

大塚啓二郎編『技術移転と産業発展の長期的展開過程：インドとタイにおけるオートバイ産業と自動車産業の比較研究』調査研究報告書 アジア経済研究所 2018年

## 第2章

### **The development of the motorcycle and automobile industries in Thailand: An overview (Interim Report)**

Keijiro Otsuka <i>Kobe University</i> <i>IDE-JETRO</i>	Kohei Mishima <i>Keio University</i>	Chadatan Osatis Thammasat University	Takeshi Aida <i>IDE-JETRO</i>
--	---	---	----------------------------------

#### **Abstract**

In our research, we will attempt to trace out the evolutionary process of the development of the motorcycle industry in Thailand as much as possible, while using the available data. Major analytical purpose is to identify the role and characteristics of knowledge spillovers from Japanese to local enterprises.

**Keywords:** FDI, motorcycle industry, spillover effect

#### **1. Introduction**

We hypothesize that “the motorcycle industry in Thailand has been developing without significant knowledge spillovers from Japanese to local enterprises.”

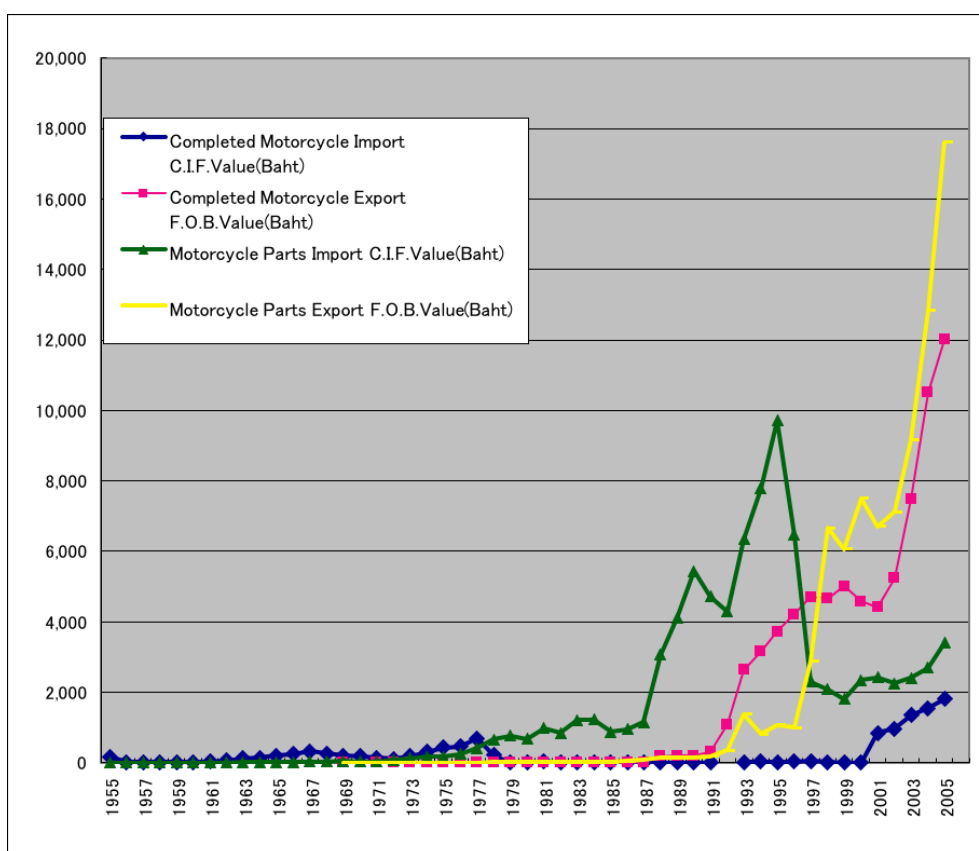
Prima facie evidence is the absence of the development of local enterprises not only in assembly sector but also in the sectors producing engine and engine parts, drive train, and electric parts. Local enterprises are engaged in relatively simple activities, which do not necessarily require much precision, e.g., production of mufflers, rims, and plastic parts, but they learn technology and management by employing experienced Japanese advisors or appoint Japanese as executive members. Since advisory fees and salaries are paid to them, it is not pure spillover effects even if technology is transferred.

#### **2. An Overview**

*2-1. The evolutionary process of the motorcycle industry in Thailand*

We propose to examine the evolutionary process of the development of the motorcycle industry in Thailand by graphical analyses. The evolutionary process entails (1) import of motorcycles; (2) knock-down production with imports of parts from Japan; (3) increasing local production of parts and motorcycles; and (4) increasing export of motorcycles and parts, including packages of parts for knock-down production abroad. Note that such long-term picture of an industrial development is missing in economic studies of FDI.

To visualize such an evolutionary process, Figure 1 shows (1) value of the import of motorcycle; (2) value of import of parts; (3) value of domestic production; (4) value of export of motorcycles; and (5) value of export of motorcycle parts. As shown in the graph, import of motorcycle parts started to rise first. Export of completed motorcycle and motorcycle parts starts from the beginning of the 1990s and Thailand has become a net exporter since late 90s, gaining a competitive advantage. This is consistent with Mishima (2010), who attributes this trend to management capacity building led by Japanese firms. However, more in-depth analyses are necessary to achieve the purpose above. Note that we should use “production data,” but not “sales data” for this purpose as the latter include imported products, particularly imported motorcycles.



**Figure 1:** Import and export of completed motorcycle and parts in Thailand (million)  
(Source: Global Trade Atlas)

## 2-2. Technological development

Another important contribution of this study will be to explore the learning effects of Japanese companies and learning-cum-spillover effects of Thai companies, which have been ignored in the economic analysis of FDI.

For this purpose, we would like to estimate TFP of the motorcycle production using the data of assemblers since 1990. However, probably we will not be able to do so due to the unavailability of the value-added data. Instead, we may show the total number of motorcycles produced and the average number of motorcycles per assembler by using again semi-log graph. The average number is assumed to be an indicator of production efficiency.

### 3. Data Source

By combining the data sources summarized in Table 1, we are planning to analyze the above mentioned two researches: (1) descriptive analysis of the long-term development of automotive industry in Thailand and (2) quantitative analysis of the learning effects of Japanese companies and spillover effects of Thai companies.

**Table 1:** Our data sources

Name	Year	Feature
Thailand Automotive Industry Directory	1997, 2003-04, 2006-16	Mixed data of 2-wheels and 4-wheels
Data collected by TAI A	1993 & 95	Mixed data of 2-wheels and 4-wheels
Data collected by Sato and Ohara (2005)	2001-03	Primarily 2-wheels but including 4-wheels
Our original survey <sup>1</sup>	2015-17	Possible to classify 2-wheels and 4-wheels
Industrial Census	1997, 2007, 2012	Mixed data of 2-wheels and 4-wheels
Manufacturing Industry Survey	1991, 92, 94, 95, 99, 2000, 01, 03	Mixed data of 2-wheels and 4-wheels

<sup>1</sup> See Appendix for the sample of the questionnaire.

## **4. Descriptive analyses of spillover effects**

### *4-1. Production by sector*

First, we will classify the whole industry into 6 sectors: (1) final production (or assembly), (2) production of engine and engine parts, (3) drive train, (4) electric parts, (5) body, and (6) miscellaneous parts. Category (6) may be further classified into metal sheet working, plastic parts, and others.

Second, for each of six categories, we show the production data by Japanese and local companies. If there is no production data, show the number of companies or use the amount of registered capital. For category (1), i.e., assembly, we may show the number of motorcycles produced by Japanese affiliates and local assemblers and their average number of production. The purpose here is to show the near absence of horizontal spillover effects in assembly.

Third, we propose to demonstrate that in categories (2) to (4) there is virtually no production by local enterprises, indicating again the absence of both horizontal and vertical knowledge spillover effects. Since the direct involvement of Japanese companies in (5) and (6) is minimum, we may be able to argue that there are basically vertical spillover effects in (5) and (6), if we observe sizable production by local enterprises.

### *4-2. Import and export by type of parts*

We examine what kind of parts have been imported and exported. If parts in categories (2) to (4) are major export items, we can conclude that export of both motorcycles and parts has been led by the Japanese affiliates.

## **5. Role of Japanese advisors, executives, and tiers of part-suppliers**

### *5-1. Role of Japanese executives*

According to our interviews, local enterprises have learned a lot from part-time Japanese advisors. Problem is that we do not have data. Appointment of executives can be identified from the Japanese names among the names of executive members. We postulate that the appointment of Japanese executives, as well as employment of Japanese advisers, is a major way for local enterprises to learn from Japanese companies. For this purpose, we will conduct descriptive analysis by showing a table of average proportion of Japanese executives employed

by local enterprises by sector. We expect to observe, particularly in body sector, higher and increasing share of Japanese executives to transfer technology and management to local enterprises. Note that this type of technology transfer should not be interpreted as externalities, as it is a part of market mechanisms. From this approach, we can explicitly analyze a type of technology transfer which has been neglected in the previous studies.

### *5-2. Production of parts for 4-wheels in addition to 2-wheels*

We are also interested in the development of the production capabilities over time. For this purpose, we will conduct a descriptive analysis by showing a table of the number and average proportion of enterprises producing parts for both 4-wheels and 2-wheels. Using the index of Directory, we can find the enterprises delivering parts to both motorcycles and automobile industries. Here we examine how part-producers shift from 2-wheels to 4-wheels. Our hypothesis is that automobile assemblers offer contracts primarily to Japanese affiliates but not to local suppliers, because of the difference in the production capabilities.

### *5-3. Heterogeneities in production capabilities within/across sectors*

Using the information about the major customers reported in the Directory, we will identify (1) 1<sup>st</sup> tier suppliers, (2) suppliers who supply to at least one 1<sup>st</sup> tier supplier (designate this category “lower tier suppliers), and (3) suppliers who do not supply anything to 1<sup>st</sup> tier suppliers (lowest tier supplier). We can do this for 1992-93, and 2006-07 using the data collected by IDE (Sato and Ohara, 2005). The biggest hurdle for this is that we need the information on the customers of each firm. We are planning to focus on major Japanese assemblers and ask their suppliers to categorize them as 1<sup>st</sup> tier since the total share of Japanese firms is more than 90%.

We assume that part-suppliers belonging category (1) are technically most advanced, those in (2) are next, and those in (3) are lowest. Using the following table, we would like to show that local suppliers belong primarily to categories (2) and (3). For this purpose, we will conduct a descriptive analysis by showing a table of the proportion of local enterprises belong 1<sup>st</sup> tier, lower tier, and lowest tier by activity and year.

## **6. Regression analyses**

We now have a few explanatory variables: (1) local enterprise dummy, (2) year of establishment, (3) the amount of registered capital, and (4) locational dummies. However, we should continue to think the specification of regression functions. We may assume that the

choice of the product is pre-determined and use them as explanatory variables.

The similar arguments should apply to dependent variables. At present, we have (1) proportion of Japanese executives, (2) the number of Japanese advisers in 2017 and (3) dummy for the production of parts for 2-wheel and 4-wheel assemblers.

We would like to examine the hypothesis that local enterprises employing Japanese advisors and appointing Japanese executives are primarily “lower tier” suppliers in the production of bodies, metal sheets, and plastic product, and suppliers for both motorcycles and automobiles.

## Reference

- 三嶋恒平(2010) 『東南アジアのオートバイ産業—日系企業による途上国産業の形成 (MINERVA 現代経済学叢書)』、ミネルヴァ書房
- 佐藤百合、大原盛樹編(2005) 『アジアの二輪車産業—基礎情報と企業一覧』、独立行政法人日本貿易振興機構アジア経済研究所
- Murakami, Yoshimichi and Keijiro Otsuka (2018) “A Review of the Literature on Productivity Impacts of Global Value Chains and Foreign Direct Investment: Towards an Integrated Approach,” mimeo.
- The Thai Automotive Industry Association (1990) *Thailand Automotive Industry Directory 1990*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (1997) *Thailand Automotive Industry Directory 1997*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2004) *Thailand Automotive Industry Directory 2003-2004*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2007) *Thailand Automotive Industry Directory 2006-2007*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2008) *Thailand Automotive Industry Directory 2007-2008*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2009) *Thailand Automotive Industry Directory 2009*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2010) *Thailand Automotive Industry Directory 2010*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2011) *Thailand Automotive Industry Directory 2011*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2012) *Thailand Automotive Industry Directory 2012*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2013) *Thailand Automotive Industry Directory 2013*, Bangkok: The Thai Automotive Industry Association
- The Thai Automotive Industry Association (2016) *Thailand Automotive Industry Directory 2016*, Bangkok: The Thai Automotive Industry Association

## Appendix: Questionnaire Sample

### Questionnaire for Firms in the Automotive Industries in Thailand

This questionnaire survey is conducted for purely academic purposes by Thammasat University, Institute for Developing Economics, JETRO, and Keio university. All firm-specific information shall never be disclosed in any circumstances.

#### 1 Profile

- (1) Name of the firm
- (2) Phone number
- (3) E-mail
- (4) Proportion of Thai shareholders (%)
- (5) Capital and number of employees (2015, 2016, 2017)

	2015	2016	2017
Capital (million baht)			
Number of employees			

- (6) Presence or absence of Japanese executive and Japanese advisor(before 2015, 2016, 2017)

	Before 2015	2016	2017
Japanese executive	YES (when? )		
	NO	YES / NO	YES / NO
Japanese adviser	YES (when? )		
	NO	YES / NO	YES / NO

#### 2 Main Products and Process Category

- (1) Main Products and Its Category

Product Category: (A) Engine parts, (B) drive train parts, (C) electrical parts, (D) Rubber Parts,

(E) Body/suspension/wheel/braking parts, (F)Plastic injection parts,(G)others.

Process Category: (H) pressing/welding, (I) machining, (J) casting, (K) forging, (L)assembling,

(M)surface treatment (heat treatment, plating, painting), (N)plastic Injection, (O) others.

		2 wheeler				4 wheeler				other	
		name of product	product category	process category	beginning year	name of product	product category	process category	beginning year	nane of product	process categor
main products	1										
	2										
	3										
	4										

### 3 Sales customers

(1) Number of sales customers

Thai firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

Japanese firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

Other firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

(2) Sales share of 2 wheelers (%) \_\_\_\_\_; 4 wheelers \_\_\_\_\_; others \_\_\_\_\_

(3) Sales share of Thai firms (%) \_\_\_\_\_; Japanese firms (%) \_\_\_\_\_; others \_\_\_\_\_

(4) Sales share of Domestic (%) \_\_\_\_\_; Export (%) \_\_\_\_\_

(5) Top 4 sales customers (specify names): \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

### 4 Number of outsourcing firms

(1) Number of material source firms (Thai firms • Japanese firms)

Thai firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

Japanese firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

(2) Number of process outsourcing firms (Thai firms • Japanese firms)

Thai firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

Japanese firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

(3) Number of other sourcing firms (Thai firms • Japanese firms)

Thai firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

Japanese firms: (A) 0, (B) 1-5, (C) 5-10, (D) 10-15, (E) more than 15

### 5 Sales turnover

(1) Sales turnover (Domestic/Export) (million baht)

	2 wheeler				4 wheeler				Grand Total	Share of Material cost in sales (%)
	Japanese firms	Local firms	others	Total	Japanese firms	Local firms	others	Total		
2017										
2016										
2015										