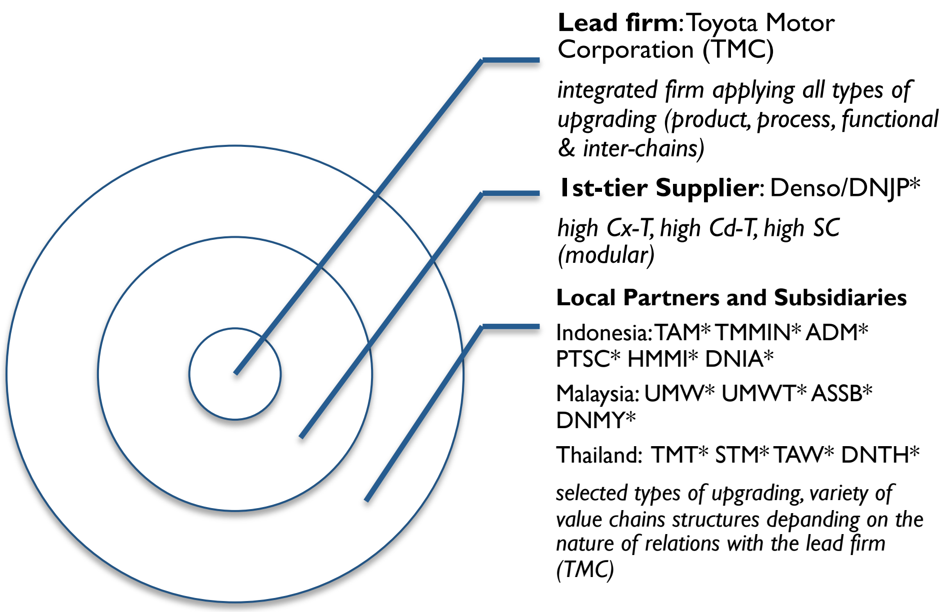
Annex 3: Supplementary Resources on Conceptual Framework

Table A.2. Scales, Styles and Actors in Production Network

Name	Definition/Scale/Scope/Style	Other names
A. Organizational scale		
1. Value chain	Sequence of value-added activities leading to end-use	Supply chain
2. Production network	Two or more value chains that share at least one actor	Input-output matrix Supply base
B. Spatial scale		
1. Local	Commute area	Industrial district
2. Domestic	Single country	Supply-base
3. International	More than one country	Cross-border production base
4. Regional	A multi-country trade bloc	Regional production network/system
5. Global	Actors integrate activities across each region of the triad	Global production network/system
C. Governance styles		
1. Authority network	Authority	Governance
a. Intra-firm	Authority of management	Vertical integration
b. Captive	Long-term relationship Authority of lead firms	
2. Relational network	Long-term personal and inter-firm relationship	Trust-based, personal network, repeated transactions
a. Agglomeration	Spatial proximity	Industrial districts, industrial clusters
b. Social network	Social propinquity	Ethnic network, interest groups
3. Virtual network	External scale economies Commodified network capacity	Turn-key production network Agile production network
D. Productive actors		
1. Integrated firm	Product strategy, design, manufacturing, sub-assembly, marketing, sales and distribution	Modern corporation
2. Lead firm	Product strategy Product design End-user sale End-user marketing	Brand-name firm Original equipment manufacturer (OEM) Anchor firm System supplier
3. Turn-key supplier	Complex parts and services Process research and development (R&D)	OEM supplier, first-tier supplier
4. Retailer	Sales Marketing Value-added packaging	Marketer Distributor Reseller
5. Component supplier	Component parts and services	Lower-tier supplier, specialized supplier, sub-contractor

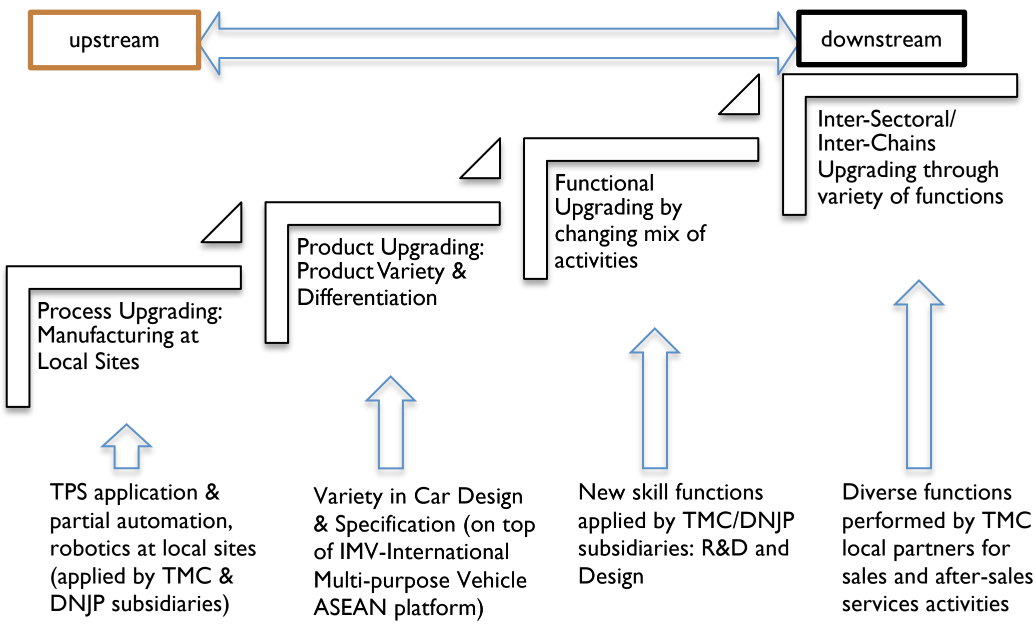
Source: Poapongsakorn and Techakanont in Kuroiwa and Heng (2008)

Diagram A.3. Firm Level Value Chains Upgrading: Operational Framework for Toyota & Denso Cases



*DNJP=Denso Japan, TAM=Toyota Astra Motor, TMMIN=Toyota Motor Manufacturing Indonesia, ADM=Astra Daihatsu Motor, PTSC=PT Sugity Creatives, HMMI=Hino Motors Manufacturing Indonesia, DNIA=Denso Indonesia, UMW=United Motor Works, UMWT=UMW Toyota Motor, ASSB=Assembly Services Sdn Bhd, DNMY=Denso Malaysia, TMT=Toyota Motor Thailand, STM=Siam Toyota Manufacturing Co Ltd, TAW=Toyota Auto Works, DNTH=Denso Thailand
Source: author's assessment.

Diagram A.4. Value Chains Upgrading of Toyota and Denso in Southeast Asia



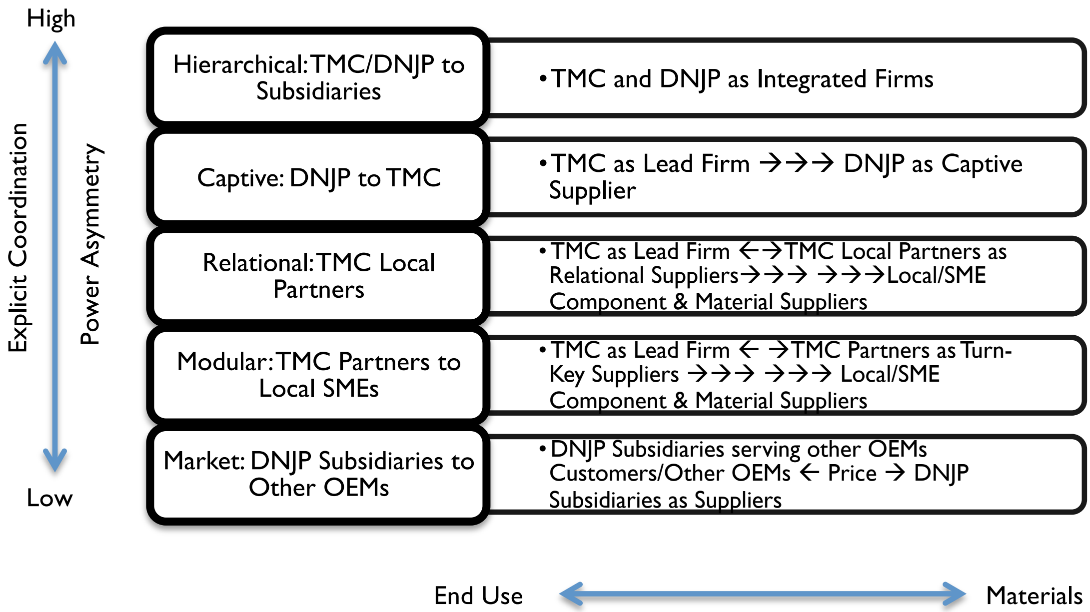
Source: author's assessment, based on Gereffi and Fernandez-Stark (2011)

Diagram A.5. Features of Transactions: Toyota and Denso Value Chains in Southeast Asia

*	Cx-T: complexity of transactions	Cd-T: codification of transactions	SC: suppliers competence
Market: DNJP Subsidiaries	Low: Simple Sub-contracting	High: Procurement Standards	High: Modules Products
Modular: 2nd tier and up Suppliers	High: Parts Specification	High: Competitive Procurement	High: Certified Suppliers
Relational: TMC Local Partners	High: Parts Specification	Low: Simple Procurement	High: Certified Local SMEs
Captive: DNJP to TMC	High: Product Specification, Design	High: Procurement Standards/JIT	Low: Modules Products
Hierarchical: TMC	High: TMC to subsidiaries	Low: TMC to 1st tier Suppliers	Low: TMC to 1st tier Suppliers

Source: adapted from Gereffi et al (2005) as also quoted in Pietrobelli & Rabelloti (2011)

Diagram A.6. Value Chains Structure of Toyota and Denso in Southeast Asia



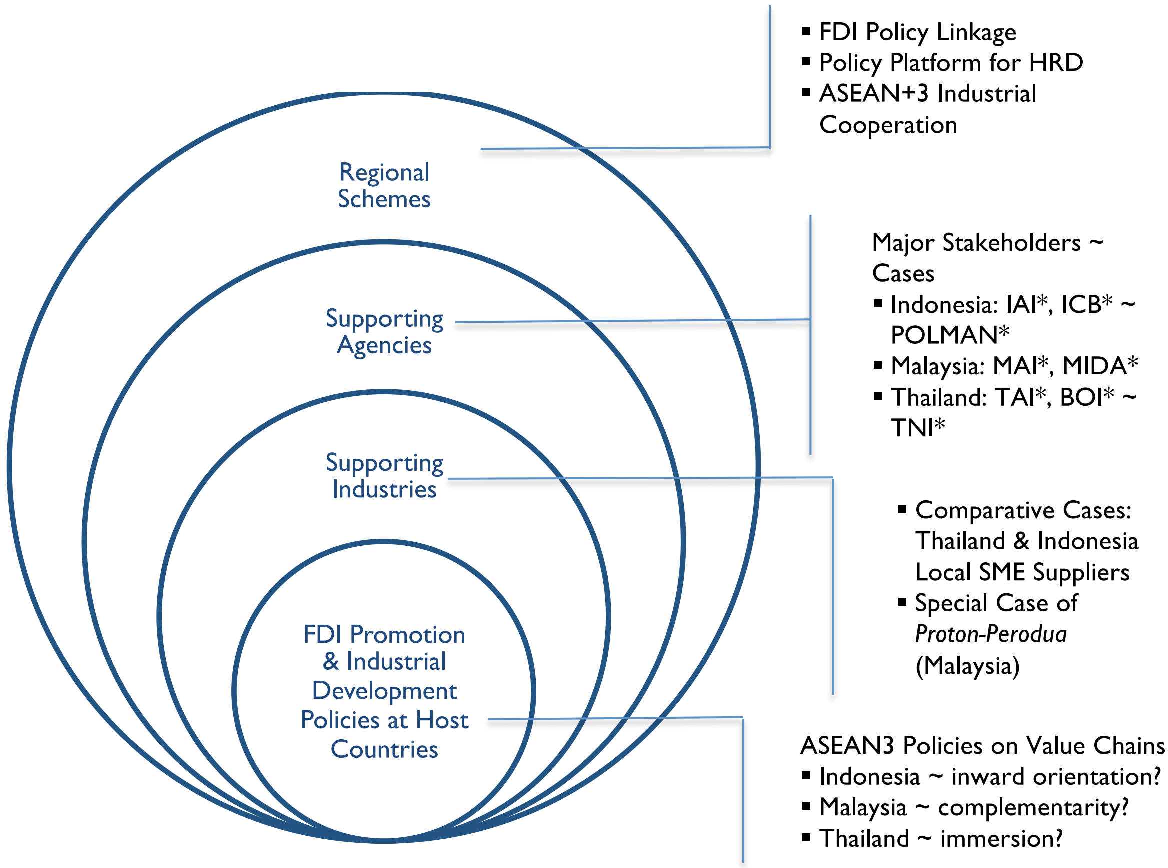
Source: *ibid*

Notes on the abbreviation for Diagrams A.4, A.5 and A.6: SME=small and medium enterprises, OEMs=Original Equipment Manufacturers, others are the same as applied in Diagram A.3

Notes on the Cx-T, Cd-T and SC levels (in Diagram A.5): see footnote number 52

Notes on the Cx-T, Cd-T and SC contents (in Diagram A.5): procurement refers to logistics purchase activities in the value chain.

Diagram A.7. Beyond Firm Level Value Chains Upgrading: Operational Framework for ASEAN3



*IAI=Indonesia Automotive Institute, ICB=Investment Coordinating Board, POLMAN=Polytechnics of Manufacture (TAM), MAI=Malaysia Automotive Institute, MIDA=Malaysia Investment Development Authority, TAI=Thai Automotive Institute, BOI=Board of Investment, TNI=Thai Nichi Institute of Technology

Source: author's assessment