ĐÁNH GIÁ NĂNG LỰC CẠNH TRANH CỦA NGÀNH THÉP VIỆT NAM BẰNG MÔ HÌNH KIM CƯƠNG PORTER

Nguyễn Khánh Tùng[1], Nguyễn Trung Kiên, Đinh Quang, Lê Nhật Hoàng
Sinh viên K58 CTTT Kinh tế - Viện KT & KDQT
Trường Đại học Ngoại thương, Hà Nội, Việt Nam

Nguyễn Thu Hằng
Giảng viên Viện Kinh tế và Kinh doanh Quốc tế
Trường Đại học Ngoại thương, Hà Nội, Việt Nam

Tóm tắt

Do tác động ngày càng sâu sắc của đại dịch COVID-19 lên hoạt động kinh tế toàn cầu, ngành thép đã bộc lộ nhiều yếu kém. Với đà tăng trưởng âm cùng nhu cầu thu mua không đảm bảo, mặt hàng thép Việt Nam tỏ ra lép vế hơn các nước khác trong khu vực, đặc biệt là những nơi được nhận nhiều sự đầu tư hơn. Nghiên cứu này đánh giá năng lực cạnh tranh của ngành thép Việt Nam bằng việc áp dụng mô hình kim cương Porter để phân tích dữ liệu định tính tới thời điểm năm 2021. Bài viết đưa ra tổng quan về các tác nhân ảnh hưởng đến năng lực cạnh tranh của ngành thép Việt Nam và những đề xuất về mặt chính sách tương ứng. Kết quả từ mô hình nghiên cứu đồng thời cũng chỉ ra rằng ngành thép Việt Nam sở hữu những điều kiện thuận lợi để phát triển, song chưa tận dụng tối đa tiềm lực công nghiệp để cạnh tranh ở thị trường nước ngoài. Tuy nhiên, Việt Nam có tiềm năng trở thành một trong những quốc gia xuất khẩu thép chính trên thị trường thế giới trong tương lai.

Từ khóa: Năng lực cạnh tranh, ngành thép, Việt Nam, mô hình kim cương.

AN ASSESSMENT OF THE COMPETITIVENESS OF VIETNAM'S STEEL INDUSTRY USING PORTER'S DIAMOND MODEL

Abstract

Due to the rapidly evolving impacts of the Covid-19 pandemic on global economic activitíes, steel market fundamentals have weakened seriously in recent years, with negative production growth, uncertain prospects for demand growth, and the increase in new capacity investment in every region except for Asia and the Middle East. This paper evaluates the competitiveness of Vietnam's steel industry using Porter's Diamond model, analysing qualitative data covering the latest figures up to 2021. Based on the analysis, a critical overview of factors influencing competitiveness is presented, and policy recommendations can be suggested. The results from the model also indicate that Vietnamese steel, while still benefiting from specific conditions, has not profitably capitalised on

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[1] Tác giả liên hệ, Email: k58.1911400728@ftu.edu.vn

its strengths to compete against rivals in overseas markets. However, there exists a potential for Vietnam to become a key exporter in the future.

Keywords: Competitiveness, steel industry, Vietnam, Diamond model.

1. Introduction

Recent developments in steel have led to a renewed interest in Vietnam for over two decades, and enterprises in the sector enjoyed a prosperous time over the first half of 2021. Production and sales of steel products in Q12021 registered double-digit growth, and the figures were far higher compared to previous estimates (Trinh, 2021). Many enterprises have invested heavily in manufacturing high-quality products given their increased demand in foreign markets. As a result, Vietnam's steel industry has made genuine progress in the region, which strengthens its position in Southeast Asia as well as the global steel marketplace. (Duong, 2021).

Nevertheless, Vietnam's steel industry has long been recognised as a rather sensitive one. The country is reported to have witnessed a challenging year for steel exports, due to the spread of protectionist tendencies and trade remedies amongst foreign countries. Also, domestic rivalry and international competition are rapidly growing. Since Vietnamese steel depends greatly on imported raw input materials, global market trends have caused wide fluctuations in domestic steel prices (Trinh, 2021).

Therefore, this research aims at addressing the following questions:

(1) What are the aspects of achieving a competitive advantage on the path of rapid steel development in Vietnam, and how has the industry benefited from them?

(2) What disadvantages is Vietnam's steel industry experiencing, and what actions has the government taken to overcome them?

In this paper, the comparative advantages of Vietnam's steel industry are studied to show how competitive steel products exported from Vietnam are, regarding their market access in global and regional trade, using Porter's Diamond model. Based upon the availability of information, secondary data examined in the model is collected from 2007 to 2021 from reputable sources. The rest of the paper is organized as follows: Section 2 presents the literature review; Section 3 puts forward the research method employed; Section 4 describes and discusses the research outcomes. Section 5 concludes Vietnamese steel export prospects towards the combination of government regulations and situational elements.

2. Literature review

2.1. Porter's Diamond model

2.1.1. Concept of competitiveness on a national level

In respect of competitiveness on a national level, Stigler's (1988) definition of competition is used as a fundamental principle: "Competition is a rivalry between individuals (or groups or nations) and it arises whenever two or more parties strive for something that all cannot obtain". In this modern changing marketplace, nations have their own competitive advantages (Porter, 1998). Aldington Report (1985), Abdel-Latif (1993), Edwards and Schoer (2000) mentioned product quality, innovation, design, distribution network, after-sales services, transaction costs, institutional factors related to the bureaucracy of export procedures, and other non-price factors, as the criteria for analysing a manufacturing firm's or industry's competitiveness. Lall (2001) referred to national competitiveness as a major concern of policymakers in developing countries

who intently keep track of indices ranking international competitive performance that rely on integrating basic and associated factors.

2.1.2. Critics and extensions to Porter's Diamond framework

Porter's diamond framework has been widely criticised by international business scholars and management theorists, who held that he has failed to develop a theory of national competitive advantage. It is a theory just concerning how companies and sectors inside countries gain a competitive advantage (Yetton et al., 1992). Rugman and D'cruz (1993) supported this argument, maintaining that Porter undervalued the significance of multinational corporations and national culture in the global economy, as well as the importance of technology (Oz, 2002). Furthermore, the five-force concept has been attacked on the basis that the principal unit of analysis is the industry rather than the individual firm, possibilities of applicability in MSMEs, the role of domestic rivalry in the small economy (Clancy et al., 2001). Despite these flaws, this model is widely recognized as the fundamental analytical framework of the 1980s competitive positioning paradigm, and it is still used in most business school strategy classes today (Jin and Moon, 2006; Esen and Uyar, 2012).

Several academics proposed revisions to Porter's single diamond framework and the concept of double and multiple-linked diamonds, to reflect holistic competitive advantages (Liu and Hsu, 2009). For instance, Rugman and D'cruz (1993), Moon et al. (1998), and Jin and Moon (2006) incorporate the effect of international activity. The international business scholars Rugman and Verbeke (1993) and Asmussen et al. (2009) provided the groundwork for the creation of a new paradigm for analyzing the various approaches to foreign subsidies and multinational strategic management.

2.1.3. Using Porter's Diamond approach

Chung (2016) developed assessment criteria of logistics cluster competitiveness among Asian nations based on Porter's diamond model, attributing a country's higher competitiveness to its absolute advantage in logistics cluster indices. To analyze the comprehensive competitiveness of China's coal industry, Wu et al. (2017) adopted the same model, mentioning factors such as excess capacity, low price, and alternative sources of energy to affect the current performance of the sector. Fang et al. (2018) utilized a revised diamond model to compare the international competitiveness of G20 countries' renewable energy industry. By examining the geographical and economic factors within the diamond theoretical framework, Da et al. (2020) showed that the model is supported in explaining the export competitiveness of the agriculture sector from emerging markets. Tsai et al. (2021) constructed an analytical framework that includes the six dimensions of Porter's diamond model to enhance the creation of a theoretical framework and suggest priorities for improving Taiwan's solar photovoltaic sector's competitiveness.

2.2. Qualitative research on the competitiveness developments of Vietnam's steel industry

Kawabata (2001) discussed the structure and policies of Vietnam's steel industry that affected its competitiveness in the 1990s. Regarding steel competitiveness, Kawabata (2007) revealed that a new phase has been affecting the competitiveness of Vietnamese steel and that a policy shift is needed to fit the new phase after 2007. Kawabata (2016) discussed opportunities and challenges for developing Vietnam's steel industry during the transition to a market-oriented economy and indicated that economic reforms had benefited Vietnam's steel sector regarding more extensive market selection, despite limitations such as overproduction and over-reliance on other sectors. In

his latest study in 2018, Kawataba delved into the expansion of Vietnam's iron and steel sector towards international economic integration, where private enterprises and foreign capital firms have been prominent participants in the development.

Kiyong (2019) performed a detailed analysis of the outlook for sustained growth in Vietnam's steel demand since the national economy was proliferating and the government directly financed the construction of infrastructure and housing. Chen & Zhao (2016) showed that as the government liberalizes investment regulations with less upfront capital, Vietnam's steel industry can enjoy cheap labour costs and rapid development, while Dang and La (2020) focused on the protectionism tariffs with evidence from the steel sector in Vietnam. Nguyen (2020) utilized Data Envelopment Analysis (DEA) to analyze the business efficiency of steel enterprises from 2011 to 2019 and concluded that the Hoa Sen Group and the Pomina Steel Corporation are prominent steel producers but have not delivered efficient performance.

However, there has been no ex-ante research on the competitiveness of Vietnam's steel sector using the complete Diamond model. Therefore, in this research, this model will be employed to assess Vietnam's steel industry for a thorough understanding of the competitive advantages of Vietnamese steel thanks to available factors, and how the government can help improve the export opportunities of domestic enterprises.

3. Research method

This research makes use of Porter's Diamond Theory of National Advantage as an inductive approach. By analysing qualitative data, the Porter's Diamond model is designed to assess the competitive advantages that nations or groups gain under certain conditions readily available to them, and explain how governments can act as a catalyst to improve a country's position in a globally competitive economic environment.
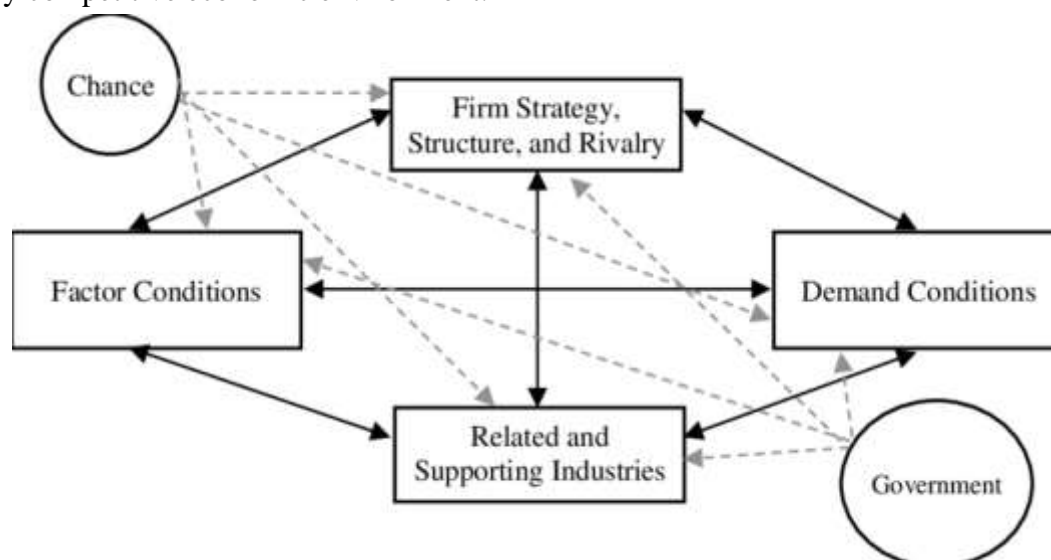
Figure 1. Porter's Diamond Model
Source: Recommended

Internal and external factors that affect the competitive advantage of the domestic steel sector are included in the model. Internal factors include factor conditions, demand conditions, firm strategy, structure, rivalry, and related and supporting industries, which are positioned at four corners of the model. Solid lines indicate mutual influences between internal factors. Factor conditions are elements that an economy can create for itself, which are not easily susceptible to

the imitation of other countries. Demand conditions allude to the size and nature of the customer base for products in both the domestic and international markets. Related and supporting industries refer to upstream and downstream industries that substantially impact the competitive edges of an industry. Firm strategy, structure, and rivalry mean the existing industrial structure will adapt to the corresponding changes in the external environment, and businesses in this industry create coping methods. By contrast, the government and chance are the two most important external influencing elements, which have reciprocal effects on internal factors, as demonstrated by the dotted lines. The government's roles include raising competitiveness by stimulating early demand for advanced products, focusing on specialized factor creations, promoting domestic competition, and encouraging change. "Chance" alludes to random and unplanned events, such as war, natural disasters, or scientific breakthroughs.

4. Results

4.1. Factor conditions

4.1.1. Natural resources

According to Steven (2019), Vietnam has a relatively large reserve of iron ore distributed along the coast. Its geographical environment gives a natural advantage, namely hydrogeological conditions, easy access to transportation, and centrally distributed mines. According to the Vietnam Steel Association (VSA), the largest mines are located in Thach Khe, Ha Tinh, where a deposit of more than 544 million tons is estimated, and Quy Xa, Lao Cai, where a deposit of 112 million tons is estimated (Hinh et al., 2013). However, plenty of iron ore is still being sold abroad, leading to massive loss of value, while steel is imported from other nations at a high price.

Table 1: Distribution of iron ore resources in Vietnam

Region	Iron ore reserves	Main types of iron ore	Iron ore grade	Main distributed areas
Northwest	More than 0.2 billion tons	Limonite, magnetite	38-55%	Lao Cai, Yen Bai, Phu Tho, Vinh Phuc
Northeast	More than 0.5 billion tons	Magnetite, goethite	42-60%	Ha Giang, Thai Nguyen, Cao Bang, Bac Kan, Tuyen Quang
Central-north	More than 0.8 billion tons	Magnetite	60-65%	Thanh Hoa, Hoa Binh, Nghe An, Ha Tinh
South	0.05 billion tons	Magnetite	N/A	Dong Nai, Ba Ria Vung Tau

Source: HXJQ Corporation

Taking into account its limited land area, Vietnam has a substantial resource of iron ore which is primarily reserved in the country's northern regions, with proven reserves of 1.3 billion tons and total reserves of 2.3 billion tons, with an iron ore quality of 50-65% (Steven, 2019). On the other hand, Vietnam is a significant importer of low and medium-grade steel from Japan, as well as even lower-grade steel from China, the Russian Federation, and Ukraine, implying that the market for high-grade steel is restricted (Hinh et al., 2013).

4.4.2. Capital resources

The state budget expenditure plan in 2021 for steel infrastructure has changed little compared to 2020, accounting for VND477,300 billion with VND841,300 billion in public investment funds (Fintel, 2021). Based on the decision of the Prime Minister (2014), the investment capital needed for iron ore discovery, exploitation, and processing by 2030 is anticipated to be VND20,282.5 billion, with VND692.5 billion going to exploration and VND19,590 billion going to exploitation and processing. In terms of Foreign Direct Investment, CEIC (2021) reported that it was accounted to be worth USD2.322 billion in June 2021, which is an increase over the previous month's figure of USD1.862 billion.

4.4.3. Political system

Vietnam is regarded as one of the most politically stable countries globally, which has resulted in various foreign investment prospects. Furthermore, after negotiating many FTAs, Vietnam is granted preferential custom tariffs that are substantially lower or even 0% for exports, including steel products. Also, since countries usually follow protectionist policies to help the domestic steel industry even after joining the WTO, when such a policy is put into effect by the government, steel enterprises in Vietnam would gain a home-field advantage (Lan et al., 2008). Nevertheless, the Vietnamese steel industry did not grow due to protectionism; instead, it developed as a result of opportunities and learning to compete in a global economy (Kawabata, 2018).

4.4.4. Infrastructure

According to VSA, Vietnam is currently the leading country in Southeast Asia, amounting to 29% of the region's total crude steel production. For the past decade, Vietnam's steel industry has developed strongly and risen to the 14th position in the world by 2020, with domestic crude steel production achieving a record level of 19.5 million tons/year. Nominal crude steelmaking capacity in Vietnam increased significantly throughout the period starting from 2009 (Figure 2).
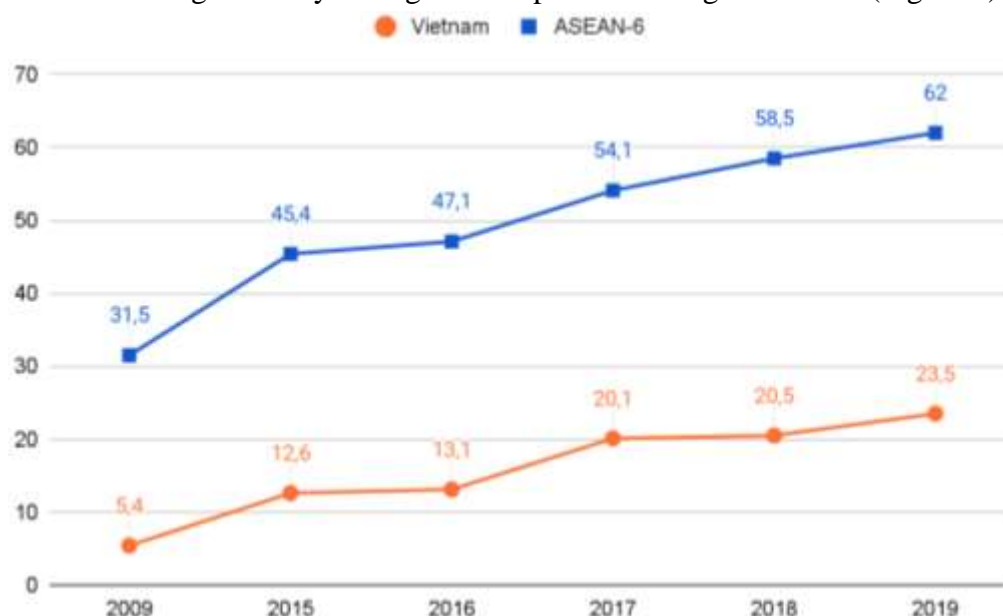
Figure 2. Nominal crude steelmaking capacity developments (in million MT)
Source: OECD Steel Committee

In terms of material flow, Vietnam follows the general trend of using blast furnaces, going from iron ore, iron smelting to steel. This technology accounts for 70% of production, while electric induction furnace technology makes up only around 30%. OECD (2020) estimates that

steelmaking induction furnace capacities in Vietnam are 1.63 million metric tons, ranked 3rd amongst ASEAN economies (**Table 2**).

Table 2: Estimates of steelmaking IF capacities in ASEAN

Economy	Indonesia	Malaysia	Philippines	Thailand	Vietnam	Total
IF capacity (million MT)	Over 3	0.53	0.4-0.5	2.8	1.63	8.4-8.5

Source: OECD Steel Committee

4.4.5. Human resources

Low labour costs and *excellent productivity* are two factors that might help Vietnam establish a competitive local metal products sector. Labour costs for competent metalworkers in Vietnam are less than a quarter of those in China. Workers at companies using best practices in Vietnam produce 25–27 pieces/day, compared to 13–25 pieces/day in China (Hinh et al., 2013). Although Vietnam's labour productivity reached VND117.4 million per employed person and labour force participation rate increased to 75.6% in 2020 (Statista, 2020), Vietnam's labour productivity fell by 6.24% YoY in December 2020, compared to an increase of 8.23% the previous year, followed with an average of 10.43%.
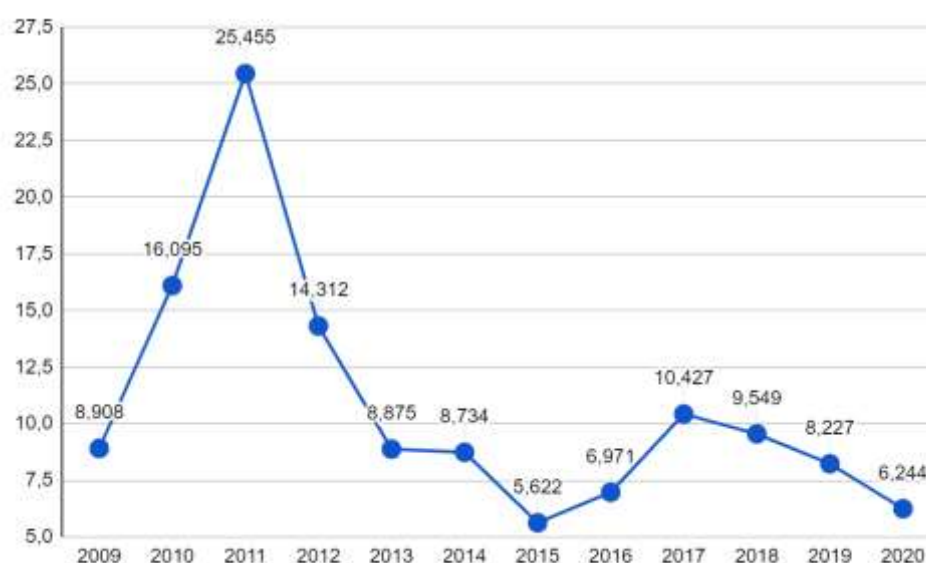
Figure 3: Vietnam's Labour Productivity Growth from 2004 to 2020
Source: CEIC

According to the most recent statistics, Vietnam's population reached 97.58 million people in December 2020. In March 2021, the unemployment rate was 2.42%, and monthly earnings were USD311.15. The labour force participation rate rose to 74.40% in December 2020 (CEIC, 2021).

4.2. Demand conditions

4.2.1. Segmented Structure of Demand

Based on type, Vietnam's steel industry can be divided into two primary segments: long steel and flat steel. Long steel products are made from "billets and blooms" and include reinforcing bars, wire rod and wire products, rails, profiles, and merchant bars. Flat steel products produced from "slabs" consist of hot-rolled coils (HRC), cold-rolled coils (CRC), coated steel, tinplate, and heavy plates.

Based on application, major market segments include construction, shipbuilding, automotive, packaging, electrical appliances, mechanical equipment and others. According to the Vietnam Construction Market Report 2021-2026, the construction industry is projected to continue the same growth rate as before the Covid-19 pandemic because of the government's determined efforts to improve the quality of the country's overall infrastructure with sizable investments in construction activities and affordable housing projects.

4.2.2. Anticipatory Buyer Needs

Vietnam Steel Industry Report for the phase 2020-2024 demonstrates that as Vietnam's economy develops and living standards are raised, the demand for steel among industries such as construction, automobiles, and appliances will also grow. As maintained by the Ministry of Construction, the building materials market is forecast to be robust this year, with the demand fuelled by the increase in infrastructure development investment and the recovery of the property market (SEAISI, 2021).

Based on the SEAISI Newsletter (2021), repairing infrastructure damaged by floods in the central region and landslides in mountainous areas would demand a large volume of construction materials. Furthermore, the real estate market is anticipated to rally, which leads to upturns in property investment and boosts the consumption level of construction materials. Steel demand is derived from steel-consuming sectors, thus by assessing social factors and requirements for products in steel-consuming industries, it is possible to forecast changes in the steel industry resulting from the dynamic consumption structure of building materials.

4.2.3. Sophisticated and Demanding Buyers

The flat steel market in Vietnam could be segmented into high-grade, medium-grade and low-grade products. Kawabata (2016) suggests that given the early rise in demand for high-quality steel, and the modest production scale of electronics and automobiles in Vietnam, the demand growth for high-quality products would be reduced. Conversely, the medium-quality flat steel products for factory and warehouse construction, household goods, motorcycles, propane gas cylinders, are expanding as consumer income rises and industrialisation proceeds. In particular, consumers in these segments demand not only superior quality but also a low deficiency ratio and express delivery.

Nevertheless, the extensive proliferation of high-rise buildings and complex constructions has generated an extra demand for high-quality construction steel. While Vietnam's steel industry has considerably expanded to the level of advanced ASEAN economies such as Thailand and Indonesia, its demand is heavily reliant on construction, as depicted in **Figure 4.** Meanwhile, the steel sector has an appreciably lower demand for automotive and machinery, compared to that of Thailand and Indonesia in 2015.
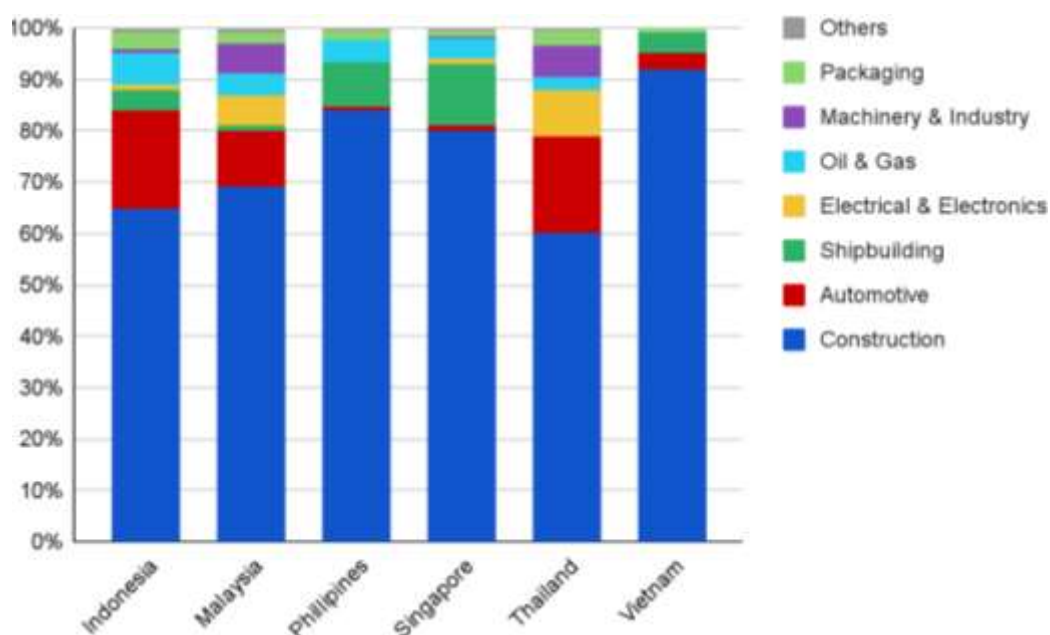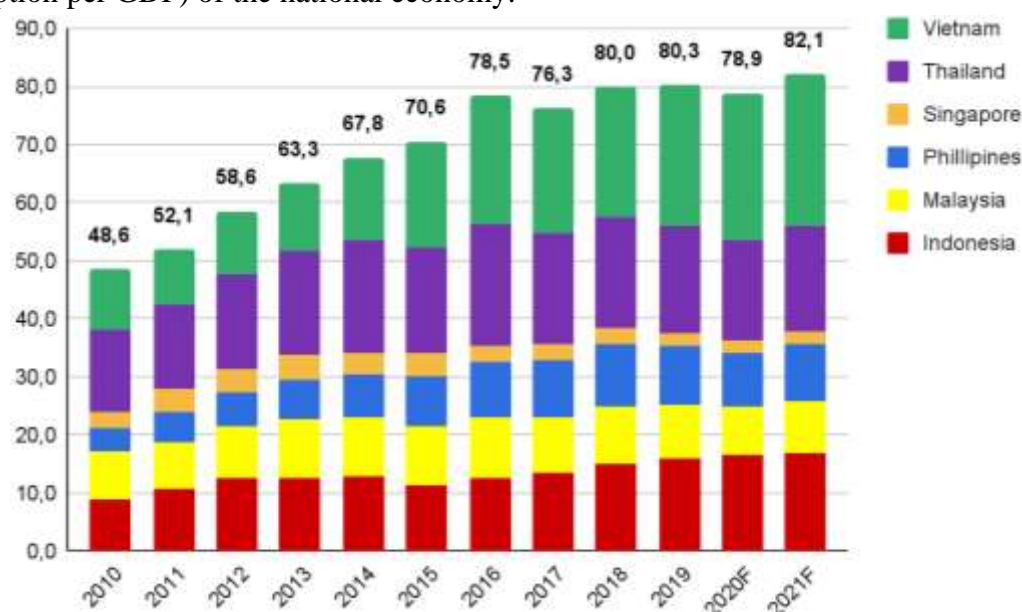
Figure 4. ASEAN-6's apparent steel consumption by steel-consuming sector and country (%)
Source: SEAISI Research & Analysis, SEAISI Study

4.2.4. Size and Growth Rate of Domestic Demand

Despite being a latecomer even among ASEAN economies, sharing the common challenge of finding a development path without large-scale integrated production systems, Vietnam's steel industry is expanding steadily. **Figure 5** shows changes in steel demand in ASEAN countries, which is projected to continue rising in line with the construction industry growth in Vietnam and Indonesia, hitting 82.1 million tons in 2021. As Kawabata (2016) mentioned, although Vietnam's consumption stood at the bottom of the ASEAN-6 throughout the 1990s, it climbed to third place behind Thailand and Indonesia in 2013. This evinces great increases in the steel intensity (steel consumption per GDP) of the national economy.
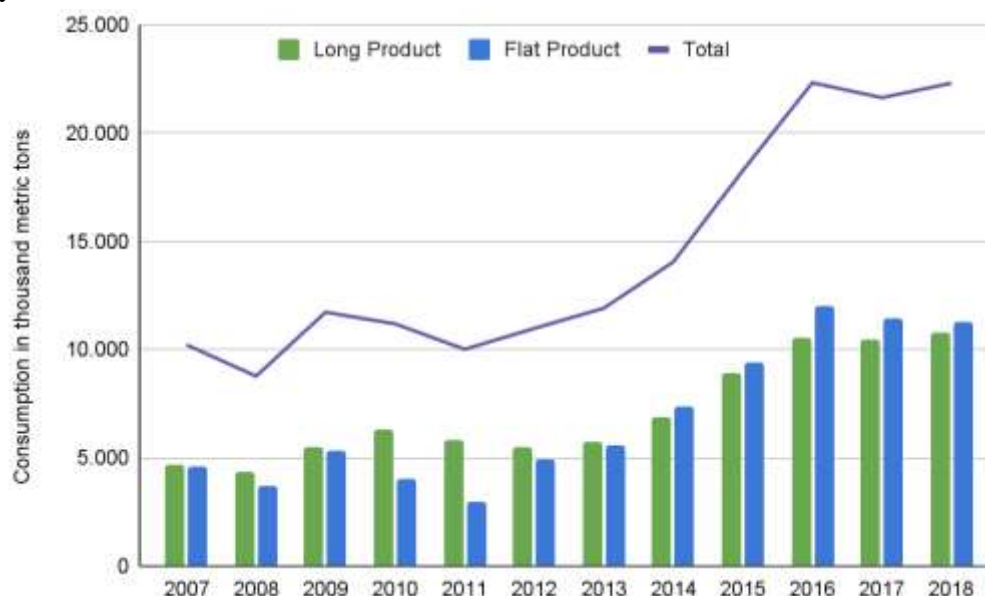

Figure 5. ASEAN-6's apparent steel consumption and forecast, 2010 to 2021 (million MT)
Source: World Steel Association, SEAISI Research & Analysis

In line with the consumption structure by steel type, steel demand in the construction industry seems to be growing steadily. As is presented in **Figure 7**, although the share of flat products in

the total demand was always smaller than that of their long counterparts before 2014, it has overtaken the latter segment and witnessed a higher growth rate ever since. Kawabata (2016) reveals that flat steel consumption is pivotal to various applications such as construction and heavy machinery in Vietnam.


Figure 6. Vietnam's apparent steel consumption by product, 2007 to 2018 (thousand MT)
Source: VSA

4.3. Related and supporting industries for Vietnam's steel industry

4.3.1. Mining

Steelmaking requires iron ore and metallurgical coal. Over 70% of global steel produced today from iron ore is largely dependent on coal (Kumar and Kumar, 2016). Vietnam has over 300 iron mines with a total quantity of 1.2 billion tons, with notable mines such as Thach Khe (Ha Tinh), Tien Bo (Thai Nguyen), and Quy Xa (Lao Cai). In **Figure 8**, it can be seen that the production of iron ore in Vietnam has increased from 1.93 million metric tons in 2010 to 5.52 million metric tons in 2020.
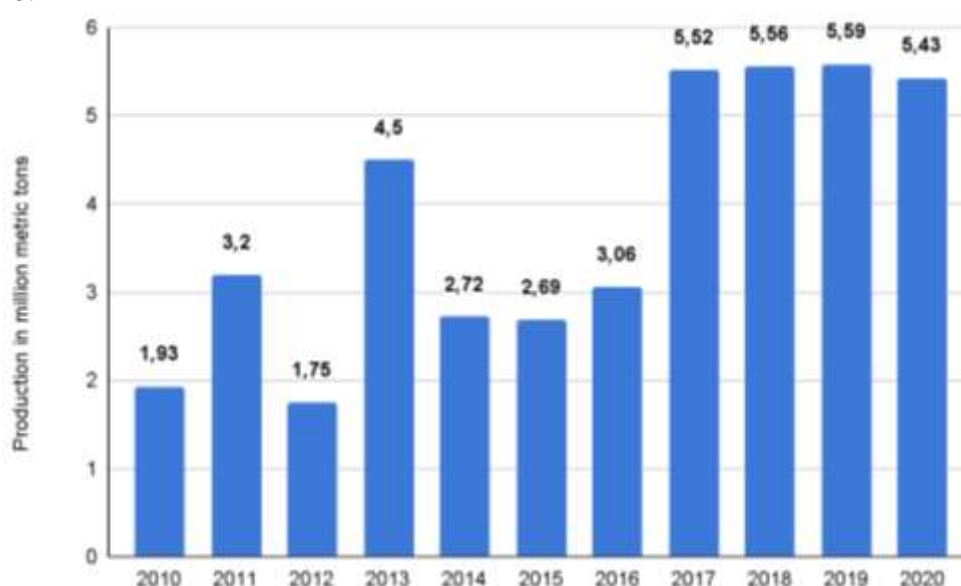

Figure 7. Production of iron ore in Vietnam, 2010 - 2020 (million MT)
Source: Statista

Difficult natural characteristics of mines and lack of specialized equipment may prevent effective exploitation, such as the case of Thach Khe mine. It was indicated that since Thach Khe is 1.5km from the coast, traditional opencast mining would entail the risk of damaging the ores by seawater. Regarding the chemical content of Thach Khe's iron, the zinc content in the ore (0,071%) is 10 times the standard ore, causing toxic emission and degradation to steelmaking equipment (Le, 2018).

The exploitation of coal, another indispensable input for the steel industry, is conducted by national firms such as Vinacomin and Dong Bac Corporation. The following figure provides the government's projection in 2016 for demand for coal from 2020 to 2035.
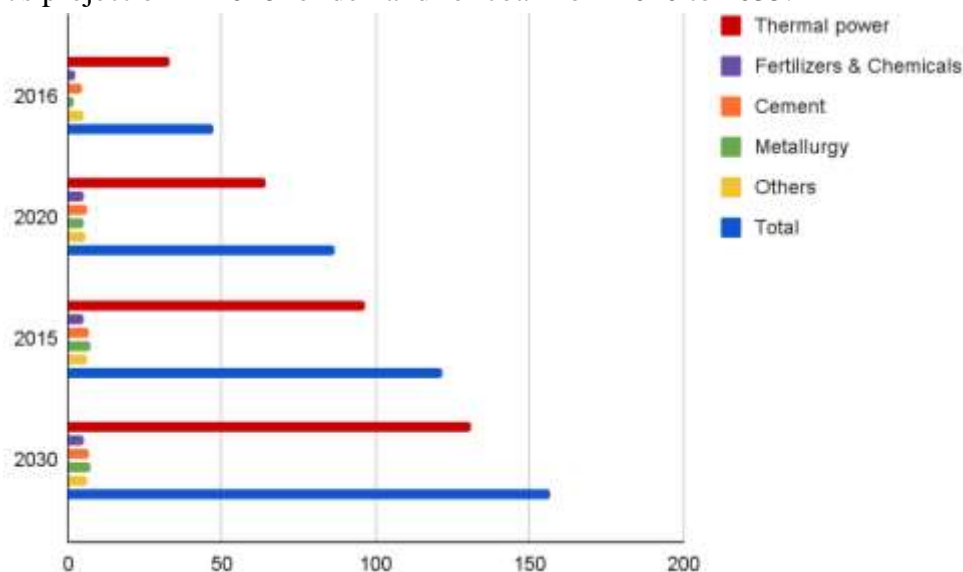

Figure 8. Projected demand for coal-based on sectors, 2016 - 2030 (million tons)
Source: Official development plan for the coal industry, outlook to 2030

Most of Vietnam's bituminous coal mines are situated in Thai Nguyen and Northern regions, with a total reserve of 15 million tons, and are difficult to exploit. Vietnam can only produce 220,000 - 300,000 tons of bituminous coal per year. Vietnam's steel industry would need to import 4 to 7 million tons per year from 2020 to 2030 to produce steel.
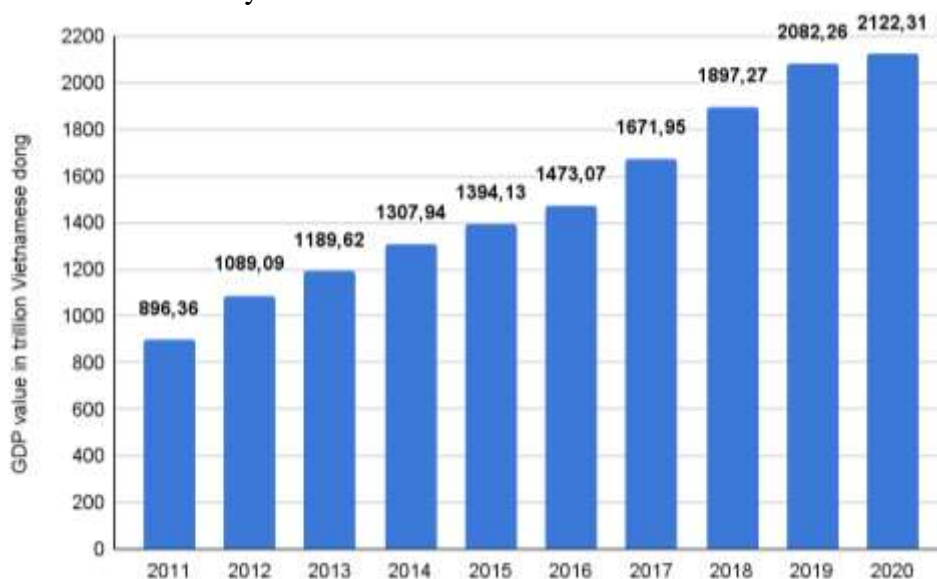
4.3.2. Construction

The construction industry accounts for over 90% of steel consumption in Vietnam and will continue to be the main consumer of steel in Vietnam for the upcoming years. The following diagram shows the growth in Vietnam's construction industry from 2011 to 2020.
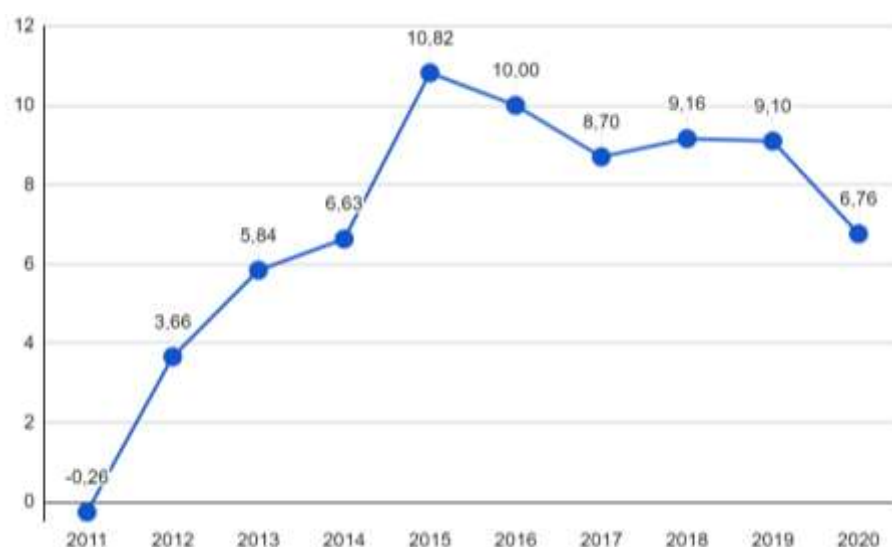
Figure 9. Vietnam's construction sector growth rate, 2011 - 2020 (%)

Source: VnEconomy, 2020

Overall, the construction saw positive growth figures throughout the whole period. It is noticeable that the two dips in growth rate are due to external events that negatively impact Vietnam's economy, especially in 2020 with Covid-19. Despite the pandemic, the growth rate of Vietnam's construction industry maintained at 6.76%.

Figure 10. GDP value of the construction sector in Vietnam, 2011 - 2020 (VND)

Source: Statista

The bar chart illustrates the GDP value of the industry during the same period. This is where the construction sector shows its value - its contribution to GDP has increased steadily from 2011 to 2020. The GDP value of the construction sector in 2020 nearly tripled that of 2011, with VND2122 trillion, accounting for 6% of the country's GDP. Although construction for tourism, e.g., resorts, hotels decreased in 2020, new industrial areas have been built in many Vietnam provinces, such as Bac Ninh, Binh Thuan, etc.

4.3.3. Automobile

In Vietnam, steel is generally sold at a high price as a consequence of having to import raw materials from other countries. Since the beginning of 2021, steel prices have increased around

40-50%, according to Minh (2021). Moreover, car manufacturers nowadays are shifting toward using Advanced High-strength Steels (AHSS) in nearly every new design (Worldsteel, 2021). The fact that Vietnam is yet to be able to produce such a complex type of steel implies that the industry must innovate if they want to support the automobile industry. Moreover, Vietnam's automobile industry contributes 3% to the overall GDP of the country, much lower than that of other ASEAN economies, which is on average 10% (Chanh, 2021). More exactly, automotive firms in Vietnam have not grown enough to reach the standard of the region.

4.4. Firm strategy, structure, rivalry

4.4.1. Goal of the steel industry in general

The strategic plan for the steel industry was announced by the government in 2007, clarifying long-term goals such as consistent and sustainable growth, prevention of surplus and shortage of products, the adaptation of new technologies, and protection of the environment.

Table 3. Projected target for production and export of several steel products, 2010 - 2025 (million tons)

	2010	**2015**	**2020**	**2025**
Production of cast iron	1.5 - 1.9	5 - 5.8	8 - 9	10 - 12
Production of steel billets (crude steel)	3.5 - 4.5	6 - 8	9 - 11	12 - 15
Production of finished steel products	6.3 - 6.5	11 - 12	15 - 18	19 - 22
Production of flat steel products	1.8 - 2	6.5 - 7	8 - 10	11 - 13
Export of cast iron	0.5 - 0.7	0.7 - 0.8	0.9 - 1	1.2 - 1.5

Source: Official development plan for the steel industry, outlook to 2025.

#### 4.4.2. An analysis of firms' strategy, structure, and goals

Hoa Phat Group (HPG)

HPG is currently the leading firm in long steel products such as construction steel and steel pipes, with 32.5% and 31.7% market share respectively. Being one of the leading industrial production groups in Vietnam, HPG is well known for its investment in new manufacturing lines and technology. This could be seen in the firm's effort to increase flat steel production capacity through self-sufficiency in iron ore (HPG News, 2021), and coke (HPG News, 2015). Furthermore, the Dung Quat 2 HRC steel manufacturing unit of HPG is expected to come into full service in 2025. With a production capacity of 5 million tons of HRC steel, HPG will directly compete with Formosa in the market, the firm accounting for 86.6% of the market for HRC steel in 2020. (Ngoc, 2021).

Hoa Sen Group (HSG)

HSG, a major supplier of flat steel products, takes pride in its close-loop production lines and pioneering in the adoption of new technology. The chart below shows that HSG has maintained its position as the largest market share for galvanized steel sheets at 29.5% in 2019 and 33.4% in 2020. Regarding steel pipe, the firm has the second largest market share at 16.8% in 2020. HSG also benefits from its chain of 536 retail stores, allowing for quick responses to changes in demand

and. High quality and standards compliance thanks to improved technology has enabled the firm to export its products to 85 countries.
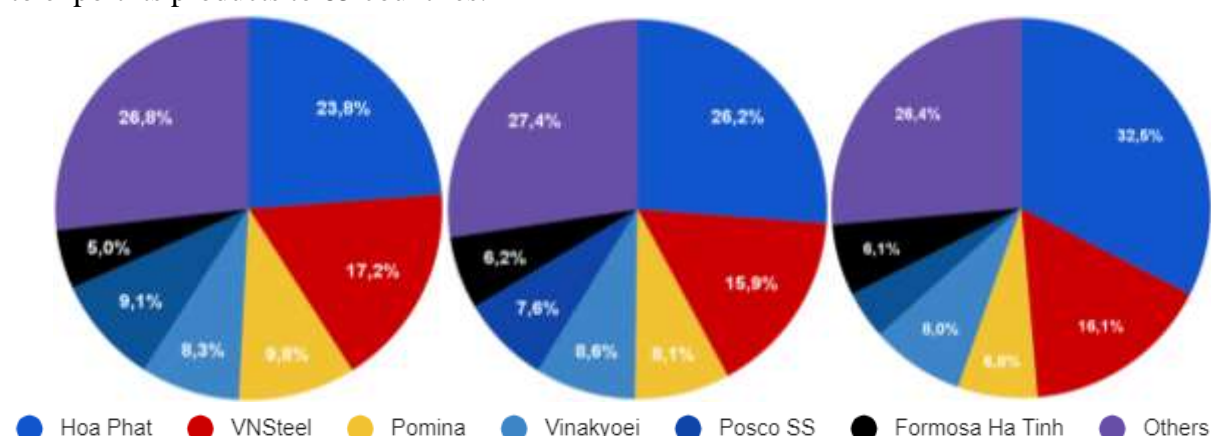
Figure 10. Domestic market share for construction steel from 2018 to 2020
Source: 2020 Steel market report, Vietnambiz
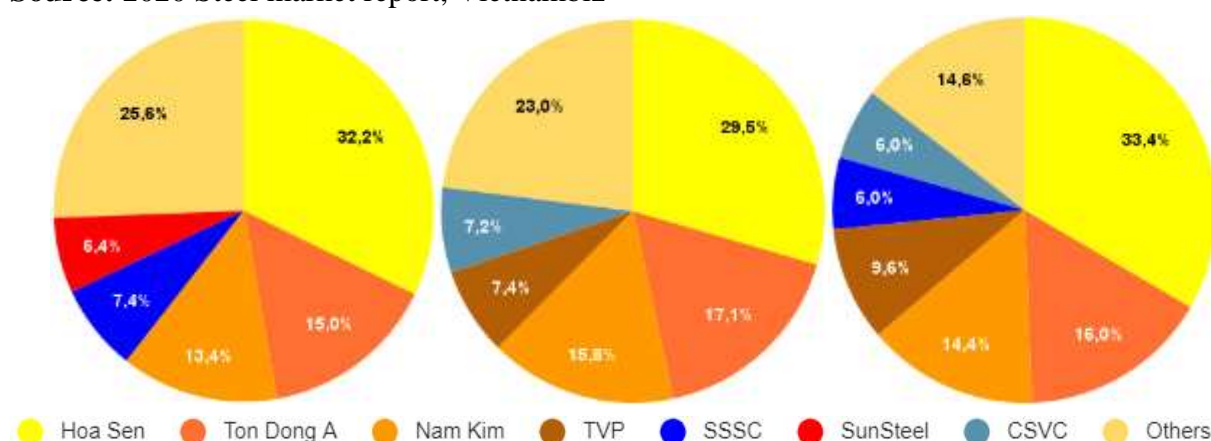
Figure 11. Domestic market share for galvanized steel sheet from 2018 to 2020
Source: 2020 Steel market report, Vietnambiz

Nam Kim Group (NKG)

NKG focuses on flat steel products, mainly galvanized steel sheets, with an additional steel pipe plant in Long An. As stated in the 2020 annual report, the firm has a production capacity for CRC steel at 900,000 tons/year and 1 million tons/year for galvanized steel. Being a key player in the flat steel market has contributed significantly to the firm's business in 2020 and Q12021. In addition, products by this firm have met strict standards in Japan, Australia, and the United States, allowing the firm to export nearly 152,000 tons of end products to the US and Europe market in Q12021 (Tuc, 2021).

4.4.3. Rivalry in the industry

Domestic rivalry

Because steel is an industry with high fixed costs in factories and machinery, smaller firms may be disadvantaged especially in competitive and saturated markets such as the market for long steel. Firms with economies of scale and advanced technology in production are also outperforming other firms. For example, Dung Quat integrated Iron and Steel complex allowed HPG to increase its production capacity and gain more market share in the long steel market from 26.2% to 32.5% in 2020. Pomina also launched a new steel manufacturing plant in Phu My Industrial Zone, capable of producing 1 million tons of finished products using a novel type of

furnace. However, there exists a potential for other firms in the market for flat steel, as currently HRC steel is only provided by Formosa Ha Tinh and HPG, and the demand is yet to be met adequately via domestic production.

International rivalry

China is the biggest influencer on global steel. The country can produce steel with economies of scale and low international prices in general, while also demanding steel for its industries. As can be seen in the data below, China is leading in both export and import of steel products.

Table 4. Top 20 importers and exporters of steel in 2020 (million tons)

Rank	Total exports	Mt	Rank	Total imports	Mt
1	China	51.4	1	China	37.9
2	Russia	31.5	2	European Union (28)	32.6
3	Japan	29.8	3	United States	19.9
4	South Korea	27.6	4	Germany	18.2
5	European Union (28)	22.6	5	Italy	15.5
6	Germany	21.2	6	Vietnam	13.7
7	Turkey	18.5	7	Thailand	13.1
8	India	17.1	8	Turkey	12.5
9	Ukraine	15.2	9	France	11.8
10	Italy	14.9	10	South Korea	11.5
11	Belgium	12..9	11	Poland	10.8
12	Brazil	10.6	12	Belgium	10.4
13	France	10.2	13	Mexico	9.7
14	Taiwan, China	10.0	14	Indonesia	9.3
15	Malaysia	8.4	15	Spain	8.7
16	Netherlands	8.3	16	Netherlands	7.8
17	Spain	7.9	17	Taiwan, China	7.3
18	Vietnam	7.8	18	Saudi Arabia	7.0
19	Canada	6.9	19	Canada	6.8
20	United States	6.3	20	Philippines	6.6

Source: World Steel Association

VSA reported that in 2020, import of steel products was 13,7 million tons at USD8 billion, a decrease of 8.92% in quantity and 12.2% in price compared to 2019. According to Trademap, China accounted for 25% of Vietnam's steel imports in 2020. As shown by **Table 4**, Vietnam ranked 6th as a steel importer. Nevertheless, thanks to constant improvements by Vietnamese steel-producing firms, the country has been capable of exporting its products to other markets while still increasing supply for domestic consumers. Export turnover for Vietnamese steel in 2020 was USD5.26 billion, mostly to ASEAN countries, China, Taiwan, etc. (VSA, 2021).

4.5. The role of government

Kiyong (2019) argued that the transition to a market-oriented economy has fuelled Vietnam's growth over the last decades. The government's support for change has hastened the openness of the national economy, while membership in international organizations has given technical assistance for these reforms. To safeguard state-owned steel enterprises such as Vietnam Steel Corporation, the Vietnamese government maintained public monopolies and enforced import restrictions over the 1990s to facilitate their business expansion, attracting private and foreign investments in real estate and infrastructure.

The government has also imposed tariffs on imported steel products depending on the market at different temporary protection rates. Vietnam has imposed anti-dumping tariffs on all billet, long steel, and H-shape steel, regardless of their origin. As for galvanized steel, Vietnam only introduced anti-dumping tariffs on items from China and South Korea, as these two countries are the largest exporters of galvanized steel products to Vietnam. With decreased competition, companies that manufacture such items will benefit from the protection (Dang and La, 2020).

4.6. The role of chance

According to the World Steel Association (2021), it is predicted that the global steel demand will increase significantly in 2021 by 1795.1 million tons, compared to 1725.1 million tons in 2020 with negative growth in most regional areas (except for China) due to COVID-19. Steel demand forecasts for 2020 and 2021 have been improving since June for both developed and developing economies, creating a premise for Vietnam to expand exports. The country is also in the top 10 markets with the highest steel demand in the world, accounting for 25.9 million tons in finished steel, which represents high steel demand in the domestic market.
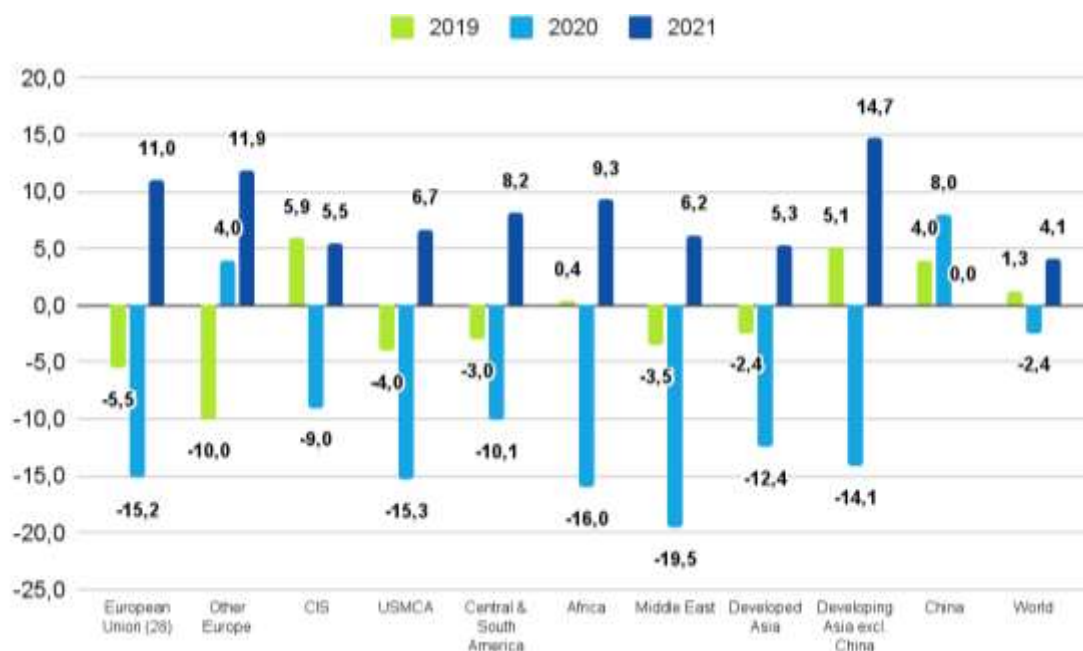
Figure 12. Steel demand, finished steel (SRO October 2020)

Source: World Steel Association

Vietnam has set out to publish tariff elimination guidelines for steel products in the process of negotiating free trade agreements (FTAs), giving indigenous steel businesses adequate time to expand (Dang and La, 2020). The execution of new-generation Free Trade Agreements (FTA) such as CPTPP, EVFTA, and UKVFTA, is expected to introduce Vietnam to new markets and stimulate exportation. However, the Vietnamese steel sector is forecast to face multiple trade remedy lawsuits targeting Vietnamese steel products (**Table 5**).

Table 5. Summary of trade protection lawsuits against Vietnam's flat steel product chain

No	Taxable products	Suing Country	Product Origin	Initiation	Temporary Decision	Conclusion	Final Decision
1	Cold-rolled carbon steel, not cold rolled	Thailand	Vietnam	2014	6,97-51,61%	Taxed since 2014, extended anti-dumping measures for 5 years from February 4, 2020	6,97-51,61%
2	Steel pipe	Thailand, Vietnam, China, Korea, Taiwan		22/08/2018	-	Tax for 5 years from 12/02/2020	6,97-51,61%

3	CR and galvanized steel	US	China		456%	The US has made the final official conclusion December 2019, continue to impose tax on products derived from raw materials China, Korea, Taiwan	456%
4	CR and galvanized steel	US	Korea, Taiwan	07/2019	10,34 - 29,4%		10,34 - 29,4%
5	CR and non-alloy steel	Malaysia	Vietnam, China, Korea, Japan	26/08/2019	7,7 - 20,13%	Tax from 12/2019 to 12/2025	7,7 - 20,13%
6	Galvanized aluminium steel	Indonesia	Vietnam, China	26/08/2019		Under investigation	
7	Corrosion-resistant steel	Canada	Vietnam	08/11/2019	36,3-91,8%	The Vietnamese government does not subsidize Vietnamese enterprises	2,3-16,2%
8	Steel pipe, section steel	Australia	Vietnam, China, Korea, Taiwan	06/01/2020		Under investigation	
9	Non-alloy cold sheet	Malaysia	Vietnam	13/03/2020	39,27%	Under investigation	

10	Stainless steel plate	US	Vietnam	13/05/2020	139-267%	Under investigation	
11	Galvanized steel	Philippines	Vietnam	15/06/2020		Under investigation	
12	Stainless steel welded pipe	Turkey	Vietnam	25/06/2020	39,27%	Under investigation	
13	Cold rolled stainless steel	Malaysia	Vietnam, Indonesia	28/07/2020		Official conclusion on December 30, 2020, most Vietnamese enterprises are taxed at 3.06-37.14%.	3.06-37.14%.
14	Cold rolled steel coil	Malaysia	Vietnam	28/07//2020		Under investigation	

Source: VCBS

5. Conclusion

From the data analyzed, it is evident that Vietnam possesses favourable conditions to produce steel as the country is endowed with rich natural and human resources. Vietnam also benefits from its status as a transition economy, since the rising domestic steel demand would provide enterprises with incentives to focus on their competitive edges in quantity and quality of steel products, thereby addressing the need to depend on imported steel.

Additionally, steel-related sectors i.e. construction are growing rapidly, creating opportunities for manufacturers and exporters. Apart from environmental factors, Vietnam's economic and political stability also attracts foreign investments. Considering production capacity, domestic steel enterprises such as HPG, HSG, and NKG have managed to reach international standards of infrastructure and technology, thanks to which they have expanded with increased product quality, production capability, and export performance to markets around the world.

However, there exist hindrances for the industry due to the unavailability of advanced factors and fierce international rivalry. The majority of Vietnam's steel sector consists of small firms, leading to imbalances in steel products output. In detail, long steel production is much higher than

its quantity demanded, while the flat steel demand is not satisfied due to their inability to manufacture. Given the aforementioned factors, Vietnamese firms are not yet able to compete with their counterparts from China or India. Also, as the government is introducing protection policies toward domestic production, companies may face competition against imported steel, especially from China.

This study examines the competency of Vietnam's steel industry by assessing each of the six dimensions included in Porter's Diamond model which is suitable for the analysis of a sector's competitiveness. The findings indicate that the evaluation indicators are valid and thus useful for determining the best approaches to improve the steel industry's development performance. This study has several implications for scholars. As shown above, Porter's Diamond model is a powerful tool to identify the sources of international competitiveness for an industry as well as to provide valuable insights for enterprises and policymakers. Despite this, the literature on industrial competitiveness reveals that a number of different criteria, techniques, and methods can be used in this field, thus future research can account for other determinants and variables based on quantitative analysis to provide more clarity into how such variables could influence Vietnam's steel industry competitiveness, such as economic or cultural factors.

Due to practical challenges in retrieving primary data, this research examines secondary data from various reputable sources to yield results, which may potentially influence the accuracy and objectivity of information for analysis purposes.

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