

Asian Industrial Development from the Perspective of the Motorcycle Industry

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journal or publication title	IDE Discussion Paper
volume	182
year	2008-12-01
URL	http://hdl.handle.net/2344/808

IDE Discussion Papers are preliminary materials circulated
to stimulate discussions and critical comments

IDE DISCUSSION PAPER No. 182

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December 2008

Abstract

This paper discusses the diversity of industrial development among Asian countries that emerges through an investigation of the motorcycle industry despite its uniform industrial attributes. The paper then explores factors that generate diversity, focusing attention on the differences in knowledge-based assets accumulated in each country. It finds that diversity is brought about through the differences in domestic industrial resources and the capabilities of local firms. The analysis underscores each country's intrinsic logic in industrial development, contrary to the current trend of stressing assimilation through the global production networks of multinational corporations.

Keywords: motorcycle industry, Asian industrial development, knowledge-based assets, industrial resources, capabilities

JEL classification: L16, L62, O14

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1. Introduction

How do the processes of industrial development vary among late Asian industrializers? What are the major factors inherent to each country that has brought about such diversity? This paper tackles these questions by focusing on the motorcycle industry in Asian countries.

The authors of this paper carried out a research project on the motorcycle industry in Asia with five other researchers at IDE in the period from 2004 to 2006. This paper is a summary of the outcome of the research project. Our research project on the motorcycle industry did not aim to devise a generalized model that can be adapted to other industries or countries. Rather, we found that the motorcycle industry, despite its uniform industrial attributes, highlighted the diversity in the industrial development process of each country. In this paper, therefore, we firstly aim to present the diversity of Asian industrial dynamism in the various countries that became apparent through the investigation of the motorcycle industry. Based on the country analyses, we secondly aim to explore the factors that generate diversity, focusing special attention on the differences in the knowledge-based assets accumulated in each country. Knowledge-based assets include industrial resources at the national level and capabilities at the firm level.

The paper is organized as follows. The following section 2 presents the significance of the motorcycle industry as an object of academic research, and section 3 introduces the knowledge-based asset approach adopted in our research. Section 4 provides an overview of the essence of the country analyses in order to highlight the diversity of industrial development by country. The subsequent three sections discuss

¹ This paper is a summarized English version of the Introduction and Chapter 1 in Sato and Ohara eds. [2006] (in Japanese). For other chapters, see bibliography. Section 4 of this paper introduces the essence of each chapter.

the factors involved in the bringing about of this diversity, respectively focusing on domestically accumulated industrial resources, motorcycle manufacturers as integrators of the resources, and their capabilities. Section 8 concludes our discussion.

2. Why the Motorcycle Industry?

Generally, the motorcycle industry is regarded as a branch of the automobile industry. In reality, however, motorcycles (two-wheeled vehicles) have quite different attributes from cars (four-wheeled vehicles), both as a product and as an industry.

A motorcycle is smaller than a car. This is particularly true for the small-sized motorcycles (engine capacity of 125cc or less) that are mainly in demand and produced in Asia and other developing countries. These motorcycles have a simpler structure than a car, using around one-tenth of the number of components per unit. This means that the entry barrier for producers is lower in terms of required capital and technology when compared with cars. The prices of motorcycles are also lower, below one-tenth of those of cars. This is why the demand for motorcycles expands prior to car motorization in developing countries. This demand expansion motivates producers to enter into the assembling and component manufacturing of motorcycles. However, the manufacturing of motorcycles, which is comprised of a variety of raw materials and processing technologies, requires comprehensive technological capabilities, reflecting the level of industrial knowledge accumulated in each country.

Unlike the car industry, the motorcycle industry is an “Asian industry,” as around 90 percent of production and markets are concentrated in Asia. While in the car industry the leading manufacturers in the USA, Japan and Europe compete fiercely in global markets, the motorcycle industry is overwhelmingly dominated by the Japanese giants. Especially, Honda Motor (hereafter Honda) has long maintained its dominance since it developed the “Super Cub” (C100) in 1958 and began operation of an integrated mass-production factory tailored for the model in 1960. Since then, for almost half a century, the core technology of the C100, which is now a global “*de facto* standard” model, has not changed significantly. Thus, in terms of technology, the

motorcycle industry is highly mature, unlike the car and electronics industries. Thus a notable feature of the motorcycle industry is that, although it has a low entry barrier, which motivates the dynamism of local Asian firms, these firms have a long way to go to catch up since the industry has a tough oligopolistic structure. How local Asian firms tread this difficult path reflects the diversity in each of the countries.

In this regard, the motorcycle industry could provide a useful field for indicating the diversity by country that has arisen despite the uniformity of production processes and prevailing models, especially with regard to how indigenous Asian firms contribute to the development of the industry, and what kinds of interrelationships they have with the dominant Japanese manufacturers. In spite of this significance, the academic literature on industrial studies has thus far neglected to produce studies of the motorcycle industry as differentiated from the car industry.² Our attempt is unique in the sense that it specifically focuses on the motorcycle industry and explores the factors which have generated diversity within Asian industrial development from the perspective of the motorcycle industry.

3. The Knowledge-Based Asset Approach

It would seem that mainstream studies on Asian industrial development in the era of globalization emphasize technological assimilation by late-starter countries through global value chains, production networks, the international transfer of capital and technology, the increasing role of multinational companies, their outsourcing strategy, and involvement of local clusters and small and medium enterprises in global networks (Gereffi [1994], Schmitz [1995], Borras, Ernst and Haggard eds. [2000], Kenney and Florida eds. [2004], Schmitz ed. [2004], Gereffi, Humphrey and Sturgeon [2005]). The familiar concepts that were once widely used to understand late-industrializers, such as

² The limited academic literature on the motorcycle industry includes Demizu [1991], Oguri [1995], Otahara [2000] for Japan, Koerner [1995] for the UK, Yukihiro Sato [1999] for Taiwan, and Ohara [2001] [2006a] for China. Regarding Japan, there are extensive informative sources other than the academic literature, especially Honda [various years] and IRC [2003] for statistical data, and Ozeki [1993] and Tomizuka [1996] for history.

the role of state, import substitution using the domestic market, and the independence of large local firms, seems to be already outdated. However, after scrutiny of the motorcycle industry, we found that such seemingly old-fashioned concepts are still relevant and remain as core issues in understanding the contemporary Asian industrialization process. We reaffirmed the importance of domestic markets in late-starter countries, domestically accumulated industrial resources, large firms as integrators of the resources, and the efforts by local firms to develop capabilities.

Based on this understanding, our research adopts a knowledge-based asset approach. Amsden [2001] defines economic development as a process of moving from a set of assets based on primary products to a set of assets based on knowledge. Knowledge-based assets are proprietary, intangible, difficult to copy, and hence yield long-run differentiation and long-lasting rents. While firms in developed countries can yield such rents through unceasing “proprietary innovations,” Amsden sees that what most late-starter country firms are doing is engaging in the “pure learning” of commercialized technology that carries short-term unstable rents in a copying race.

Our research assumes indigenous Asian motorcycle manufacturers³ and component suppliers in the motorcycle industry to be possible proprietary innovators, and the possible embodiment of knowledge-based assets accumulated in a country under study. We analyze to what extent and how Asian motorcycle manufacturers that challenge manufacturers in developed countries build “capabilities” for generating their proprietary innovations (e.g. the development of new models, building quality into the product, ingenuity in reducing costs, and so on). Innovations here may not necessarily be of a change-the-world type, and are mostly of an incremental type.⁴

We also focus attention on “industrial resources” as knowledge-based assets that have supported the development of the motorcycle industry. “Industrial resources” in this context refers to a variety of assets embedded in related industries and

³ A “motorcycle manufacturer” in this paper refers to a producer of motorcycles as a final product. It is not a mere assembler but carries out a wide range of activities covering planning, product development, design, coordination of suppliers, and marketing, besides the production process.

⁴ Abernathy and Clark [1985] classified four types of innovation by new/existing technology and by new/existing markets, and considered that “incremental innovation” could take place even with the existing technology in the existing markets.

institutions that are directly and indirectly mobilized into the development of a certain industry. In the case of the motorcycle industry, these include firms and human resources (managers, engineers, laborers) in such industries as components, raw materials, production facilities, molds, tools, and so on, financial institutions, R&D service sectors, distribution networks, and governmental institutions. Our research investigates to what extent and how industrial resources have been mobilized and reinforced in the development process of the motorcycle industry.

4. Country Analyses: The Diversity of Industrial Development

This section introduces the essence of our country analyses concerning the Asian motorcycle industry, which covers seven countries or areas, namely, Japan, Taiwan, China, India, Thailand, Indonesia, and Vietnam.⁵

Japan

In the 1960s, the Japanese motorcycle industry gave birth to dominant manufacturers, which successfully created global production networks in the 1990s. There are two major reasons why these manufacturers have been able to maintain their market dominance and not allow late-comers to catch up, despite the fact that the core technology is quite mature. Firstly, the Japanese motorcycle manufacturers were able to utilize a variety of solid industrial resources accumulated within the country. Secondly, they had a high capability for adapting Japan's industrial resources to the needs of each country's market.

Their dominant position is also reflected in the relationship with domestic component suppliers. Compared to car manufacturers, Japanese motorcycle manufacturers exert a higher degree of control over product design and force suppliers to specialize one-sidedly in production. Consequently, suppliers have acquired high

⁵ For detailed discussions, see Ohara [2006b] and Otahara [2006] for Japan, Yukihiro Sato [2006] for Taiwan, Ohara [2006c] for China, Shimane [2006] for India, Higashi [2006] for Thailand, Yuri Sato [2006] for Indonesia, and Fujita [2006] for Vietnam.

QCD (quality, cost, and delivery) capabilities, which constitute a basis for the competitiveness of the Japanese motorcycle industry. However, the suppliers have been provided less opportunities for product development and design. They can enhance their design capabilities only by diversification into non-motorcycle sectors, including car components.

Taiwan

Two Taiwanese motorcycle manufacturers, Kuwanyang and Sanyang, learned their production technology through joint ventures with Honda, but could not acquire product development capabilities. After they shifted to selective patent contracts with Honda and cooperation in engine development with institutes in Europe and the United States, they eventually made the jump to technological independence in the mid-1990s. Many local component suppliers, who had also introduced technology from Japan, but were later able to terminate their dependence on Japanese companies, supported the original product development of Kuwanyang and Sanyang.

Taiwan's motorcycle industry forms a "loosely interrelated system," composed of two major local manufacturers, Japanese-affiliated and other smaller manufacturers, component suppliers, and a governmental research institute. In overseas operations, Taiwan's motorcycle manufacturers are facing an uphill struggle with the dominant Japanese brands, but have fought their way forward with a "niche strategy" of exporting ATVs (all terrain vehicles) to American and European markets, a positive outcome produced by the loosely interrelated system of the industry.

China

In the 1990s, when the world's largest domestic market expanded to 10 million units in annual sales, China's motorcycle industry was characterized by a copying race and unstable business transactions among a large number of homogeneous firms. Since 2000, however, both local motorcycle manufacturers and component suppliers have improved their capabilities in product development and have formed more orderly transaction relations. The relations are shifting from "isolated

development,” in which motorcycle manufacturers and suppliers pass on risks to each other, to “united development,” in which they share risks in product development, as in Japan. Although manufacturers and suppliers have started to develop new models jointly, the advantage of the Chinese motorcycle industry continues to lie in the large size of production scale and the production of standardized models.

India

The Indian motorcycle industry has three types of motorcycle manufacturers --- indigenous manufacturers, Japan-Indian joint ventures, and 100 percent Japanese subsidiaries. Among the three, the latter two do not conduct new model development in India. Joint ventures tend to require low costs, while Japanese subsidiaries require high quality from local component suppliers. Unlike these, indigenous motorcycle manufacturers, which had provided chances for local firms to enter into the component industry in the 1970s and 1980s under the closed economy regime, encouraged suppliers to acquire capabilities in product development and design through joint development of new models in the 1990s and after. India’s case shows that the discipline required of suppliers differs depending on the ownership of the manufacturer, and that the existence of indigenous manufacturers has a crucial impact on the growth and capability development of suppliers.

Thailand

The Thai motorcycle industry serves as a prime example of Japanese dominance. The market is dominated by a few Japanese brands. Not only motorcycle manufacturers but also component suppliers are mostly Japan-affiliated. Local suppliers account for only 15 percent in terms of the value of local procurement. These local suppliers have, however, accumulated capabilities that allow them to meet the required levels of QCD for the offering of VA/VE⁶ proposals to the motorcycle

⁶ VA/VE, value analysis and value engineering, refers to systematic efforts in functional analysis on products and services in order to achieve the necessary functions with the lowest total costs. The purpose is to maximize value (V), defining value as functions (F) over costs (C) ($V=F/C$). The efforts are basically aimed at simplifying the design of products and services in order to realize the

manufacturers. The most advanced examples include one supplier that embarked on the production of motorcycle components in India, and another supplier that succeeded in developing new products, such as car components and golf carts.

The first Thai motorcycle manufacturer was established in 2002. Although the founder is an engineer with experience in a Japan-affiliated manufacturer, the firm is pursuing a strategy quite different from its Japanese counterparts, namely, outsourcing to non-Japan-affiliated local suppliers, no requirement for VA/VE activities, short-term transactions, and procurement of engine components from China.

Indonesia

The structure of Indonesia's motorcycle industry is an oligopoly of Japanese-brands, as in Thailand. However, local suppliers account for around 30 percent of total value of local procurement, substantially higher than Thailand, as the agglomeration of Japan-affiliated suppliers is not as large as it is in Thailand. Since 2000, when the domestic motorcycle market started to expand rapidly, local suppliers have enhanced their capabilities with regard to QCD, dies, molds and jigs in increasing production volume. The market expansion has also triggered the multiplication of small local firms specializing in dies, plating and other related processes. The motorcycle industry plays a crucial role in opening up cycling dynamism of backward and forward linkage effects, where final demand stimulates the upstream supporting industry, and the supporting industry reinforces the downstream machinery industry in the wider sense. However, the only local motorcycle manufacturer, established in 2000, is confronted by the high wall of the Japanese-brand oligopoly.

Vietnam

In the Vietnamese motorcycle industry, where the dominance of Japanese brands is not yet established in such a degree as in Thailand or Indonesia, dozens of

necessary functions (e.g. performance, quality, credibility, safety, etc.) and, for instance, revisions of design, specifications, materials, production processes, layouts, delivery, customers, transaction units, and so on.

local “assemblers” of China-made parts have appeared since 2000. Of these, those who specialize in assemblies of low-priced, low-quality models continue to grow, while those who have pursued their own brands and in-house manufacturing have faltered. However, the appearance of local “assemblers” as a whole has induced the entry of many local firms into component manufacturing. Some of them have enhanced their capabilities to become suppliers of Japan- or Taiwan-affiliated motorcycle manufacturers. The rise of local “assemblers,” although temporarily, has stimulated local firms to new entry and technological learning, and contributed to the expansion of the industrial base.

5. Differences in the Accumulation of Industrial Resources

The remainder of this paper discusses factors that bring about the diversity of industrial development by country as described above. Our research focuses on the differences in domestically accumulated knowledge-based assets as a key to diversity generation.

The country analyses of the Asian motorcycle industry indicate that the competitiveness of the industry of each country is closely related to the width and the depth of domestic industrial resources as knowledge-based assets accumulated at the national level. There are two patterns in the relationship between the motorcycle industry and utilizable industrial resources. The first is that the motorcycle industry is a latecomer and can utilize resources in the existing industrial base. In this pattern, a forward linkage effect may work; the outputs of the existing upstream and midstream industries support the development of downstream motorcycle manufacturing. This is typically the case with Japan,⁷ and is also regarded as being true of Taiwan, China and India. The second pattern is that the motorcycle industry is a pioneer and stimulates development of the industrial base. A backward linkage effect works here; downstream manufacturing of motorcycles induces the production of intermediate goods and

⁷ Japan’s motorcycle industry started with the new entry of firms and engineers from such preceding industries as aircraft, weaving machinery, musical instruments, cars, bicycles, and sewing machines (Oguri [1995], Tomizuka [1996]).

materials as inputs from midstream and upstream industries.⁸ This is the case in most Southeast Asian countries.

As seen in Figure 1, Japan's motorcycle industry has been supported in the forward direction by a robust multi-layered triangle of industrial resources, comprising of basic material industries (steel, plastics, glass, and so on), basic machinery industries (machine tools, molds, dies, jigs, tools, measurement equipment, heat-treatment, and so on) and component manufacturing industries (components manufactured from metal, plastics, glass, rubber, and so on). Japanese motorcycle manufacturers, located at the apex of the triangle, invested overseas prior to investments in the lower-layer industries (). In Southeast Asian countries, where there exists less accumulation of industrial resources due to the relatively short history of industrialization, expanding local production by the Japanese motorcycle manufacturers induces overseas investment by Japanese component producers (), and further, that of Japanese basic machinery producers (). Overseas investment also stimulates growth of local suppliers. Despite this backward linkage effect, however, the industrial resources of these countries are regarded as forming an inverted triangle, as a certain amount of time is required before lower-layer basic industries put down roots widely within the local economy. Due to the thin industrial base, the forward linkage effect is also regarded as weak.

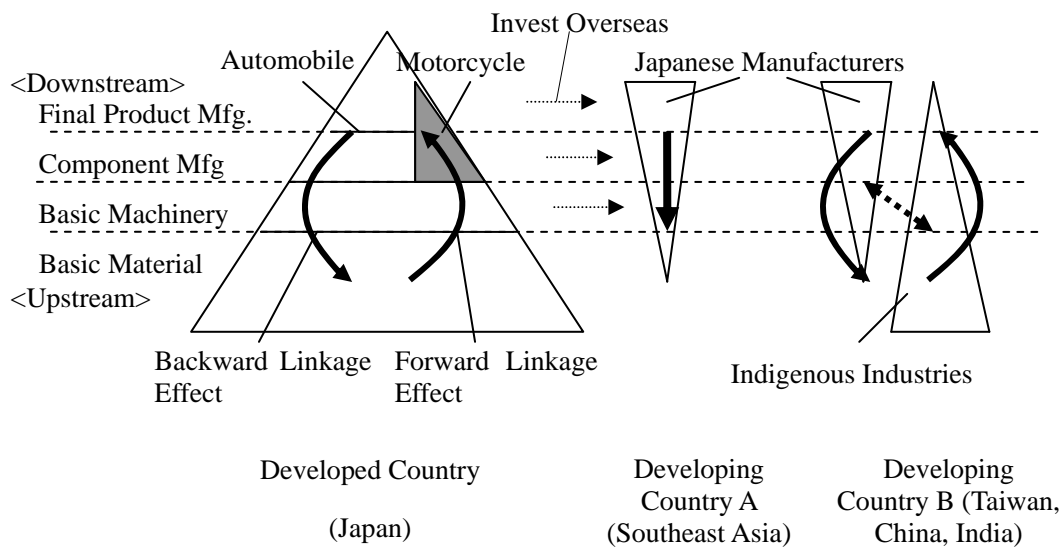
On the contrary, in Taiwan, China, and India, it is regarded that there exists a triangular indigenous industrial base owing to the longer history of industrialization. In this case, once the Japanese motorcycle manufacturers facilitate the operation of the backward linkage effect, it is more likely that the existing upper-stream indigenous industries will react and exert a forward linkage effect supporting motorcycle manufacturing. Thus the Japanese manufacturers can boost a cycle of forward and backward linkage effects more actively here than in the countries with an inverted triangular industrial base.

Mainstream studies stress the significance of local firms in developing countries participating in global production networks and exporting to overseas

⁸ Forward and backward linkage effects here are in the sense of Hirschman [1958].

markets in order to enhance their competitiveness. Our research, however, emphasizes more the domestic accumulation of multi-layered and widely-based industrial resources as a vital source of industrial competitiveness. In this sense, clumsy but long-standing efforts to foster a full set of industrial resources in some developing countries like China and India are well worth reevaluation.

Figure 1: Multi-layered Industrial Resources and Forward/Backward Linkage Effects



6. The Significance of Local Motorcycle Manufacturers

In the development process of the motorcycle industry, motorcycle manufacturers function as an integrator of industrial resources. The thicker the industrial resources they can integrate in their home country, the more competitiveness they can exert. This is evidenced by the Japanese motorcycle manufacturers, who were able to integrate the thickest accumulation of domestic industrial resources among the Asian countries, and thus established overwhelming dominance. In Taiwan, India and China, with a certain level of accumulation of industrial resources, leading local motorcycle manufacturers have emerged, while local manufacturers are still weak in the Southeast Asian countries, which exhibit an inverted triangular industrial base.

In most countries under study, there are foreign (mostly Japanese and partly Taiwanese) motorcycle manufacturers that function as an integrator of industrial resources. However, in our observation, the manner of integrating resources differs between foreign and local indigenous motorcycle manufacturers. Local manufacturers tend to mobilize domestic industrial resources more vigorously than foreign manufacturers, who procure inputs from locations matching their global strategy. Moreover, foreign manufacturers are able to exert their power to limit the scope of activities for local firms. That is why we place more emphasis on the existence of local motorcycle manufacturers than foreign ones.

One of the salient features of the motorcycle industry is that the dominant Japanese manufacturers hold a high degree of control over product development and design. They often set limitations for local partners and suppliers becoming involved in basic R&D activities, which would produce high rents if successful. While the Japanese manufacturers are very active in nurturing the capabilities of local firms in QCD, they tend to be reluctant to start up core portions of R&D activities (except for localization R&D) in the host countries. In contrast, local motorcycle manufacturers draw on all utilizable domestic industrial resources in their R&D activities for product development.

As indicated in the Taiwan country analysis, for example, Kuwanyang and Sanyang initiated their motorcycle manufacture in partnership with Honda. However, it was only after extricating themselves from Honda's technical control that they were able to start up new model development on their own. After they began R&D activities for their own models, local component producers embarked upon massive R&D activities, and a governmental research institution also started to provide R&D services. The trial and error entailed in these local manufacturers' R&D activities has become an important process of accumulation of a variety of knowledge, which has resulted in shared assets for Taiwan's business society. While the Taiwan case is diachronic, the Indian country analysis provides a synchronic comparison between local and Japanese manufacturers, and results in a similar implication. The product development activities of the local Indian manufacturers widely mobilized domestic resources and had

significant impacts on the capability building of local suppliers.

7. Differences in Capability Building of Local Manufacturers

We have emphasized the significant role played by local motorcycle manufacturers in mobilizing domestic industrial resources. Interestingly, our research also reveals that local motorcycle manufacturers in each country have different capability characteristics. The difference in the capabilities of local motorcycle manufacturers is regarded as another important factor in the generation of diversity in industrial development by country besides the difference in domestic industrial resource accumulation.

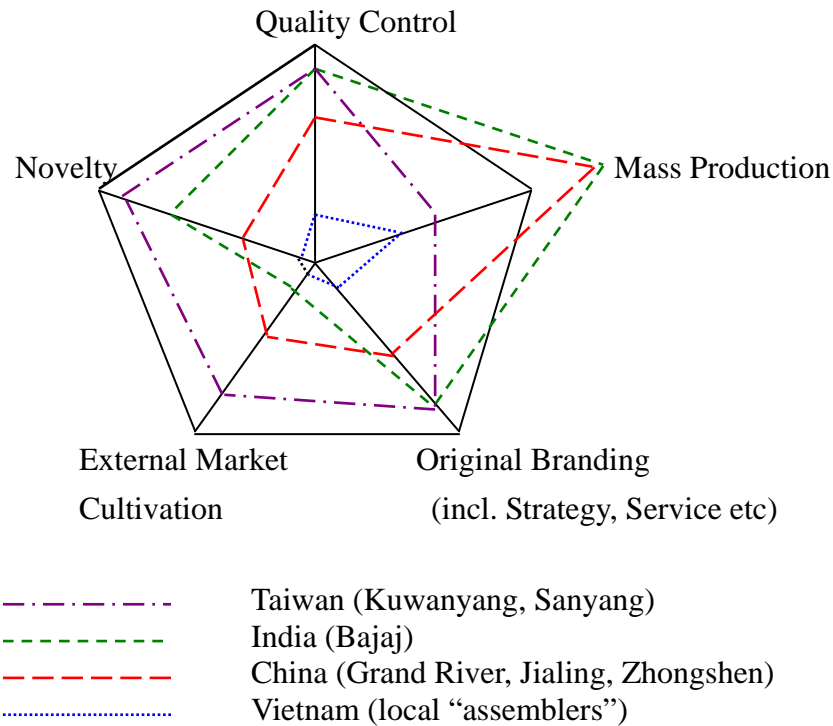
We assume that local motorcycle manufacturers in each country have built their capabilities according to different priorities and sequences under the conditions in the respective countries in at least the following five aspects; capabilities for (1) mass production, (2) quality control, (3) novelty (new model development), (4) original branding (original brand planning, strategy, marketing, services, and so on), and (5) development of external markets (that require adjustment to different cultures).⁹ Figure 2 compares the capabilities of local motorcycle manufacturers by country, that is, Japan, Taiwan, India, China and Vietnam, in the selected five aspects.

Both Taiwanese and Indian manufacturers have relatively high capabilities in quality control and in original branding with domestic marketing networks. The Taiwanese are also quite good at creating novelty and at developing external markets, but have less ability in mass production. The Indian motorcycle industry is far better at mass production than the Taiwanese and even the Japanese industry, but has not yet progressed very far with the cultivation of external markets. Compared to their Taiwanese and Indian counterparts, the capability building of Chinese motorcycle manufacturers is rather disproportionate. They have developed a prominent mass-production capability, which has not been accompanied by capabilities in

⁹ For the selection of the five aspects, we referred to Lall [1992], Ernst, Mytelka and Ganiatsos [1998], and Amsden [2001].

securing quality, producing innovative new models (novelty), and original branding. Vietnamese local “assemblers” have very limited capabilities in every aspect selected for the Figure.

Figure 2 Comparison of Capabilities of Asian Motorcycle Manufacturers



Note: The levels of manufacturers’ capabilities are plotted as compared to the levels of Japanese manufacturers (domestic operation only) which are set at 1 (exterior frame).

According to our observations, the differences in capability building of local motorcycle manufacturers are derived primarily from the differences in domestic market environments of the respective countries.

The Chinese manufacturers’ disproportionate expansion of mass-production capability and relative ignorance in building quality and novelty capabilities stem from the following competitive nature of the Chinese domestic market. The overall production size is large (10 million units in 1997 and over 20 million units in 2006) due to the very large domestic market. The market has a prominent preference for low price rather than quality, such that price competition has been harsh at all times. Local

motorcycle manufacturers are numerous and there have at all times been 100-150 manufacturers in operation since the mid-1990s. Since they are to a large extent homogeneous with respect to the level of manufacturing capability, their products have mostly been duplication models, with almost half of the motorcycles produced annually mounting engines that were minor-change versions of Honda's three models. Thus, they have had to pursue economies of mass production in order to realize lower prices in the harsh homogeneous price competition.

India and Taiwan have had contrasting environments in their respective domestic markets. Since new entry to motorcycle assembly was regulated by the governments, there has been no emergence of a large number of homogeneous manufacturers as in China, although the market size is sufficiently large in India (3 million units in 1997 and over 8 million units in 2006). The mode of competition has largely been controlled by a few dominant players, and the harsh price competition experienced by the Chinese manufacturers did not take place. Unlike China, the Indian market has preferences not only for low price, but also for high performance (fuel efficiency and durability) and high secondhand selling prices, as evidenced by the fact that China-made duplication models have had poor sales records. Given these market environments, Indian and Taiwanese manufacturers were able to steadily pursue capability development in quality and novelty. The difference between the two lies in the size of the domestic market; the Taiwanese had to attempt to sell overseas due to the limited size of their domestic market.

The shape of Vietnamese local assemblers' capabilities in Figure 2, though far smaller, resembles that of the Chinese. In Vietnam after 2000, similar to the Chinese experience, numerous small local firms that assembled China-made parts and produced homogeneous models emerged abruptly. Their emphasis on mass-production capability was derived from market conditions similar to those in China; abrupt and rapid expansion of the domestic market, market preference for low price, low requirements for quality and novelty, and homogeneity of players.

With respect to Thailand and Indonesia, local motorcycle assemblers cannot yet be evaluated, but the capabilities of major local component producers can be

analyzed in the same framework. Their capabilities are prominently high in quality control as they have been disciplined in QCD technology by Japanese manufacturers, while there is naturally little room for them to enhance capabilities in novelty and original branding.

We regard the difference in capabilities of local manufacturers as one factor in the generation of the diversity of industrial development by country. As viewed above, the uniqueness of their capabilities has been formed in response to the domestic market environments of each country. The domestic market environments encompass market size, market preference, the number of players, the form of ownership, mode of competition, and government policies and regulations.

8. Conclusion

The motorcycle industry, despite the uniformity of production processes and prevailing models, brings out the diversity of industrial development among Asian countries. Based on the country analyses, we ascribe diversity to differences in domestically accumulated industrial resources and capabilities of local manufacturers. The accumulation of industrial resources is essentially related to the history of industrialization of each country, and the characteristic capabilities of local manufacturers are formed in response to the respective domestic market environments. Our knowledge-based asset approach sheds light upon the intrinsic logic in the economic development process of each country, in contrast to the current trend of globalization where there is more emphasis on the power of multinationals and global networks.

From this basic stance, we summarize our findings on the Asian motorcycle industry as follows. The achievement of the Asian motorcycle industry is, firstly, the rise of local motorcycle manufacturers based on the homeland accumulation of industrial resources. Taiwan, India and China have generated the leading indigenous motorcycle manufacturers, which were supported by the existing industrial base and thus promoted the further development of supporting industries. The second

achievement is the capability strengthening of Asian local component suppliers, focusing on QCD. The overseas business of Japanese motorcycle manufacturers has had an impact on the diversification and deepening of resource accumulation in host countries, and more specifically, on the disciplining of the QCD capabilities of local suppliers in their transactions. This impact was especially significant in the Southeast Asian countries, which have relatively thin resource accumulation. QCD capabilities serve as a key source of their industrial and corporate competitiveness.

In contrast to this bright side of the industry, the dark side is that, firstly, local motorcycle manufacturers have a far from easy task in catching up with the dominant Japanese manufacturers. Our research logically indicates that the same level of Asian local manufacturer competitiveness would require the same level of homeland resource accumulation as Japan. However, our research empirically demonstrates the diversity of development paths in response to the domestic markets and based on their respective resource accumulations. We can observe such developments in the highly fuel-efficient models developed by the Indian manufacturers, Taiwan's scooters and ATVs, and China's standardized low-priced models.

The second dark side is that local component suppliers have limited chance to acquire the capability to develop and design new products as long as they are devoted to transactions with the dominant Japanese manufacturers. Our research indicates two possible prospects. One is to specialize in motorcycle components and to pursue export markets or overseas investment with high QCD capabilities. The other is to diversify, either into non-motorcycle industries, or into new transactions with non-Japanese manufacturers, which would provide opportunities for joint product development. In either specialization or diversification, local producers need to develop their own strategies for extricating themselves from their position as passive suppliers and to open up their own development paths.

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