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Nozomu Kawabata

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GRADUATE SCHOOL OF ECONOMICS AND
MANAGEMENT TOHOKU UNIVERSITY
27-1 KAWAUCHI, Aoba-KU, SENDAI,
980-8576 JAPAN

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Abstract

This study discusses the development of the Vietnamese iron and steel industry under international economic integration. In particular, this study investigates what type of enterprise was responsible for this development, as well as the economic and managerial logic that can explain this development. The analysis provides suggestions for industrial development under international economic integration in developing economies.

Under trade and investment liberalization, private enterprises and foreign capital firms have been the main participants in the development of the Vietnamese iron and steel industry. However, such development did not occur via a simple laissez-faire approach. Each enterprise type and the government faced challenges. Ownership and management reform were required of state-owned enterprises, and local private enterprises had to ensure market creation through innovation, by making full use of the local condition. Foreign enterprises had to introduce the huge funds and state-of-the-art technology. Moreover, adaption to local society influenced their projects' progress. Thus, the government should review and monitor large-scale projects from both economic and social viewpoints. The Vietnamese iron and steel industry recorded steady growth because some of these conditions were met, while some unachieved conditions caused problems.

This case suggests that industrial development under international economic integration is possible. In addition, such integration requires not only a market mechanism but also an entrepreneurial spirit that encourages market creation and government policies that complement the market's role and resolve social issues.

I Introduction

This study discusses the industrial development of developing economies under international economic integration, or globalization, through the case of the iron and steel industry in Vietnam.

First, this study clarifies that there is little room for protectionism and a development policy for local enterprises in the domestic and foreign economic environment of Vietnam since the 1990s. Second, assuming such constraints, this study examines the roles of state-owned enterprises (SOEs), private enterprises, and foreign enterprises in the development of Vietnam's iron and steel industry. Through this

examination, this study clarifies the factors that drive industrial development under international economic integration.

The path of industrial development varies depending on the time and industry, and differs across countries. It is impossible to give a single answer as to the potential for industrial development in developing countries and the measures necessary for that development. However, this study suggests that the case of the iron and steel industry in Vietnam can provide insights. This study confirms one realistic path through which industrial development becomes possible, even under international economic integration and suggests other cases. Moreover, this study will clarify that this development can occur not only via *laissez faire* policies, but also certain enterprise behaviors and government policies.

II Steel Industry Promotion without Highly Protectionist Policies

Based on the theory of free trade, world trade expands and each economy increasing its income through specialization in industries with comparative advantages. However, capital-intensive industries like iron and steel were the target of state protectionist policies in the 19th and 20th centuries. Such policies were justified for various reasons. As iron and steel are basic commodities and the raw material for arms, domestic production was considered crucial for state independence. Moreover, high fixed costs and various infrastructure needs such as port facilities and electrical and transportation systems induced government involvement. Governments in developing economies protected domestic enterprises by applying high tariffs on imported steel materials and provided preferential treatment for domestic companies through infrastructure and financing. Sometimes, even under the capitalist system, the steel industry's development was promoted under state ownership. In a socialist planned economy, the production and distribution of steel was a key factor in the "command and control" strategy of the state. In 1986, at the end of the Cold War, about 70% of world steel production was under government control. Only the United States and Japan did not have state ownership of the steel companies (Toda ed. [1987] 57-59).

In many Asian economies, the iron and steel industry developed under the government's industrial policy in the 20th century. The steel industry in Japan in the first half of the century,¹ and in South Korea² and Taiwan³ in the latter half of the century, achieved remarkable growth. China and India are more complicated cases. The iron and steel industry in these two economies showed astonishing growth after reforms and the opening-up policies at the end of the 20th century. At the same time, industrial policy still has a strong

¹ There are various views on the government's role in the development of the Japanese steel industry. For example, Nagura [1984] and Okazaki [1993] have differing opinions. However, no researcher denies the important role of the government before World War II, and during the wartime and recovery periods. See the survey by Nagura [2015].

² On the development of the South Korean iron and steel industry centered on POSCO, see Mitsubishi Research Institute [1981], Park [1989], Juhn [1991], D'Costa [1994][1999], Kojima and Watanabe [1983], Hogan [2001], Abe [2016], and Fujimoto [2009].

³ On the development of the Taiwanese iron and steel industry centered on the China Steel Corporation (CSC), see Syu [1995] and Sato [1999] [2008].

influence over these industries.

It should be emphasized here that since the 1990s, it became extremely difficult to promote the steel industry through highly protectionist policies (Ohno [2003], Kimura [2004]). In the current global economy, with huge flows of trade and direct investment, a country cannot promote economic development unless it joins the World Trade Organization (WTO) and exploits the benefits of cross-border trade and investment. It is also important to participate in regional free trade agreements (FTAs) and regional economic partnership agreements (EPAs). In other words, developing economies must drive industrialization under the condition that they promise trade and investment liberalization in the early stages of economic development. This makes it difficult to nurture infant industries and local enterprises through targeting and protectionism. Even if a government implements such policies, the probability of success is fairly low. In fact, the joint industrial project of the Association of Southeast Asian Nations (ASEAN) conducted in the 1970s and the protectionist and nurturing policies for the iron and steel industry in Malaysia, Indonesia, and the Philippines in the 1970s and 1980s ended in failure (Kawabata [2005] 81-83. Kawabata [2016a] 2-3).

Under the trend of liberalization, some industries in developing economies flourished due to their comparative advantages. The agro-industries that commercialize domestic natural resources and labor-intensive industries, including the garment, footwear, and the assembly of machinery, electric, and electronic equipment are a few examples. These industries supported the growth of ASEAN economies from the 1990s to 2000s.

However, as some industries grow, there is need for machinery and equipment, and the construction of factories, offices, houses, and buildings stimulates demand for materials, which consequently increases imports rapidly.⁴ Room emerges to substitute imports by domestic production, utilizing the growth in steel demand in demand industries. Thus, the problem of how to nurture the steel industry without protectionist policies arises. Many countries face this challenge today, not only in the ASEAN, but also in the Middle East and Africa.

Here, the special status of China and India should be emphasized. Both countries are not typical developing economies with regard to the iron and steel industry for two reasons. First, both economies have a long history in this industry. The iron and steel industry as well as metallurgical research at universities existed even under Western and Japanese imperialist control before World War II. China and India already had a modern steel industry before they opened their economies. Second, these countries have huge populations and large domestic markets. In most developing economies, the problem of low domestic demand deters protectionist policies. In China and India, this was not a serious problem. The experience of China and India does not translate to that of many small developing economies with steel industries are in their infancy.

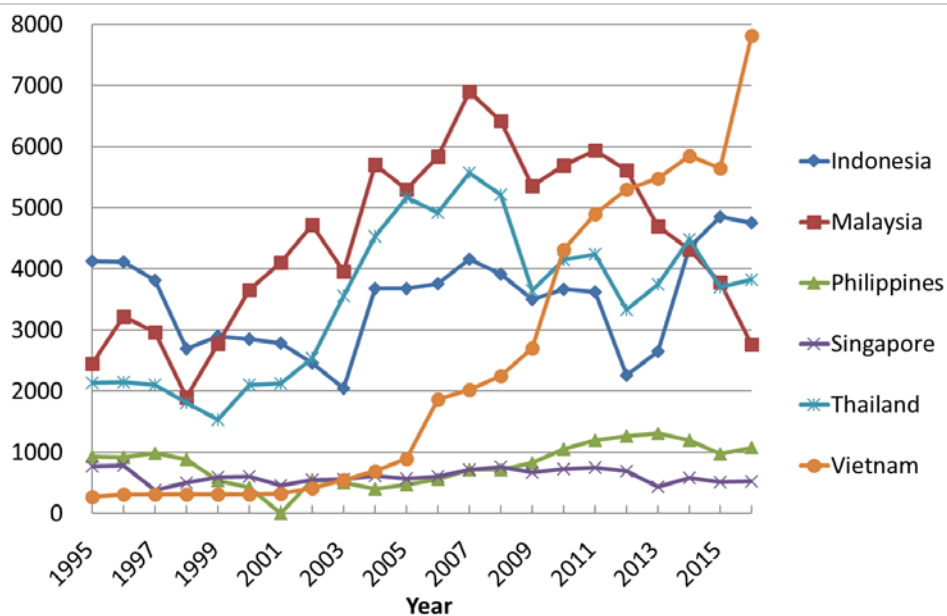
⁴ For Vietnam in the 1990s, see Imaoka and Ohno [1999] 215.

What are the opportunities for iron and steel industry development in a developing economy without the use of protectionism? This study looks at this issue through the example of Vietnam.

III Growth of the Iron and Steel Industry in Vietnam

In 2017, 11.5 million tons of crude steel were produced in Vietnam (3.7 million tons above that in 2016).⁵ The country became the 18th largest steel-producing economy worldwide. The increase was due to the start of the first large-scale integrated iron and steel complex. Vietnam’s production scale is still small compared to China’s (the world’s largest producer with 831.7 million tons) or Japan’s (the world’s second largest producer with 104.7 million tons) (World Steel Association [2018]). However, Vietnam is the largest steel producer among the ASEAN economies, as Figure 1 shows, while it still has the lowest GDP among them.⁶ Moreover, Vietnam had the lowest crude steel production before 2003. These figures illustrate the degree and speed of Vietnam’s steel production growth. The country consumed 21.6 million tons of steel products in 2017, which exceeded domestic production and led to large imports.

Let us review the production processes and products in the iron and steel industry. Steel production is a long, multistage process. In each stage, some outputs are final products, while others are host materials for



Source: SEAISI [various years].

Figure 1. Crude steel production in ASEAN economies

⁵ Production, exports, imports, and consumption of the Vietnamese iron and steel industry according to SEAISI [various years] unless otherwise noted.

⁶ World Bank Open Data.

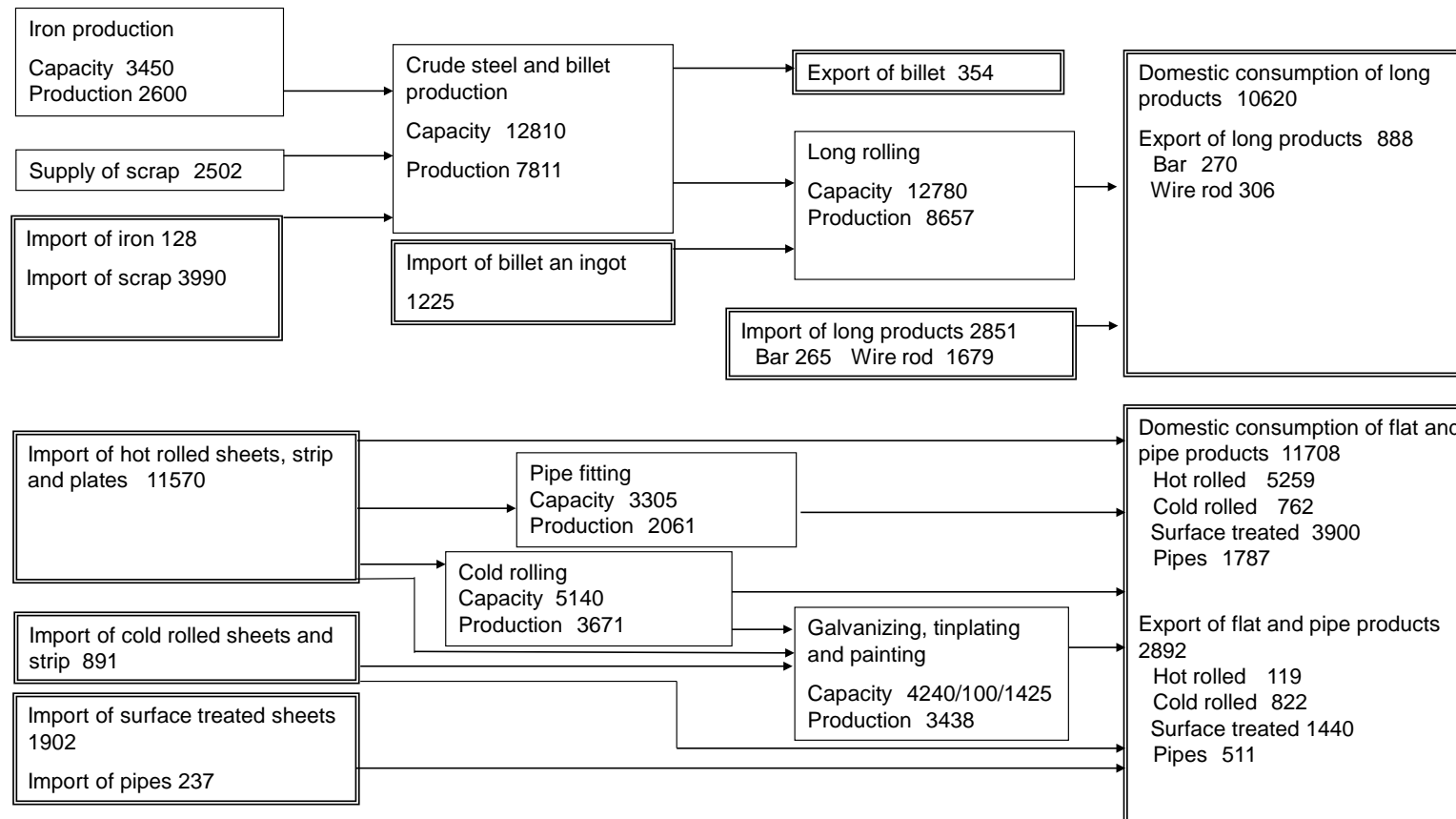
the next stage. The most popular process is the integrated production system because iron and steel are produced through a continuous process in the same location. The major facilities are the blast furnace (BF) and the basic oxygen furnace (BOF). In this process, iron ore is reduced into pig iron in the BF using coke. Next, carbon contents and other elements are adjusted in the BOF and secondary refining facilities. Melted steel is poured into a continuous casting machine (CC) and cast into semi-products like slab (for flat products and welded pipes) and billet (for long products and seamless pipes). Third, the semi-products are hot-rolled into various shapes of steel products. Some hot rolled coils are re-rolled under regular temperatures. Moreover, some hot or cold rolled coils are surface-treated, such as through galvanizing and painting. The other popular process is called the mini-mill or semi-integrated production system. The major facility is an electric arc furnace (EAF). Because the main material is steel scrap, not iron ore, the iron-making process is not necessary. Scrap is melted, refined in the EAF and ladle furnace (LF), and cast in the CC. The rolling process is the same as in the integrated process.

The BF-BOF method is suitable for large-scale steel production. The major product category is flat products, which are used for roofs, walls and building structures, and for the body panels of automobiles and home appliances. However, Chinese producers use the BF-BOF method for all kinds of steel products due to its factor endowment. Relatively speaking, the EAF method is suitable for small-scale, flexible steel products. The major product category is long products, the most popular of which is construction steel such as concrete reinforcing bar.

In both production systems, the process branches into the rolling process and the surface treatment process. The production scale in upstream processes, especially the BF, BOF, and hot strip mill for flat products, is large and capital-intensive. Therefore, establishing upstream processes is challenging in developing economies because these processes require huge capital for construction and a mass market for steady operations. In contrast, installing downstream processes, such as surface treating, cold rolling for flat products, and hot rolling for long products is relatively easy for developing economies.

Figure 2 illustrates the estimated material flow of the iron and steel industry in Vietnam. Until 2016, the flow between the long and flat/pipe sectors was decoupled. In the long sector, Vietnam hosts all three of the major processes; in the flat and pipe sector, however, the country has only cold-rolling, surface-treatment, and pipe-fitting. There were no iron-making, steel-making, or hot-rolling processes within the country until the start of large-scale integrated production in 2017.

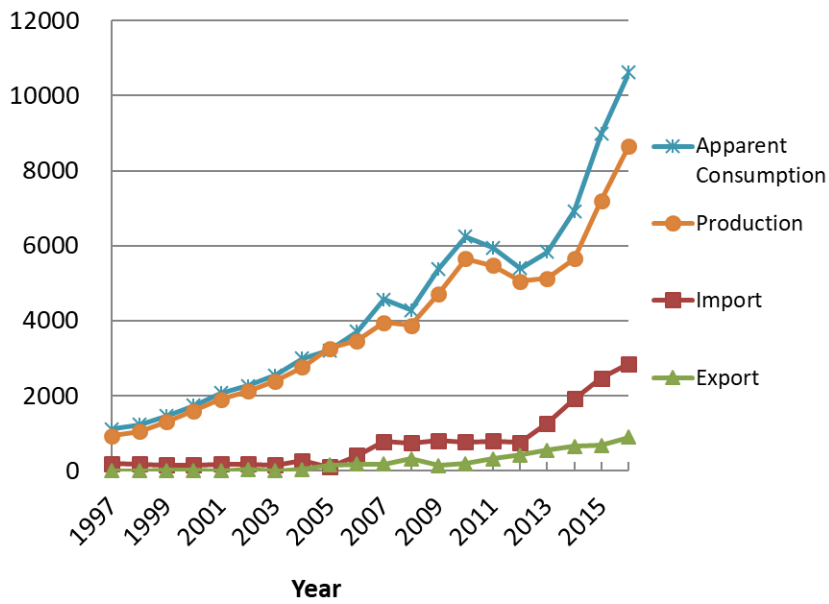
Figures 3 and 4 show the production, consumption, and trade trends for long products and billets in Vietnam. There were no modern BFs, BOFs, or EAFs in Vietnam until around the 2000s. Most companies imported billets and only rolled the bars. Thus, billet imports increased in line with the production of bars. However, EAFs and small BFs and BOFs entered Vietnam in the mid-2000s and successfully substituted imported billets with domestic production.



Note: Unit is thousand ton. The author assumed that 65% of galvanized sheet is made from cold rolled coil and that 35% of galvanized sheet is made from hot rolled coil based on the discussion with the executives of a flat rolled sheet company.

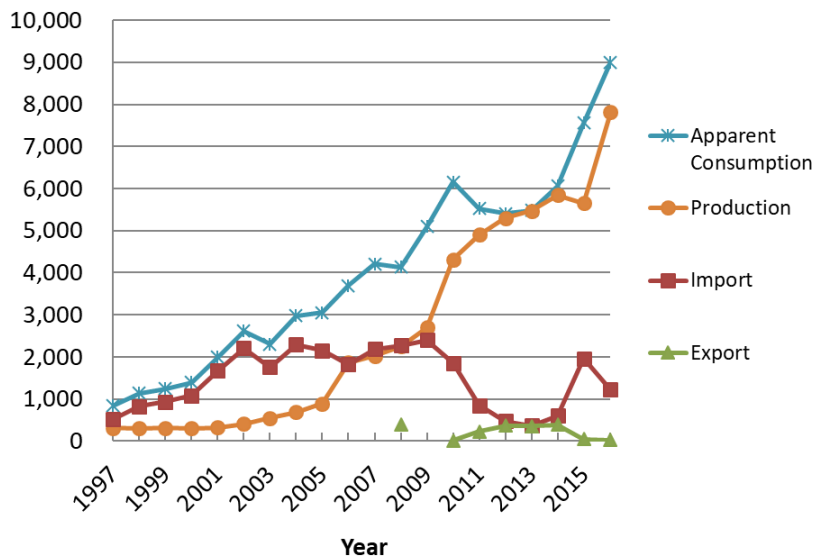
Source: Author compilation from SEAISI [2017].

Figure 2. Estimated material flow of the Vietnamese iron and steel industry in 2016



Source: Author compilation from SEAISI [various years].

Figure 3. Production, export, import, and consumption of long steel products in Vietnam



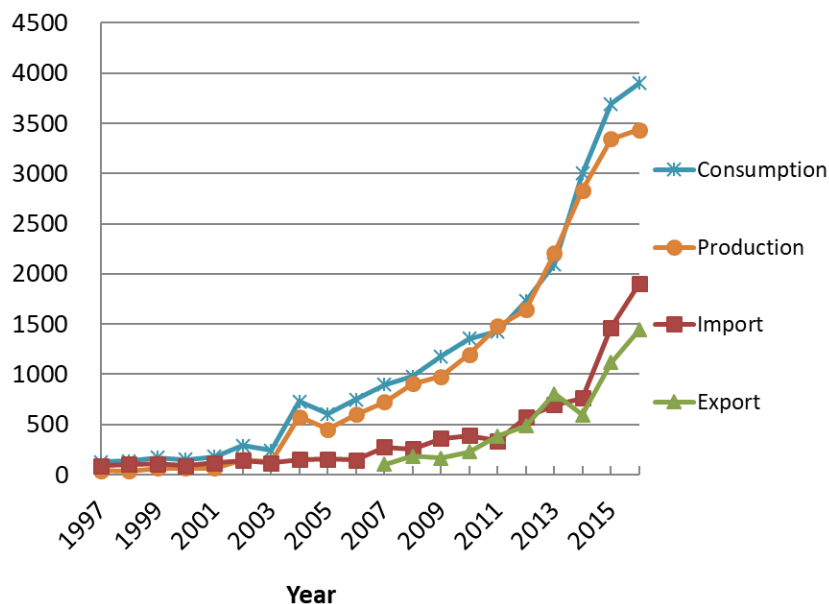
Source: Author compilation from SEAISI [various years].

Figure 4. Production, export, import, and consumption of steel billets in Vietnam

Similar patterns occurred in the flat sector. Figures 5, 6, and 7 show the production, consumption, and trade trends for flat products. In Vietnam, the major application of flat products is in the construction of roofs, walls, and structures, a result of the underdevelopment of the mechanical industries (Kawabata [2016a] 9-13). Until 2004, there were no rolling mills in the flat sector. Some companies imported cold rolled sheets, then galvanized and painted them. After that, some cold rolling mills opened and domestic products substituted for imports. As the demand and production of cold-rolled and surface-treated sheets increased, however, the imports of hot-rolled steel sheets also grew. This was a challenge left for Vietnam's flat sector.

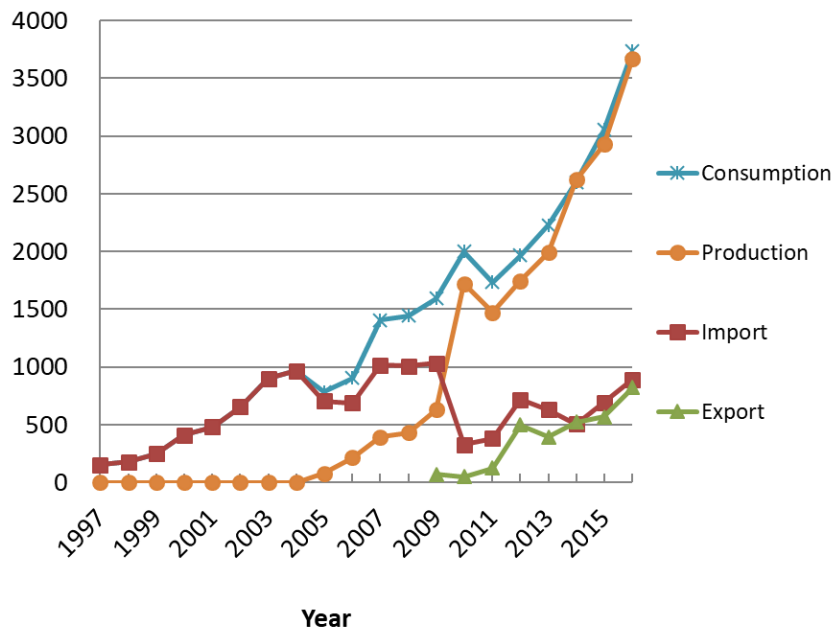
The trends observed in Figures 3 to 7 seem to fit the flying geese pattern theory advocated by Kaname Akamatsu and Kiyoshi Kojima (Akamatsu [1962], Kojima [2000]). They set a model of industrial development in which the development of domestic demand increases imports, which induce more production, and exports increase as the production scale expands. Specifically, Kojima formalized the mechanism behind the pattern that comparative advantage shifts from labor-intensive to capital-intensive products/processes in line with capital accumulation in the country (Kojima [2000] 20-21). Though there are many disputes about the validity of the flying geese pattern theory, it can be argued that the Vietnamese iron and steel industry's growth pattern is based on economic rationality.

However, Akamatsu and Kojima assumed the adoption of protectionist and nurturing policies in the early stages of industrial development, similar to many traditional scholars (Akamatsu [1962]8-9, Kojima [2000]22). In Vietnam's iron and steel industry, a 40% tariff was imposed on imported bar and surface-



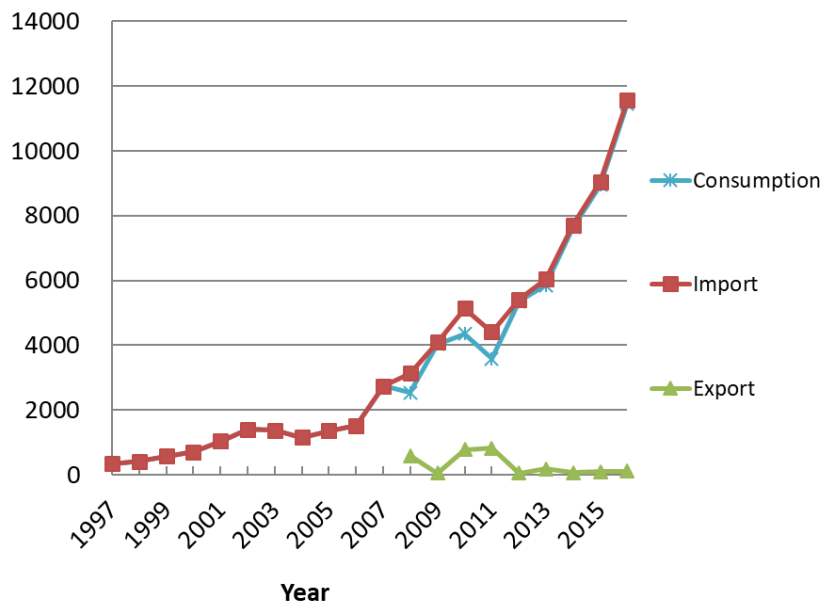
Source: Author compilation from SEAISI [various years].

Figure 5. Production, export, import, and consumption of surface-treated steel sheets in Vietnam



Source: Author compilation from SEAISI [various years].

Figure 6. Production, export, import, and consumption of cold rolled steel sheets in Vietnam



Source: Author compilation from SEAISI [various years].

Figure 7. Production, export, import, and consumption of hot rolled steel sheets and plates in Vietnam

treated sheets until the first half of the 2000s. However, the tariff rate reduced rapidly thereafter due to Vietnam's commitment to international economic integration (Kawabata [2016a] 34-35). Vietnam joined the WTO in 2007 and participated in various regional free trade agreements such as the ASEAN Economic Community (AEC), the ASEAN China Free Trade Agreement (ACFTA), the ASEAN Japan Comprehensive Economic Partnership (AJCEP), and the Japan-Vietnam Economic Partnership Agreement (JVEPA). Recently, the government signed the Trans-Pacific Partnership Agreement and the Regional Comprehensive Economic Partnership (RCEP) is under negotiation. With the recent exception of the United States, no country in the Asia-Pacific considers steel as a sensitive trade item. Steel trade was liberalized together with that of many other items. Currently, the import tariff rate for imported steel products that compete with domestic products is under 15% (MFN average)⁷, while it is 0% for imported products without domestic production. Due to high import penetration, especially from China, Vietnam imposed safeguard measures in 2016 with a limited duration. The Vietnamese iron and steel industry increased its production under trade liberalization while competing with imported products.

What enterprises are driving this development? Table 1 shows the major producers of long products in 2016. The top seller was a private joint stock company, Hoa Phat Group (HPG). The SOEs' sales share was 21.1%, while that for private enterprises, foreign joint ventures with Vnsteel, and foreign enterprises contributed 44.7%, 17.5%, and 16.7%, respectively (VSA [2017]). Table 2 shows the major producers of flat products in 2016. In the surface-treated sheets market, the top seller was a private joint stock company, Hoa Sen Group (HSG). The SOEs' sales share was 2.5%, while the foreign joint venture with Vnsteel, foreign enterprises, and private enterprises contributed 8.2%, 22.6%, and 66.7%, respectively. In the cold rolled sheets market, the top seller was POSCO Vietnam from South Korea. The sales share of SOEs was 15.6%, while foreign enterprises contributed 84.3% (VSA [2017]). Clearly, the private and foreign enterprises have become major producers.

IV The Decline of SOEs: A Rapid Reduction in State Subsidies and the Slow Reform of Ownership and Management

After the unification of North and South Vietnam in 1976, SOEs operated the iron and steel industry. After the start of Doi Moi, Vnsteel was established as a general corporation in 1990 as part of the reform agenda to move toward an open, market-oriented economy. All steel enterprises became business units of Vnsteel. Vnsteel was considered as a unified agent of industrial development and the implementer of industrial policies. However, Vnsteel faced two contradictions.

⁷ World Tariff Database.

Table 1. Major enterprises in the long steel sector in Vietnam (2016)

| Company name | Ownership | Location | Process | | | Sales volume (Thousand ton) | Sales share(%) |
|--|------------------------------|----------|-------------|--------------|-----------------|-----------------------------|----------------|
| | | | Iron making | Steel making | Rolling | | |
| Hoa Phat | Private | North | BF | BOF• EAF• IF | Bar, WR | 1,804 | 22.2% |
| Pomina | Private | South | | EAF | Bar, WR | 969 | 11.9% |
| TISCO | Vnsteel42.11% | North | BF | EAF | Bar, WR , Shape | 815 | 10.0% |
| Vina Kyoei | Vnsteel-FDI JV (Japan) | South | | EAF | Bar, WR, Shape | 724 | 8.9% |
| POSCO SS VINA | FDI(South Korea) | South | | EAF | Bar, Shape | 561 | 6.9% |
| SSC | Vnsteel | South | | EAF | Bar, WR, Shape | 466 | 5.7% |
| Viet Duc | Private | North | | | Bar, WR | 326 | 4.0% |
| Vietnam Italy | Private | North | | EAF | Bar, WR | 291 | 3.6% |
| SSE | FDI (Australia) | North | | | Bar, WR | 278 | 3.4% |
| Kyoei Vietnam | FDI (Japan) | North | | | Bar, WR | 274 | 3.4% |
| Sheng Li | FDI (China) | North | | EAF | Bar | 250 | 3.1% |
| VSC-POCSO | Vnsteel-FDI JV (South Korea) | North | | | Bar, WR | 238 | 2.9% |
| Vinausteel | Vnsteel-FDI JV (Australia) | North | | | Bar | 238 | 2.9% |
| DANA-Y | Private | Central | | EAF | Bar, WR | 196 | 2.4% |
| Natsteelvina | Vnsteel-FDI JV (Singapore) | North | | | Bar, WR | 158 | 1.9% |
| An Hung Tuong | Private | South | | IF | Bar, WR | N.A. | N.A. |
| Viet-Trung Metallurgy and Mineral | Vnsteel-FDI JV (China) | North | BF | BOF | — | Billet only | - |
| Other 5 (Vnsteel*3, Vnsteel-FDI JV*1, Private*1) | | | | | | 552 | 6.8% |
| Total | | | | | | 8,138 | 100.0% |

Source: Sales of each enterprise from the VSA [2017]. Process is estimated from the websites of each enterprise, newspapers, plant visits, and interview records.

Table 2. Major enterprises in the flat steel sector in Vietnam (2016)

| Company Name | Ownership | Location | Processes | | | Sales volume of cold rolled sheets (Thousand ton) | Sales volume of surface-treated sheets (Thousand ton) | Market Share of surface-treated sheets(%) |
|-----------------------------|-------------------------------------|----------|------------------|--------------------------|---------------|---|---|---|
| | | | Cold rolling | Galvanizing | Color coating | | | |
| Hoa Sen | Private | South | Reversing | GI,GL | PPGI, PPGL | internal use | 914 | 32.3% |
| Nam Kim Steel | Private | South | Reversing | GI,GL | PPGI, PPGL | internal use | 420 | 14.8% |
| Ton Dong A | Private | South | Reversing | GI,GL | PPGI, PPGL | internal use | 365 | 12.9% |
| China Steel Sumikin Vietnam | FDI (Taiwan and Japan) | South | Tandem, CAL, ACL | GI, GA | - | 523 | - | |
| | | | | | - | internal use | 268 | 9.4% |
| Maruichi Sun Steel | FDI (Japan) | South | Reversing | GI,GL | PPGI, PPGL | internal use | 234 | 8.3% |
| Ton Phuoc Nam (SSSC) | VnSteel-FDI JV (Malaysia and Japan) | South | - | GI,GL | PPGI, PPGL | - | 232 | 8.2% |
| Dai Thien Loc | Private | South | Reversing | GI,GL | PPGI, PPGL | 2+internal use | 96 | 3.4% |
| Tan Phuoc Khanh | Private | South | - | GI,GL | PPGI, PPGL | - | 94 | 3.3% |
| Vnsteel Thang Long | VnSteel89.01% | North | - | GI | PPGI | - | 72 | 2.5% |
| NS Blue Scope VN | FDI(Australia and Japan) | South | - | GI,GL | PPGI, PPGL | - | 64 | 2.3% |
| POSCO Viet Nam | FDI (South Korea) | South | Tandem, CAL | - | - | 1045 | - | - |
| Phu My Flat Steel | VnSteel | South | Reversing, BAL | - | - | 193 | - | - |
| POSCO VST | FDI (South Korea) | South | Sendzimir | - | - | 185 | - | - |
| Ton Nhat Flat Steel | VnSteel35.14% | South | Reversing | - | - | 131 | - | - |
| Perstima Viet Nam | FDI (Malaysia and Japan) | South | - | Tinplate, Tin-free plate | - | - | 73 | 2.6% |
| Other Company | | | | | | 0 | 1 | 0.0% |
| Total | | | | | | 2078 | 2832 | 100.0% |

Source: Sales of each enterprise from the VSA [2017]. Process is estimated from the websites of each enterprise, newspapers, plant visits, and interview records.

First, Vnsteel's technical, managerial, and financial capabilities were too weak to institute a modern iron and steel industry in Vietnam. In the mid-1990s, Vnsteel conducted a pre-feasibility study for the construction of a large-scale integrated steel complex with aid from the Japan International Cooperation Agency's (JICA) (JICA [1998]). However, the construction plan was postponed just after the Asian financial crisis in 1997.

Second, the SOEs' industry promotion contradicted the Doi Moi's primary direction. In Vietnam, entry to the steel industry was liberalized as part of the market-oriented reforms. In the rolling and/or surface treating processes, entry became possible for small private companies. Thus, it was impossible to make Vnsteel a unified agent of production. In international markets, trade and investment liberalization were inevitable due to requests from the WTO and the ASEAN. Preferential treatment for Vnsteel was difficult.

Under such conditions, Vnsteel had no choice but to draft a cautious plan while consulting with the JICA's research team (of which the author was a member) on the policy to transition toward a market-oriented economy (Japanese Members of Trade and Industry Group [2001]). The government approved the master plan for industrial development in 2001 (The Prime Minister of the Government, Decision No. 134/2001/QD-TTg). In this plan, the construction of a large-scale integrated complex was postponed after 2012. Instead, Vnsteel decided to make an effort to construct a mini-mill for long products and rolling companies in the flat sector. This plan stipulated preferential treatment such as funding from the state and the Official Development Assistance (ODA) funds, preferential loans from the development fund, and governmental guarantees for equipment purchases.

Of these plans, the installation of the mini-mill succeeded. Southern Steel Corporation (SSC), Vnsteel's subsidiary in the southern region, became one of the major producers and profit-makers.⁸ However, the other projects went on with bumps and detours.

In the long sector, Vnsteel's projects were delayed due to poor funding, bureaucratic interference, and weak bargaining power. Thai Nguyen Iron and Steel (TISCO), a small integrated producer in Vnsteel Group, started its expansion project in 2007 and planned to complete it by 2010. However, the construction was delayed and stopped. While the investment costs were supposed to be 237 million USD in the beginning, they expanded to about 400 million USD, while half of the costs were already disbursed. Vnsteel is in serious negotiations with a Chinese engineering company about reviving the construction. Another project in the long sector, Viet-Trung Metallurgy and Mineral (VTM) got a license in 2006, with a scheduled completion time in 2008. In fact, the factory began operations in 2014. Investment costs expanded from 150 million USD to 338 million USD. Although the company made a profit in 2017 with the assistance of a safeguard policy, the heavy financial costs are hiking its production costs. TISCO and VTM are among the 12 non-performing projects listed by the Ministry of Industry and Trade.

⁸ This and the following three paragraphs are based on Kawabata [2017] 16-30.

In the flat sector, newly instituted small cold rolling companies could not stay competitive. As the next section will show, private enterprises rapidly expanded their businesses in the surface-treated sheets market. They also installed small cold rolling mills and made cold coils for their own use. Moreover, POSCO Vietnam from South Korea and China Steel Sumikin Vietnam (CSVC) from Taiwan and Japan installed large scale cold rolling mills. Phu My Flat Steel (PFS) and Ton Nhat Flat Steel (TNFS), under Vnsteel, failed to attract customers.

Moreover, Vnsteel aborted its large-scale projects in the flat sector. Vnsteel negotiated with companies in India and Italy to construct hot rolling plants and an integrated steel complex, and established a joint venture company for hot rolling. However, negotiations did not succeed and the plans did not proceed.

The Vietnamese government had almost no involvement with Vnsteel, which was headed for trouble. There were two aspects to this indifference.

On the one hand, the government did not give preferential treatment to Vnsteel. The Vietnamese government tried to reinforce large-scale SOEs by instituting State Economic Groups (SEGs) in some industries like shipbuilding (Vu-Thanh [2017] 87). However, the iron and steel industry was not a subject of the SEGs. The master plan for the steel industry was renewed three times after 2001. In the second plan in 2007, however, private and foreign enterprises owned more than half of the projects. All preferential treatment for Vnsteel disappeared (The Prime Minister of the government, Decision No. 145/2007/QD-TTg.).

In international trade policy, as the author showed in the previous sections, the tariff rates for steel products were reduced in accordance with the WTO and various FTAs. The prohibition of 100% foreign equity capital in the steel industry was removed in the 2000s.

On the other hand, the Vietnamese government did not reform Vnsteel ownership sufficiently; that is, by privatization or reducing the state's ownership share.⁹ Vnsteel was equitized in September 2011, but the state maintained 90% ownership. Worse still, the publicly offered 9.7% ownership did not have sufficient bidders. After the initial public offering, Vnsteel tried to allocate 29% of its shareholdings to strategic investors. The executives tried to negotiate with foreign steel enterprises, including Nippon Steel Sumikin, but they failed. In 2017, the Ministry of Industry and Trade kept 93.93% of Vnsteel's equity.

Vnsteel recorded a deficit for three consecutive years since 2012. In 2017, the government finally adopted a policy to sell a majority of its ownership of Vnsteel. However, it is not progressing because some subsidiaries, such as TISCO, are weak in terms of competition and have heavy debts. It is not rational to bundle high-performing subsidiaries like SSC and troubled subsidiaries like TISCO.

In comparison, the Vietnamese government did not support their SOEs, unlike South Korea and Taiwan in the past and China currently. However, it did not privatize their SOEs, in contrast to Russia and Eastern European countries after the collapse of their command and control economies. Thus, Vnsteel continued its

⁹ This paragraph is based on Kawabata [2017] 20-21.

quantity-oriented investment, operating as an SOE that incorporates corporate governance and organizational behavior. However, it installed only small-scale uncompetitive factories because it could not mobilize huge amounts of capital.

In essence, SOEs could not become major producers in Vietnam's iron and steel industry in the transition to a market economy. However, ironically, the failure of Vnsteel to become a giant SOE was a good condition for the steady development of the iron and steel industry because it left room for growth among private and foreign enterprises.

V The Emergence of Private Enterprises: Catch-Down and Market Creating Innovation

In Vietnam, there were no modern private steel enterprises before the start of Doi Moi. There were only producers with small induction furnaces (a kind of electric furnace) and rolling machines (Kawabata [2001] 149-150). Products were not certified by industrial standards. These small businesses were fulfilling the demand that Vnsteel could not satisfy due to insufficient production and distribution.

Since the 2000s, however, local private enterprises emerged and expanded their market share. Among them, the growth of HPG in the long sector and HSG in the flat sector was significant.

HPG, a top seller in the long sector, was originally a corporate group known for construction, construction machinery, and furniture manufacturing.¹⁰ The company first installed the rolling process in the latter half of the 1990s, then built an electric furnace, and in 2009, launched the Hoa Phat Iron and Steel Complex in the northern region with a small integrated production system for long products. The Hoa Phat Complex was the first new (green field) integrated complex in Vietnam after the start of Doi Moi. Although it is not a coastal factory, its riverside location and facility layout was well prepared for reasonable logistics from raw material loading to product shipment. It has three blast furnaces with internal volumes of 380 m³, 520 m³, and 580 m³. Its crude steel production capacity is 2 million tons.¹¹ It owns an iron ore mine with 40 million tons in reserves in the northern region, which supplies about half of its needs for iron ore. The company's strength is that it is cost-competitive due to vertical process integration from raw materials to iron and steel products. Moreover, HPG made steel pipes, and began operating cold rolling and surface treating lines in 2018.¹²

HSG, the top seller of surface-treated sheets, started its business from a steel sheets sales shop in 1994.¹³ It promoted backward business integration through sales, color coating, galvanizing, and finally cold rolling. While HSG started its business in the southern region, it has steel factories across the country. The total

¹⁰ This paragraph is based on Kawabata [2016b] 84-86, unless otherwise noted.

¹¹ The specifics of Hoa Phat Complex were provided to the author by a company presentation in a meeting with Hoa Phat Group, August 2018.

¹² HPG website (<http://www.hoaphat.com.vn/en/hoa-phat-steel-sheet-company-limited/>).

¹³ This paragraph is based on Kawabata [2016b] 86-88, unless otherwise noted.

capacity is 1.68 million tons for cold rolling, 2.28 million tons for galvanizing, and 660 thousand tons for color coating (HSG [2016-2017 ed.]34-35). Additionally, HSG has factories to produce steel pipes, plastic pipes, and other plastic construction materials. HSG's feature is its sales-oriented behavior. It directly owns distribution-retail branches, the number of which surpassed 100 in 2010 or 2011, and reached 371 at the end of 2017 (HSG [2016-2017 ed.] 44-45). These branches concentrate on marketing surface-treated sheets (galvanized sheet, 55% Al-Zinc coated sheets, and color coated sheets) for the roofs and walls of houses, factories, and warehouses. HSG's branches sell not only steel sheets, but also steel pipe and plastic construction materials, and supply roll forming services for fabricating steel sheet into roof and wall parts. Clients support HSG because it offers availability, low prices, product variety, and fabrication services.

HPG and HSG do not necessarily have advanced technology. Rather, the opposite is true.

HPG made a unique technology selection. HPG understood that they had limitations in its capital mobilization and technical capabilities, and in the market size of Vietnam. Therefore, despite its small scale, HPG tried to maintain cost competitiveness by improving its integrated steel structure. Specifically, it developed a small but captive mine and pelletizing plant to lower the material cost under global price hikes. In the ironmaking and steelmaking process, it introduced proven small technologies from China to save investment costs. On the other hand, in the rolling process, it maintained quality by introducing world standard equipment from Italy. HPG decided to take advantage of downsized, downgraded technologies for low-cost production.

In contrast, HSG put its effort into marketing. The company responded to customers' needs through a directly managed sales network across the country and quickly distributed low-priced surface-treated steel sheets to every corner of the country. HSG's pre-painted steel roof quality is not necessarily higher than that of traditional roof tiles. Moreover, HSG's sheets do not embody higher technology compared to that of foreign enterprises in the production of surface-treated sheets for automobile bodies. However, availability anywhere in the country, low prices, and shortened construction periods were more important for Vietnamese customers. In Vietnam, it is customary for the client to choose steelmakers when building houses and factories. Spreading the captive shop network, HSG directly addressed customers. HSG's surface-treated sheets greatly stimulated construction demand in urban and rural areas.

HPG selected appropriate technology and catch-down innovation (Marukawa [2016]). HSG carried out the primitive stage of disruptive and market-creating innovation at the base of the pyramid (BOP) (Hart and Christensen [2002], Christensen et al. [2004] Chap.9, Christensen and Bever [2014]). What we should learn from the cases of HPG and HSG is that high-level technology is not necessarily the key for success in a developing economy. What is important is to supply a solution for a customer's "job to be done" (Christensen et al. [2004]). For that purpose, companies should adopt appropriate technology and business processes.

However, due to the growth of the Vietnamese market, it seems difficult for HPG and HSG to maintain

their market share with only their current technologies and business processes. The market is expanding and Vietnamese customers will soon have needs similar to customers in more advanced economies. In that case, both companies have plans to install a larger-scale integrated iron and steel complex with state-of-the-art technologies. HPG began construction on a new complex with a 4.8 million ton capacity in the Dung Quat Economic Zone in the central coastal area, while HSG's plan faltered. HPG's planned rolling capacity is 3.5 million tons for hot coil and 2 million tons for bar/wire rod.¹⁴ In an expanded and more sophisticated steel market, competition with imported steel products and foreign enterprises with huge financial resources and better technology is a challenge for local enterprises.

VI Foreign Enterprise Investment: The Step-by-Step and Leap-Frogging Approaches

The last group to investigate is foreign enterprises. There are various types of foreign enterprises in the Vietnamese iron and steel industry. This section has a special focus on two companies, Kyoei Steel from Japan and Formosa Plastic Group (FPG) from Taiwan, which took contrasting approaches for corporate growth.

Kyoei Steel instituted Vina Kyoei Steel (VKS) as a joint venture with Vnsteel in 1994 in the southern region.¹⁵ Like other joint ventures from Australia, Singapore, Taiwan, and so on, VKS was a rolling company that produced bar and wire rods. VKS faced Vietnam's special market environment, which was completely different from what Kyoei Steel faced in Japan. In Vietnam, many bars and wire rods are used for individual houses. Moreover, a client specifies steel producers, as mentioned in the previous section. To adapt to a housing market with such features, VKS maintained high product quality and detailed services much above the average in Vietnam at the time. It achieved product quality by careful billet selection, equipment made in Japan, and intensive training for employees. To provide a comprehensive service, sales agents had to act according to VKS's service policy. To that end, VKS emphasized building a long-term trustworthy relationship with agents. For example, VKS understood agents' cash flows and inventory situations, and set prices in line with their interests. In addition, VKS established a brand called "Japanese Steel" by broadcast TV commercials and other advertising measures. Thus, VKS's products attract premium prices in the market.

Due to pressure from Vnsteel for dividends, joint ventures had difficulty expanding their capacity by adding new production lines. In this case, VKS improved its production capacity 1.5 times through continuous equipment improvements and production controls. In 2015, VKS successfully installed EAF and a new rolling machine and became a semi-integrated company, with a capacity of 650 thousand tons of crude

¹⁴ The specifics of Hoa Phat Dung Quat Complex were provided to the author through a company presentation in a meeting with Hoa Phat Group, August 2018.

¹⁵ The following two paragraphs are based on the interview records with Vina Kyoei Steel from 2000 to 2018.

steel and 950 thousand tons of rolled products. Moreover, between 2012 and 2018, Kyoei Steel acquired one rolling company and one EAF company in the northern region. Among the enterprises in Table 1, VKS (4th in the sales ranking), Kyoei Vietnam (10th), and Vietnam Italy (8th) were members of Kyoei Steel group in 2018. Kyoei Steel established itself in the Vietnamese market through continuous efforts and contributed to the development of the long sector in the industry.

In the flat section, however, it was difficult to attract foreign capital for a large-scale integrated iron and steel complex. First, Vnsteel failed in a joint venture with Tata Steel from India. Next, in the latter half of the 2000s, some projects were announced and subsequently did not materialize (Kawabata [2007] 19-26). Tycoon Group from Taiwan underestimated the investment cost to get a license from the provincial government, and construction stopped at the piling stage. Conversely, Eminence Group from Taiwan announced a large-scale project for a steel complex and urban development worth more than 30 billion USD, but took no concrete actions. Vina Shin Group, one of the SEGs, tried to enter the iron and steel industry by creating a joint venture with Lion Group in Malaysia. However, the global financial crisis in 2008 and corruption among executives ended this plan. Even POSCO from South Korea, one of the top steel producers worldwide, failed to start construction due to the financial crisis. These projects resulted in lost business opportunities, leaving vast land vacant.

Finally, Formosa Ha Tinh Steel (FHS), a subsidiary of FPG, installed an integrated iron and steel complex in the central region.¹⁶ FHS obtained a project license from Ha Tinh Province in 2008 and acquired land that was formally planned as a location for Vnsteel. As FPG had no experience in the iron and steel industry, it invited Taiwan's CSC and Japan's JFE Steel as minority shareholders. FHS invested 9.996 billion USD, the largest iron and steel project in Vietnam. The first hot rolled coil was rolled in 2015, and the first BF started its operations in 2017. FHS's capacity is 7.07 million tons of crude steel, representing around 30% of Vietnam's capacity. The rolling capacity for hot coil is 5.2 million tons. In 2016, Vietnam imported 11.45 million tons of hot coil. Technically speaking, FHS can substitute over 60% of the imports. FHS has standard technologies for an iron and steel complex designed by Chinese, Japanese, and German engineering companies. In fact, FHS is expected to lead the Vietnamese iron and steel industry in the next stage of development.

However, FHS faced serious problems before the completion of construction.¹⁷ In early 2016, 115 tons of fish died in the central coastal area, which hit the fishery industry in the central region severely. Citizens in all areas were shocked and worried about food safety. A spokesperson for FHS said on a TV program immediately after the incident, "We have to choose whether to catch fish and shrimp or build a modern steel

¹⁶ This paragraph is based on Kawabata [2016b] 30-33.

¹⁷ This paragraph is based on some news reports, including "Vietnam suffers 50 major toxic waste scandals in Vietnam in 2016," *VnExpress*, December 30 (<https://e.vnexpress.net/news/news/vietnam-suffers-50-major-toxic-waste-scandals-in-2016-3521238.html>), retrieved on September 26, 2018); "Vietnam blames Formosa mill for fish kill," *Taipei Times*, July 1, 2016 (<http://www.taipeitimes.com/News/front/archives/2016/07/01/2003650089>), retrieved on September 26, 2018).

industry.” This statement raised wide opposition to FHS.¹⁸ As a result of an investigation, in June 2016, FHS claimed responsibility, apologized, and announced that it would pay USD 500 million as compensation. The government announced that the fish died due to FHS’s release of waste fluid. After that, critics concentrated on the government in terms of the legitimacy of FHS’s licensing process and the Ministry of Natural Resources and Environment’s failure to monitor FHS’s construction process.

Until now, Kyoei Steel and FPG are making a different approach in adaptation to Vietnamese society. This is the difference between the step-by-step approach and the leap-frogging approach.

Kyoei Steel gradually accumulated its capability and adapted to the Vietnamese market. Through operations in Vietnam for more than two decades, VKS enhanced Vietnamese employees’ abilities to improve efficiency and established a reputation for high product quality. As VKS accumulated its technical and managerial capabilities, it could proceed through its backward integration in the steel making process without difficulty. After observing the success of VKS in the southern region, the parent company, Kyoei Steel, acquired local companies in the north.

In comparison, FPG tried to build a large-scale integrated steel complex from the beginning. The company invested huge amounts of funds, introduced a full deck of technology, and became the largest steel producer in Vietnam. However, FPG was not familiar with the steel industry, and naturally had no experience with the construction of a huge steel complex. FHS caused a waste discharge accident, despite the global technology standards embodied in its production facilities. This suggests the importance of management and organizational maturity. In addition, FHS’s public relations with Vietnamese society since the incident has been rather negative.

In past decades, foreign companies such as VKS contributed to the development of the Vietnamese steel industry. Moreover, FHS will contribute significantly if it manages to operate its large-scale complex normally in the future. FHS is necessary for the import substitution of hot coils in particular. However, there are necessary conditions to realize this contribution. Foreign-funded enterprises should conduct economic activities that meet the needs of the Vietnamese market, communicate well with Vietnamese citizens about social issues, and fulfill their social responsibilities.

The Vietnamese government's open-door policy was successful in essence. The government promoted foreign direct investment by approving 100% foreign-ownership. Consequently, a steel company with a competitive edge was established under international economic integration, and steel production grew rapidly.

However, the Vietnamese government failed to implement the complementary policies necessary to accept large-scale foreign investment. The country has limited locations suitable for a large iron and steel

¹⁸ “Rare rallies in Vietnam over mysterious mass fish deaths,” *Reuters*, May 1, 2016 (<https://www.reuters.com/article/us-vietnam-formosa-plastics-environment-idUSKCN0XS0U6>), retrieved on September 26, 2018).

complex. Therefore, even in a market economy, the government must properly accredit investment licenses. In addition, the environmental control of large-scale steel factories requires proper government regulation and monitoring. The central and local governments in Vietnam lacked the ability to review large-scale steel projects. Thus, troubled projects such as Tycoon and Vinashin occupied coastal locations for a long time without producing value. These locations could otherwise be used for high-quality ports and factories. Moreover, the government failed to monitor FHS's environmental management adequately.

VII Conclusion

The iron and steel industry in Vietnam was developed by private and foreign enterprises under trade and investment liberalization. This example of development in the iron and steel industry offers important lessons for industrial development under international economic integration.

First, nurturing the iron and steel industry by high protectionism and state ownership is not realistic under international economic integration. However, it does not mean that the government should simply eliminate trade protections and SOE support. SOEs find it difficult to survive in a market economy and become a cost to the public sector. In addition to eliminating state protection, it is necessary to reform SOEs' corporate governance and management.

Second, for local private enterprises with inferior capital mobilization and technical capabilities to grow, entrepreneurial activity is necessary for firms to grasp the characteristics of the growing domestic market and choose technologies and products corresponding to the customers' "jobs to be done." Such technologies and products are not necessarily advanced and expensive. Through catch-down and/or disruptive innovation in the BOP market, local private companies in developing countries can create markets and grow with the macro economy. Moreover, using such technologies and selling such products are rather unfamiliar for foreign companies due to the lack of local knowledge. This provides opportunities for local private enterprises.

Third, enterprises with foreign investment can demonstrate their strengths in areas that require international standards of technology and large-scale investment. With direct investment by foreign enterprises, developing economies can more quickly accumulate technical proficiency and capital. However, enterprises with foreign investment must adapt to the market characteristics of developing countries and fulfill their social responsibilities. Moreover, a developing country's government has to review and supervise large-scale projects, even in a market economy. Developing such administrative capacity for that purpose is an important task.

Finally, it is worth mentioning the relationship between this study and political actions against international economic integration in the past few years. In today's world economy, especially in the steel industry, a storm of trade protectionism is brewing. That is exactly why we must emphasize that industrial

development is possible under international economic integration. The development of the Vietnamese steel industry did not occur under protectionism; it occurred because it found opportunities and learned to compete as international economic integration progressed.

At the same time, it is also necessary to state that industrial development cannot be realized through a simple laissez-faire approach. Enterprises require entrepreneurial behavior that meets local conditions, while the government is expected to formulate policies and actions to complement the role of the market and resolve social issues.

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*Nozomu Kawabata is Professor, Tohoku University Graduate School of Economics and Management. E-mail: nozomu.kawabata.b1@tohoku.ac.jp

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8/12/2018 p.18 1.15 million tons of fish →115 tons of fish

17/1/2019 p.10 Hoa Sen Steel → Hoa Sen Group