THE EFFECT OF EXTERNAL PLAYERS ON THAILAND STEEL INDUSTRY's SURVIVAL

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ABSTRACT

Title of Dissertation	The Effect of External Players on Thailand Steel Industry’s Survival
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Today Steel industry is affected from unfair trade which caused the high importation to Thailand. Beside the steel industry itself, external organizations are influential to steel industry’s survival, especially government organizations and trade association. This research aims to find out the most suitable actions of the external organization for survivability of Thailand’s steel industry. This research used integrated model between Porter’s Five Force with Government policy and trade association as a framework. The research used the mixed method, gaining information from the Federation of Thai Industries, and Representatives from steel entrepreneurs This research found that for steel industry sector, it can be summarized that government policies affect industry survival in the aspects of “threat of new entrants” and “competitive rivalry”, while for the trade association affects “threat of new entrants”, “competitive rivalry” and “bargaining power of suppliers”.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Steel is one of the basic infrastructures used in many aspects of the global economy, such as in infrastructure, automobiles, etc. However, volatility of this product has come from globalization, namely, oversupply from foreign countries and subsidization, which causes distortion to the global market.

Thailand counts on the steel industry as an essential product but it has been impacted by those in the global steel environment. Therefore, as it is used all over the world, if the government allowed steel producers to be extinct from Thai Society, there would be no domestic industry to compete against the imported product. Hence, overseas steel companies can hold the power to control supply and demand, in fact, they might have total control over the market, which can harm the economy and welfare of Thai people. Therefore, in order to save Thai steel producers, even for those who are not meant to be global exporters, they can be a counter balance to export economics in order to ensure that Thailand’s steel industry is not controlled by companies in other countries.

This research aims to find out how to implement policies to maximize the capability of Thailand’s steel industry. As Thailand’s steel industry is one of its main industries, and is directly linked with many other industries from many foreign investments, such as the automobile and the expanding residential construction sectors, Thailand still needs to import steel from other sources while there are sources of steel available.

In this research, we will find the answer of whether Thailand’s steel industry has the market to absorb their product, or if some continuous industries will select imported steel rather than using domestic steel. Through interventionism, government policy can play a crucial part toward steel industry development. Therefore, many properties and characteristics of the Thai steel industry need to be identified in order to allow steel development to merge with trade and industry policy to assist steel industry development.

1.2 Background of the Thailand Steel Industry

The iron and steel industry is a fundamental industry which serves as a supporting industry for various downstream sectors, i.e., construction, automobiles and auto parts, electrical appliances, machinery and packaging sectors. As a consequence, the development of the iron and steel industry to meet lower costs in production and higher quality products will enhance production efficiency for the steel consuming sector (ISIT, 2003). The details for major sectors that use steel as their raw material are in: (OECD, 2010).

It has been found that approximately 50 percent of global steel consumers are in construction, whereas the transportation sector, such as cars, trucks, aviation, shipbuilding, and rail comes in second, while the machinery industry and metal products industries each consume around 14 percent of the world’s steel.

This can be concluded from the chart below.

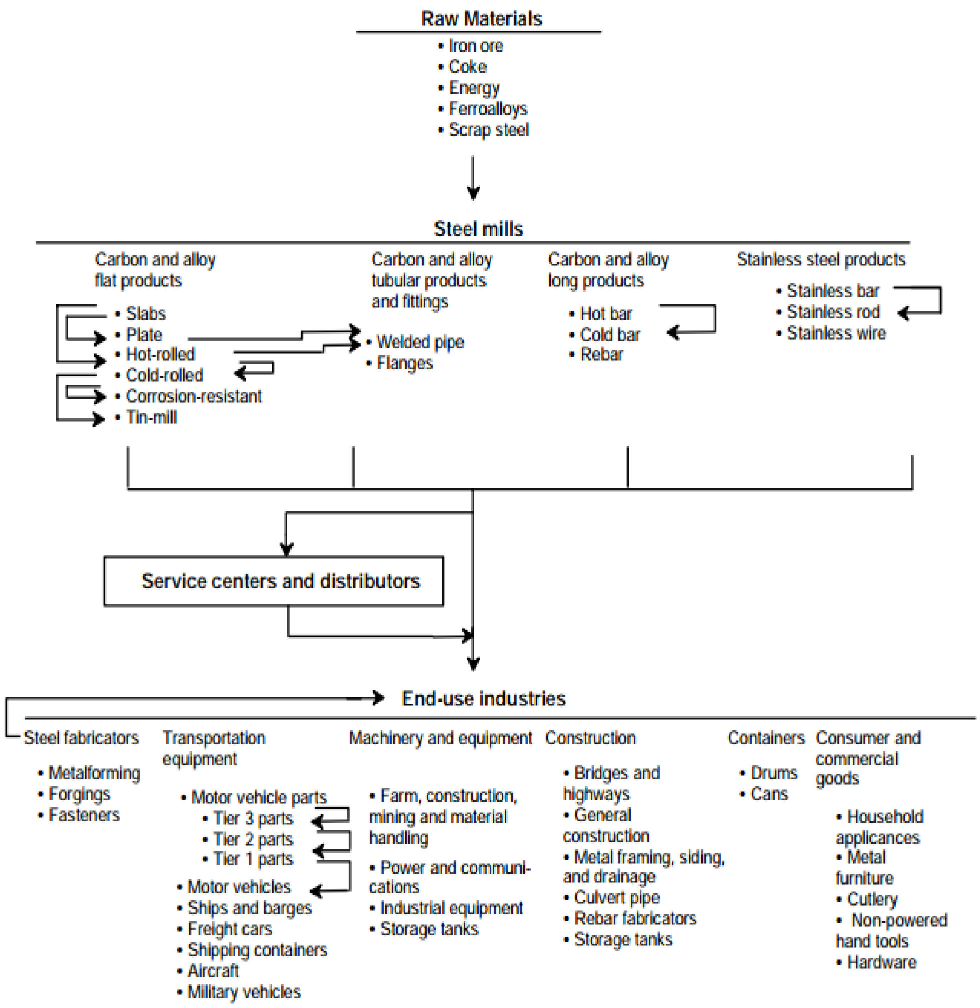

Figure 1.1 Iron and Steel Production and Processes

Source: USITC, 2003.

Before beginning this research, the situation of the global steel industry needs to be discussed regarding these following topics:

1.2.1 Global Steel Industry Situation

Steel consumption increases when economies are growing as governments invest in infrastructure and transport and as new factories and houses are built. Economic recession meets with a dip in steel production as such investments falter.

After being in the focus in the developed world for more than a century, attention has now shifted to the developing regions. In the West, steel is referred to as a sunset industry. In the developing countries, the sun is still rising, for most it, it is only a dawn, as we can see from the chart below and the table citing from the World Steel Association.

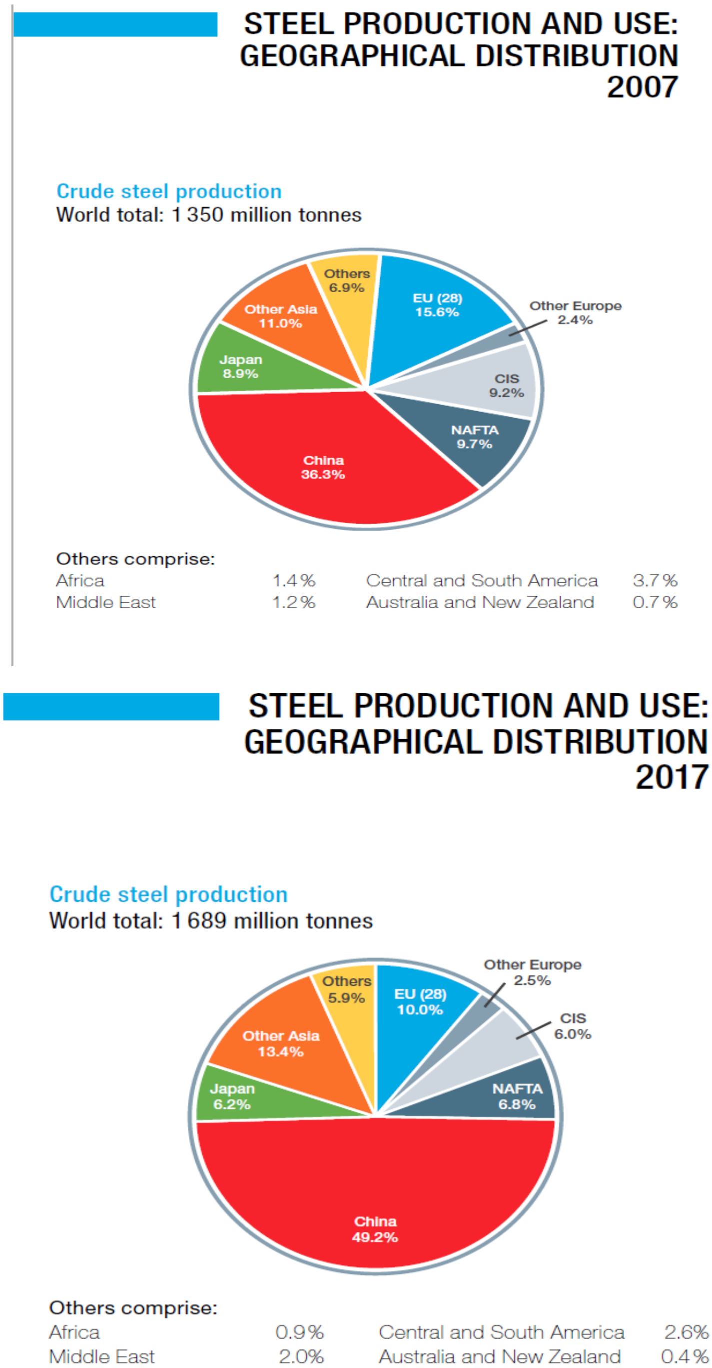

Figure 1.2 Steel Outlook

Source: World Steel Association, 2018.

Therefore, the important parties to foster the global steel situation are the following:

In terms of overall crude steel production, compared between 2017 and 2007, global steel production rose to 1,350 million tons from 1,689 tons. The most prominent figure regarding the steel market share is China, rising to almost of 50 % of the global market share in 2017 from 36.3 % in 2007. Meanwhile, developed countries such as Japan and the EU saw a decline from 8.9% to 6.2%, and from 15.6% to 10%, respectively.

1.2.1.1 World Steel Consumption Assessments

In terms of end use industries for steel, the following charts are taken (The World Steel Association, 2018).

Table 1.1 Apparent Steel Use by Region

Region	**Steel Demand, mt**
EU (28)	162.3
Other Europe	42.3
CIS	52.8
NAFTA	140.7
Central & South America	40.9
Middle East & Africa	53.3
Asia & Oceania	1053.6
World	**1587.4**

Source: World Steel Association, 2018.

According to the above chart, which presents steel demand in 2017, divided by regions, we can see that Central & South American countries hold the least demand for steel, which is 40.9 million metric tons, while other European countries, besides the EU’s 28 countries, contain the next highest demand for steel, 42.3 million metric tons. The next one is CIS countries with 52.8 million metric tons of steel demand, and Middle Eastern & African countries, with demand for steel at 53.3

million metric tons. In NAFTA countries, the demand for steel was 140.7 million metric tons and in the European Union, the demand for steel was 162.3 million metric tons. On the other hand, when we look at steel demand in the Asia & Oceania region, the demand in this region has skyrocketed to 1,053.6 million metric tons. Accordingly, more than a half of the steel demand worldwide came from Asia & Oceania, which makes Asia considered as a "sunrise" in the steel industry, while other regions, such as Europe, are considered at their "sunset" in this industry. Hence, Asia's demand in steel plays a vital part in the steel industry.

Table 1.2 Steel Consumption by End-Use Application

Millions of Tons	**Flat**	**Long**	**Tube**	**Total**
Construction including structural & building work	198	547	25	770
Mechanical engineering	185	68	16	270
Automotive	85	26	1	112
Other transport, includes shipbuilding & rail	42	19	1	62
Domestic appliances	40	7	1	48
Metal products	60	107	6	174
Oil & gas exploration & transport	1	1	63	66
Defense	11	2	1	14
Other industries/miscellaneous	5	15	2	22
Total	**628**	**793**	**116**	**1537**

According to the Steel Consumption by End-Use Application chart shown above, steel consumption worldwide is divided into steel types, which are: flat, long and tube. Construction (including structural and building work) has the highest rate of steel consumption, which is 770 million tons in total, divided into flat (198 million tons), long (547 million tons) and tube (25 million tons), respectively.

The second highest in steel consumption is mechanical engineering, which accounts for 270 million tons in total. The steel consumption in this category is 185 million tons in flat, 68 million tons in long and 16 million tons in tube. Metal products are third ranked in steel consumption from the chart above, which is 174 million tons in total. The steel consumption in each kind of steel in this category is 60, 107 and 6 million tons respectively. Automotive is the fourth in steel consumption at the rate of 112 million tons in total, which can be divided into 85, 26 and 1 million tons for flat, long and tube, respectively. Oil & gas exploration and transport ranked at fifth in the above chart with 66 million tons of consumption in total. The consumption of steel in this category can be divided into 1, 1 and 63 for flat, long and tube, respectively. Other transport includes shipbuilding and rail, it is sixth among the other categories, with total consumption of 62 million tons, which can be divided into 42, 19 and 1 for flat, long and tube, respectively. Domestic appliances ranked seventh in steel consumption, with a total number of 48 million tons. The use of flat in this category is 40 million tons, while the use of long is 7 million tons and 1 million tons are for the use of tube. Other industries and miscellaneous ranked at eighth in worldwide steel consumption, which is 22 million tons in total. The use of steel in this category can be divided into 5 million tons for flat, 15 million tons for long and 2 million tons for tube. Steel consumption in defense is the lowest among the categories, with a consumption rate of 14 million tons, which can be divided into 11 million tons for flat, 2 million tons for long and 1 million tons for tube.

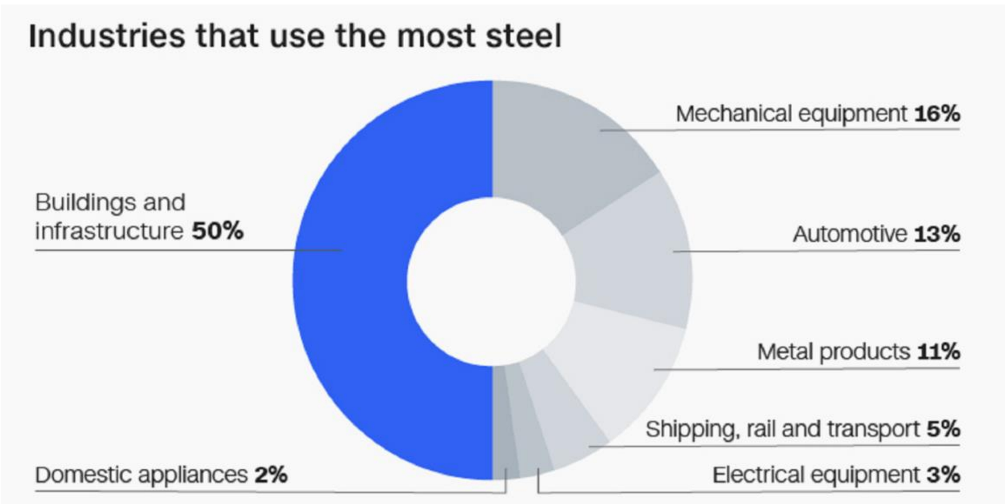

Figure 1.3 Steel Demand by Consuming End-Use Industry

Source: World Steel Association, 2018.

From the chart it can be seen that approximately 50 percent of global steel is used for the construction sector, followed by mechanical equipment, transport and metal products.

1.2.1.2 Top Five Steel Importers

Table 1.3 Steel Importers

Top Steel importers in 2017			Top Steel Net Importers in 2017		
Rank	**Country**	**Volume**	**Rank**	**Country**	**Volume**
1	European Union	41.2	1	United States	25.2
2	United States	35.4	2	Thailand	12.6
3	Germany	27.1	3	Vietnam	12.3
4	Italy	20.1	4	European Union (28)	10.1
5	South Korea	19.3	5	Indonesia	8.7
9	Thailand	14.5			

Source: World Steel Association, 2018.

However, for Thailand, the situation is not common according to the World Steel Association (2018). As we can see, Thailand ranked 9th and 2nd in import and net import respectively. The import trend of Thailand shows that there is still room for improving its steel production.

To go further into it regarding the global steel situation, the trade war between the US and China, which began with Section 232, was topped up with another 25% duty on steel, which of course affects Thai Steel exports to the US. Moreover, there is an indirect effect regarding this area, that of the redirect effect, which is the possible influx of steel imports. Thailand is likely to encounter a flood of foreign steel as US tariffs are expected to redirect steel to Thai markets, especially from China.

Domestic steel producers can submit petitions to the Foreign Trade Department if they are affected by an influx of imported steel, while the government may opt to apply safeguard tariffs, anti-dumping measures or countervailing measures to guard against a flood of foreign steel.

1.2.2 Thailand's Steel Industry

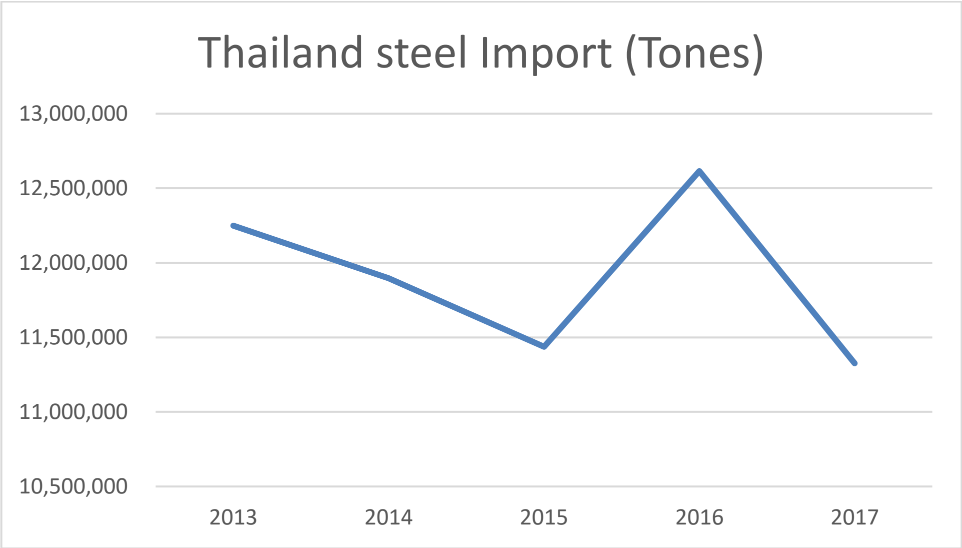

Figure 1.4 Thailand Steel Imports

Total steel imports has a lowering trend, from 11 million tons in 2013 to 12 million tons in 2017 (ISIT, 2018). From the analysis of the Office of Industrial Economics (2015), among many Thai Industries, the steel industry has been recognized as the most prominent one. This fact results from the fact that steel products have been used in many industry sectors, namely automobiles, electronic applications, furniture, the food industry (as packaging), machines and construction, especially with the many foreign investments in Thailand. Moreover, during the economic restoration period, the industrial sector, such as construction, is being revived, and therefore stimulating steel industry consumption. With this higher consumption, the demand has risen. The most noticeable one is for semi-finished steel, as the material for much steel production. Following in second place is galvanized steel sheets and hot rolled steel products. Furthermore, increased exports of those mentioned products in order to continue their production in other countries has also increased the demand for steel.

In terms of consumption, the demand for steel is positively related to economic performance. Obvious! Construction shares more than half of total demand while automobiles, machinery and electrical appliances share over ten percent, which can be broken down by the following (ISIT, 2018):

Table 1.4 Steel Consumption in Thailand by Sector

Sector	Percent Share
Construction	54
Automobiles and parts	16
Machinery and Industrial Products	13
Electrical Appliances	12
Packaging	5

1.2.3 ASEAN Economic Community

The ASEAN Economic Community (AEC) shall be the goal of regional economic integration by 2015. AEC envisages the following key characteristics:

1) Single market and production base,
2) Highly competitive economic region,
3) Region of equible economic development, and
4) Region fully ingrated into the global economy.

Moreover, according to the Thai Industry Federation, potentially six sectors benefit Thailand, they are the following (ISIT, 2011):

1) Automotie & Parts
2) Electrical & Electronics
3) Food Production Hub (packaging)
4) Manufacturing & Assembly Hub
5) Machinery and Metalworking Production Base
6) Tourism Hub

Therefore, it can be seen that 5 out of 6 of the benefited industry sectors (excluding tourism) are involved with the steel industry. Furthermore, in terms of the steel industry, AEC countries have the following characteristics (ISIT 2011), which shows some advantages for the ASEAN region:

1.2.3.1 Thailand

1) The largest steel market in the region

2) Capable of producing various steel products, as compared to ASEAN partners, due to the FDI and joint venture steel mills (Korea/Japan/India)

1.2.3.2 Malaysia

1) Strong in the rebar, wire rod, wire, galvanized steel and steel pipe market

1.2.3.3 Indonesia

1) Strong in the rebar, wire rod, hot-rolled coil and hot-rolled plate market

2) Attracting new investment from global steel players due to a huge market potential and its prosperous economy

1.2.3.4 Singapore

1) Strong in rebar and wire rod and strong steel trader in heavy section, seamless pipe and galvanized steel

1.2.3.5 Vietnam

1) Strong in the rebar, cold-rolled coil and zinc-alume market

2) Booming steel market in Vietnam is expected after it survives a volatile economic period

1.2.3.6 Philippines steel production serves its local market, no role in export

1.3 Government Policy and Industry Improvement

1.3.1 Industry Policy

Industrial policy isn’t limited only to manufacturing. Trade policy, such as tariffs and protective trade policies through tax relief, subsidies in various forms, export processing zones, and state ownership of the industry can be included among industrial policy. The industrialization promotion of Joseph Stalin in the Soviet Union in the 1930s was completely unlike General Park Chung Hee in South Korea in the 1960s.

Industrialization is adopted in both developed and developing countries. For developed countries, laissez faire might step in in place of industrial policy, hence, recent industrial policy and the potential for intervention has started to re-emerge again. The example is of the UK, whose credit crisis of 2008–2009 was a major driver of this re-emergence and led many to believe that a rebalancing of the economy towards manufacturing was required for stability. As Lord Mandelson (British Labour politician, president of international think tank Policy Network and Chairman of strategic advisory firm Global Counsel) commented, “some rebalancing is required, and the next decade will be about strengthening manufacturing’s place at the heart of Britain’s economy alongside and rooted in a strong services sector.”

Industrial policy, especially in a developed economy, has no clear boundary. Policy rationales based on market failure and system failure struggle to explain or guide policy makers (Zerbe & McCurdy, 1999). Over the past twenty years the study of industrial policy has largely taken place in developmental economics (Pack & Saggi 2006; Rodrik, 2007b), while at the same time the policy discussion in developed economies has moved on to innovation and entrepreneurship.

In addition, for developing countries, generally, the quality of public services and political checks and balances are crucial factors for the success of their industrial policy. OECD members and high/higher-middle income countries are often mentioned as examples, such as Korea, Taiwan, Singapore, Brazil and Chile, aiming for growth in order to reach the same height as the developed countries. However, for lower income countries, the result is quite contrasting with high/higher-middle income countries. Resulting from lower government effectiveness, transparency, and accountability, lower income countries might consequently face market failure. As such, it can be assumed that government effectiveness is one of the factors that accounts for the difference between results of industry policy. In the case of Thailand, according to the World Bank, Thailand is a higher-middle income country which can improvise some sort of industry policy from the high/higher-middle income countries as an example.

In this research, Government Policy is defined as policy related to the steel industry. Those government agencies in Thailand, namely, are the Office of Prime Minister, Ministry of Industry, and Ministry of Commerce. Furthermore, herewith is an overview of Thai steel industry policy, which will be discussed further in Chapter 2.

1.3.2 Thailand Steel Policy

For this part, as mentioned, even though there are no direct agencies responsible for the steel industry in Thailand, there are separate steel agencies that are responsible for the steel industry, as the following:

Table 1.5 Government Agencies Responsible for Steel Policy in Thailand

Agencies		Responsibility
Office of Prime Minister	Board of Investment	So far, the steel industry has been counted among major sectors for foreign investment, which ranked 2nd after the service industry. For details see table below.
Ministry of Industry	Office of Industrial Economics	For the purpose of approving policy for the cabinet. For details see table below
	Thai Industrial Standards Institute	Their policy is to set the standards for steel products for the classification and link of Thai standards with international ones.
Ministry of Commerce	Department of Foreign Trade	To overlook foreign trade. In the aspect of the steel trade, trade remedies emphasize measures for international trade. The trade remedies consist of

Table 1.5 (Continued)

Agencies	Responsibility
	1) Anti-dumping 2) Countervailing 3) Safeguards For the steel industry, Thailand is adopting trade remedies to protect steel. 7 out of 11 active products for AD cases are steel products, while another 1 safe guard case is also for steel products.
Department of Internal Trade	To supervise steel trade within Thailand. To provide enough products to meet demand and to prevent hoarding. Moreover, monitoring the movement of steel products closely and take measures of additional care, especially during an economic recession.

In short, the Office of Industrial Economics (2012) has presented a SWOT Analysis, which can summarize the steel industry situation in Thailand as the following:

Table 1.6 SWAT Analysis for the Steel Industry in Thailand

Strengths	Weaknesses
1) Advanced technology production machines. 2) Adaptive human resource, being able to learn new technology. 3) Geographical advantage, Thailand at the center of ASEAN can enjoy its advantage of product distribution.	1) Domestic unavailability of upstream material forcing Thailand to import 100 percent of its upstream material in order to produce further products. 2) No closed connection among entrepreneurs in the supply chain. 3) Cannot reach full production capacity and inappropriate production procedures, which results in high cost of production. 4) No fast and efficient mechanism to solve the dumping problem. 5) Lack of man power and support infrastructure. 6) No clear policy for steel industry development.
Opportunities	**Threats**
1) The domestic steel consumption rate is growing, especially when compared with developed countries. 2) Steel product is able to replace other products, especially for the constructions sector	1) High Finance is required in order to enter the steel business, moreover, raw materials, technology and production equipment can only be imported. 2) Tax-structure and inconvenient customs clearance might obstruct industrial competitiveness. 3) High competitive environment, foreign trade remedies and foreign dumping, especially from major producer countries such as Japan and China, which might harm the steel industry.

1.3.3 Thailand Trade Association

In addition to government policy, another prominent player is the Trade Association, which can be defined as “a body representing organizations within the same trade. It aims to protect their collective interests.”

In the case of Thailand, the prominent trade association is the FTI (Federation of Thai Industries). The F.T.I. is a private sector administrative juristic body which serves as the core organization and also as the center for all Thai industries in the Kingdom. It is a non-profit organization with the main duties of promoting and supporting industry, focusing on developing sustainable growth for all industrial operations in the country. F.T.I. is at the core of the following four areas:

1) Center of industrial co-operation among and with the private sector and government sector, in Thailand and abroad.

2) Service center for all industrial developments.

3) Activities center for all industrial operators.

4) Problem-solving center for all industrial enterprises in the Kingdom, both members and non-members, regardless of size and type. Under F.T.I. Act, 1987 it is empowered to perform the duty of representing the private sector in the industrial sector of Thailand.

1.3.4 Steel Trade Association for Thailand

In the case of steel there is the “Thailand Iron and Steel Industry Club”, which is under the paradigm of the FTI, focusing on the steel industry. Moreover, even though there is a strategic plan hence, the clearer action plan is the government policy, for direction in how to survive the global steel crisis.

1.4 Statement of Problem

1.4.1 Thailand Steel Import Quantity

In terms of import quantity, Thailand ranked 9th in imports, and 2nd in net imports. This factor shows the significance of this research - that development of the steel industry can be of benefit to the country, especially in terms of self-sufficiency, in order to create protection of self-immunity, following a 'Sufficiency Economics' philosophy.

1.4.2 AEC Change and Chance

According to (UTCC, 2011) the steel industry, the country that would receive the most benefit in the AEC is Vietnam, followed by Thailand. Consequently, if the Vietnam steel industry gains advantage in the ASEAN region and climbs up to be the top manufacturer in the region, this might consequently result in harming the Thai steel industry. On the bright side, Thailand has geographical advantages, and so, on the logistics of foreign investment, Thailand's steel industry might receive benefit from the AEC. As such, immunity must be gained in order to ensure the survival of the steel business and ensure self-sufficiency.

1.4.3 No Clear Policy from Government or Trade Associations for Steel Industry

Industry policy includes many areas of policy-making, thus requiring cooperation from many agencies, from both public and private sectors. However, there is no clear policy or strategic plan for cooperation between the public and private sectors and the agencies responsible for the steel industry, thus, it may require all of them.

Regarding the Trade Association, there is a strategic plan, hence clearer action plan in the same fashion as the government policy, in order to help survive the global steel crisis.

1.4.4 Global Economic Influence on the Steel Industry

Sustained overproduction is likely to continue impacting the global market in 2019, but the impact will vary from region to region. High rates of overproduction combined with volatile raw material prices have adversely affected the profitability of Chinese steelmakers. This has seen the Chinese government make attempts to restructure its steel industry and increase efficiency by removing some excess capacity (Ernst & Young, 2014), thus driving the Thai steel business to establish self-immunity, not for the steel business itself but also for protecting the contiguous industries within Thailand.

1.5 Research Question

For the statement of the problem, thus drawing the Research Question. "What is the most suitable course of action of the external organizations pushing for the survivability of Thailand's steel industry?"

This research aims to achieve a course of action for the external players, namely, the government agencies and their actions, which are clear but lacking an integrated strategic plan, which limits the policy to their own approach.

This research aims to find a course of action for the external players, namely government policy and the Trade Association, toward the steel industry, which might prove to enhance the survivability of the steel industry in the global environment

1.6 Research Objective

1.6.1 Find an Overview of the Thai Steel Industry

In order to write this research paper about the steel industry, the picture and the information about the steel industry must be captured, so as to understand the steel industry itself.

1.6.2 Find Out What the Best Course of Action is for the Government to Assist the Industry's Survivability

The first factor for this research involves government agencies. The connection between government agency and action towards the steel industry is to reach out with a recommendation to the government agencies in order to advise on their course of action.

1.6.3 Find Out What is the Best Course of Action for the Trade Association to Assist the Industry's Survivability

The second factor for this research is the Trade Association. The connection between the Trade Association and action towards the steel industry is to reach out with a recommendation to the Trade Association in order to advise on their course of action.

1.7 Significance of the Research

The steel industry is vital to our country since it holds the key to Thailand's economic development. The importance of the steel industry to Thailand's economy comes from the use of steel as the main raw material in midstream industry manufacturing. This said midstream industry is a vital part of the growth of the national economy in various industries, such as the construction sector, automobile industry and electrical appliances industry, et cetera. Hence, the direction of the said industries directly affects domestic steel use.

At present, the steel industry is affected by foreign countries' manufacturing and their government policies, especially overcapacity from China, which is the cause of high importation that affects Thailand's steel industry.

Apart from the adaptation of the private sector in the steel industry, external organizations are also influential to the steel industry's survival, especially government organizations as regulators and supporters of industry, together with associations or aggregations of the industry, working as coordinators among entrepreneurs in the industry and coordinators between the government sector and private sector, including acting as committees in any decision making.

However, in order to proceed for the support of steel industry survival in the current circumstance, the operation of external organizations, which are government organizations that consist of various organizations with different scopes of duty and authority to operate and industrial associations, must hold clear procedures in order to reach the highest efficiency to support the steel industry.

Hence, this dissertation focuses on building connections between these survival factors of the steel industry and the roles of external organizations in order to operate with the highest efficiency.

1.8 Benefits of the Research

This research can help to extract government action toward the steel industry in order to achieve survivability in the global economy, as well as enhance Thailand to be able to create more sustainability in the total economy, and thus act as a counter balance to imported products of foreign countries. Moreover, to allow the steel industry to survive is to enhance the workforce in Thailand and create jobs, thereby allowing businesses that are owned by domestic companies to survive in the global business environment.

1.9 Limitations

Limitation to Thailand from a steel manufacturing perspective, not including the importing perspective, mainly focuses only on integrated action of external actors regarding the steel industry rather than separated units.

CHAPTER 2

LITERATURE REVIEW

In this Chapter a history of interventionism, industry policy, and contemporary issues regarding the steel industry will be discussed, followed by the current situation in Thailand's steel industry, and concludes with a discussion of a model and variables.

2.1 Industry Policy, Interventionism and Infant Industry Definition

Considering improvements to the steel sector in Thailand, the Industrial Policy plan is a government strategy that will be used in this research. Industrial policy is a government measure aimed at improving the capability and competitiveness of the targeted sector. However, there is a difference between macroeconomic policies which aim at the whole system, and industrial policies that are aimed at specific sectors. To illustrate this matter, the example of VAT reduction for macroeconomic policy, and a steel surcharge, shows the difference between sector policies and the whole system.

Industrial policies may contain a variety of types of interventionist practices, such as trade and fiscal policies or subsidies. An example for steel is trade remedies which aim to give extra time for infant industries to adopt themselves.

Speaking of interventionism, interventionism is an economic policy which aims to correct a market failure and promote general welfare. This action is mostly taken by the government to correct for market failures beyond normal regulations. Economic intervention mostly aims at a specific area, such as increasing employment, raising wages, raising or reducing prices, promoting income equality, managing the money supply and interest rates, increasing profits, or addressing market failures. This makes interventionism quite contracted compared to the laissez-faire of free markets.

In contemporary situations interventionism is used in infant industries, which is an industry in its early stages or is incapable of competing in the international environment. In the case of the steel industry, Thailand's steel industry needed protection in order to survive in the global economic environment (Niratsai Toomwongsa, 2018). Hence, the validity of an infant industry will be discussed in order to explore this concept.

2.2 Rationale Behind Interventionism and Infant Industries

In this part, the theory of interventionism is explored so as to understand the theory supporting interventionism.

2.2.1 Theory Origin

The argument of the infant industry was, on the one hand, a reaction to Great Britain's unstable industrial development, and on the other hand, raised by mainland European countries and the United States after the first industrial revolution. These countries followed Great Britain in industrialization. According to List (1856: 69–70), the universal theory of international trade was developed by Smith (1776) – absolute CA – by having a major interest in Great Britain and such a theory. The followers of Adam Smith developed his theory of CA, which also supported universal free trade.

The infant industry argument was originally from Alexander Hamilton, who began the debate in 1791 on industrialization through infant industry protection. His argument was for the United States' industries protection vis-à-vis imports from Great Britain in his official reports to the American government (McKee, 1934: 178–276). In 1789, the first Tariff Act of the United States was regarded as having elements of protectionism. Therefore, the origin of infant industry protection was in the United States, moreover, it was regarded as a tool of trade and industrialization policy.

According to Bairoch (1993: 23, 30), not only "the modern protectionist school of thought was actually born in the United States", but "it was also the mother country and the bastion of modern protectionism." List, who resided in the United States between 1825 and 1830, along with Hamilton, Carey, Henry Clay and Daniel Raymond (1786–1844) who were his main influences, had his first publication of a book called Outlines of American Political Economy in 1827 (List, 1827). List published a variety of books and articles as a journalist and writer. Nonetheless, concerning the argument of infant industries, his book, which was first published in German, National System of Political Economy, is considered as the most important and comprehensive one. Although these ideas did not originate from List, he used economic analysis tools with determination in order to develop and formulate that book's infant industry argument (Schumpeter, 1952). There was a correct claim from Henderson (1983: 158), that "List offered his readers much more than a repetition of the familiar argument put forward by these writers" (those who advocated protectionism before him). This generally refers to the National System of Political Economy in this part, which was the United States' first English translation of the book in 1856.

List has a very broad infant industry argument, furthermore, as a framework of basic theory, it is exceedingly related to developing countries' trade and industrialization problems concerning trade and industrialization.

2.2.2 The Main Feature of List's Argument

List's argument about infant industry is based upon these following principles: first, there are five stages of development in these countries: (i) the savage stage; (ii) the pastoral stage; (iii) the agricultural stage; (iv) the agricultural and manufacturing stage; and (v) the agricultural, manufacturing and commercial [services] stage. Secondly, in order to make progress, countries need to be industrialized, for example, go from stage (iii) to stages (iv) and (v). Thirdly, there is no such transition that automatically appears through the "natural course of things", for example, through market forces. Accordingly, to do so, stage (iii) countries need infant industry protection in cases where other countries are at different development stages, for example, "some have outdistanced others in manufacturing". Fourth, they ought to have temporary protection, for example, at the infant stage they might be limited but they should be removed slowly as the industry matures. Last but not least, there should be limited protection to the manufacturing sector, moreover, there should be limited protection in the agricultural sector, although this sector has a vital productivity growth rate for its development.

2.2.3 Justification

In order to make a justification for List's theory, he values the differences between national and universal interests by suggesting the productive power (development) theory, which is contrary to the theory of universal free trade and focuses on differences in the industrialization levels of many countries.

List's theory of international trade is a philosophy on the principle issue which departs from Adam Smith. There is no common interest among individuals, nations and mankind at large (Smith, 1776: Book II, chap. V), according to Adam Smith. According to Smith, in order to seek their own interests, society's interests are also preserved by individuals as a whole. However, according to List, the individuals' interests are not as important, to be regarded equally as the national interest (List, 1856: 74), for example, social interests may deviate from private interests (Shafaeddin, 2000a: 245, 261).

Moreover, Adam Smith "overlooks nationality and national interest by arguing for maximization of the global welfare" (Smith, 1776: vi). According to List, some nations may focus more on their own welfare than to humanity's collective interests; in that case, the expansion of productive forces of the country through infant industry protection would be more interesting to those nations than the expansion of the welfare of humanity through free trade (List, 1856: 2-61). The individuals' economy is not the same as the national economy, which is not the same as the cosmopolitan economy, such is the economy of mankind.

There is an affirmation by Professor Viner (1953: 4–5), that a cosmopolitan approach was taken by Adam Smith and other classical economists because, in their opinions, what was in England's interest was in the world's interest as a whole, too. This was because they did not have patriotism. Nonetheless, there is an argument from Viner that it is not necessary that things which were relevant to their time and country be relevant for other times and other countries, especially for "economically less advanced countries" at any given time. Thus, Viner has the same point of view with List when he makes the affirmation that, "it is today always necessary…as it was for the English classical economists, to be perfectly clear whether we are considering a problem, say, commercial policy from a national or from a cosmopolitan point of view" (List, 1856: 5).

The "theory of productive power" for the national economy as proposed by List, which is in opposition to the theory by Adam Smith, is a theory of exchangeable values (international trade), which in his point of view is relevant to the cosmopolitan economy. In contrast, the theory of productive power goes further than international trade. National productive power is not only dependent on production and "possession of natural advantage" factors, but also on the availability and stability of institutional factors and their independence and power as a nation. These following matters should follow the division of labor: a sense of national unity, independence and a common goal, and cooperation of productive forces (Smith, 1776: 74). In modern economic language, "the theory of productive power" is adjacent to capability-building, in other words and in a broader sense, to the theory of State-directed economic development.

According to List, free trade is appropriate for developed countries. In the case of England at that time, there is his following statement:

> A country like England which is far in advance of all its competitors cannot better maintain and extend its manufacturing and commercial industry than by a trade as free as possible from all restrictions. For such a country, the cosmopolitan and the national principle are one and the same thing. This explains the favour with which the most enlightened economists of England regard free trade, and the reluctance of the wise and prudent of other countries to adopt this principle in the actual state of the world (List, 1856: 79).

In the case of unindustrialized countries, it is similarly that there would be a possibility of having industrialization through free trade if all countries had similar (low) levels of development, for example, if all countries had a shortage of its industrial base and restricted their trade through legislation or military power.

> The elevation of an agricultural people to the condition of countries at once agricultural, manufacturing and commercial, can only [our italic] be accomplished under the law of free trade, when the various nations engaged at the time in manufacturing industry shall be in the same degree of progress and civilization; when they shall place no obstacle in the way of the economical

> development of each other, and not impede their respective progress by war or adverse commercial legislation (List, 1827: 72-73).

In the case of countries with different levels of industrialization, however, List claims that to protect an infant industry it is a must to boost the productive power of the low industrial base nation (List, 1856: 394). According to Senghaas (1991), if a “competence gap” exists among nations they might need infant industry protection for the nations in the lower positions. According to this proposal of List, his theory is to apply infant industry theory to countries with a low or no industrial base.

> It [principle of adopting free trade by a nation which has fallen behind in industrialization] seemed to me at first reasonable; but gradually I satisfied myself that the whole doctrine was applicable and sound only when adopted by all nations. Thus, I was led to the idea of nationality; I found that the theorists kept always in view mankind and man, never separate nations. It became then obvious to me that between two advanced nations, a free competition must necessarily be advantageous to both if they were upon the same level of industrial progress [our italics]; and that a nation unhappily far behind as to industry, commerce and navigation must above everything put forth all its strength to sustain a struggle with nations already in advance [our italics] (List, 1856: v–vi).

We should notice that List's argument is under the scope of a “competence gap”. Therefore, under his statement that “the whole doctrine was applicable and sound only when adopted by all nations”, as stated above, he tends to give an additional hint - “and all nations are at the same (low) level of industrialization.”

List's insistence is that as long as there is no achievement of universal association and some nations are slower than others, it is not proper to use universal free trade in cases when we are concerned for the interests of non-industrialized countries.

> Universal association and absolute free trade may possibly be realized centuries hence, their [classical] theory regards them as realized now. Overlooking the necessities of the present and the idea of nationality, they lose sight of the nation and consequently of the education of a nation with a view to independence (List, 1856: 64).

There are some reasons proposed by List, for justification of List's infant industry argument, which are written on various cases presented in his book in the language of the time, however, we might base our reasons as modern-day arguments as to the basis of the protection of infant industries with the use of more technical language.

First of all, there will be no industrialization in countries which lack experience in manufacturing, according “to the natural course of things” in a foreign competition aspect (List, 1856: 378, 394), which in technical language can be explained as those countries who cannot be supported by rapid industrialization in the market.

Secondly, since there is big risk in establishing new industries, extra incentives should be given to the producers who enter into the industry. In case such an industry gets to compete with foreign industry at the beginning of its development, the producers might be affected and their industries could suffer losses (Shafaeddin, 2000a: 81, 248, 252, 378). In this context, there is an argument from List that domestic industry protection which is followed by a monopoly would finally have permission to reduce costs and prices as permitted by the exploiting domestic market, which is guarded by import duties (List, 1856: 378). Besides, to finally and gradually introduce domestic competition would be a safeguard of the consumers' interests (Shafaeddin, 2000b: 113). Even though there is no mention from List about the economies of scale, there is an implication of this concept by the mentioned argument. This is a short explanation, since he focuses on the domestic market size as a condition for the successful realization of economies of scale, thus infant industry protection. It is interesting that there is also an awareness of the role of effective demand in the realization of economies of scale by him (List, 1856: 383).

Thirdly, List sees “industrial training or education of the country as a whole” and achieving experience – or development of “invisible capital” – as one of the principle reasons for the regulation of import duties (List, 1856: 68, 77-78). According to modern economic jargon, this means “human capital”, development through learning by doing and achievement of dynamic external economies of learning.

Fourth, although there is no specific mention from List about externalities, this is understandable since such a term was uncommonly used at that time, however, there are several occasions where this notion can be seen in his argument. Apart from his argument on the whole topic of protection for industrial training and education of the country being important, as mentioned above, he refers to the importance of experience, knowledge and relations [linkages] of certain industries with the whole picture of the economy as a criteria for industries for protection selection (Shafaeddin, 2000b: 69). These are all externalities of elements which can be considered as an infant industry protection argument, which is the modern version of the theory of infant industry protection (see, for example, Corden, 1974: chap. 9).

2.2.4 Modalities and Neglect Feature

This part discusses government intervention and infant industry protection in the aspect of List’s theories. On the issue of modalities of protection, this author uses List’s theories in List (1856), which focuses on government policies in various aspects to help both the protection and the enhancement of the industry. In the nature of infant industry arguments, List gave his theories on how an infant industry should be protected, however he advised that unnecessary protection can also cause damage. This author shall explain the modalities of protection and features of infant industry arguments in the following paragraphs.

2.2.4.1 Modalities of Protection

According to List's book, (List, 1856), there are a few points on the modalities of protection which he focuses on, in which he paid little interest to critiques concerning the infant industry argument. Likewise, there are some of his theory characters which are either neglected or not profoundly given appreciation.

First of all, according to modalities of protection, in List's point of view, regulation of import duties and subsidies are considered as one, however, but not the only, government intervention means in favour of industrialization. Besides, he also mentions a host of other policies, such as industrial, financial and educational– necessary for promoting industries (Shafaeddin, 2000b: 393). In this perspective, List's commercial policy theory is merely industrial policy with developmental policy elements. The more vital factor is that to be successful with such policies it forces a large amount of other factors to exist. It is comprised of such socio-economic factors as: transport infrastructure; science and art (R&D) inventions; technical knowledge; “enterprise in industry”; provision of educational facilities; patent law; political and cultural factors; morality, a sense of national unity; an efficiently operating administration; liberty; and, above all, the right institutions (Shafaeddin, 2000b: 70, 122-123, 385-393). In addition, he focuses on agricultural development as an essential condition to be successful in industrial development. There are some arguments in this context that the theory of List is not only one of infant industry protection, but also of a multidisciplinary theory of development, including international trade (i.e. infant industry protection) as its key part, and that List focuses on internal factors and government policy measures (Senghaas, 1991).

Secondly, in contradiction to the aspect which has somewhat been attributed to Corden (1974), List prefers to recommend the protection of manufacturing products on a selective and discriminatory than a universal basis. Such judgment comes from the whole picture of assessment of his writings in the System of National Economy, rather than on specific material, which might lead to the wrong impression at first. There is a clear statement of List: “But it is not necessary that all branches of industry [our italics] be equally protected” (List, 1856: 266). List’s reference to “all branches of industry” causes misinterpretation. However, looking closer into his works clarifies his intent to mean that “all branches of industries which are chosen for protection at each point in time”. For example, it is clearly seen that he talks about some kinds of industrial products for protection, at the time that the choice of industries to produce “articles of general consumption”, at the beginning stages of industrialization (List, 1856: 388), is mentioned. Under such categories, he makes a specific mention of the industries which “require large capital...general knowledge, much dexterity and experience", and industries in which linkages are provided with others. If he referred to general protection of all industries, or even one genre of industry (e.g. consumer goods), there would be no industries specified by him. Yet, his theory is dynamic, once there is a development in these industries, afterwards others there might desire protection, or desire for others to be chosen, and there would be lower rates of protection needed. List does not refer to "other" industries, however, referring to those with forward and backward linkages to them in economic jargon these days, he insists that "W[w]hen these [chosen industries] are suitably appreciated and developed, other branches of less importance grow up round them [our italics] even with less protection" (List, 1856: 267). He even makes a clarification, excluding certain groups of industries for protection at early stages: "industries of luxury should not receive attention until in the last phase" (List, 1856: 392). In England's case, he obviously makes a reference to this country's experience in "selectivity" at each point in time, for example, in commencing with the processing of raw materials such as flax, wool, cotton, silk, cloth, and iron, which were produced domestically, and exploring deeper at the industrial structure afterwards by moving to industries such as fisheries, metals, leather, etc. (List, 1856: 112). Besides, List raises an argument that industrial inputs, both raw materials and capital goods should get an exemption from duties or should be given a low level of duties. Where the import of these items is subject to duties, he recommends a system of drawbacks, as will be seen shortly.

There is also a good explanation of List's selective protection of the industrial sector in his book, Outlines of American Political Economy in a passage cited by Henderson (1983: 148–49):

List next asked himself whether all branches of American manufacture should be protected…He replied that the "productive powers" of a new country, such as the United States, could best be stimulated by fostering only those industries "which employ a number of labourers, and consume great quantities of agricultural produce and raw materials; which can be supported by machinery and by a great internal consumption; … and which are not easy to be smuggled." List considered that the first branches of manufacture to receive tariff protection should be the woolen, cotton, iron, earthenware, and chemical industries. On the other hand luxury goods did not require any protection at this stage of the economic development of the United

States. “Those articles of comfort and luxury, if imported cheaper than we can manufacture them, get in use among all labouring classes, and act as a stimulus in exciting the productive powers of the nation.” A few years later List argued that “there is no reason for the United States to encourage silk manufactures in competition with those of France, so long as France will not compel the Americans to do in regard to silk what, compelled by English restrictions, they would not avoid to do in regard to English cottons, woolens, and iron.”

There is also List's recommendation in his book Natural System of Political Economy, that the imposition of a general tariff on a country's industries happen in extremely unusual circumstances (Henderson, 1983: 161).

Thirdly, according to the debate in section IV, protection should not only be temporary (see also List, 1856: 113), but also, the protection level should not exceed to destroy competition abroad, or it should not be too low, to prevent the industry from being exposed to the threat of foreign competition (Shafaeddin, 2000a: 79). Since the development of the industrial base of a country takes a long time (Shafaeddin, 2000b: 373, 398), the introduction of protective measures should be in moderation, and “raised by degrees in proportion as intellectual and material capital, skill in the arts and the spirit of enterprise increase in the country” (List, 1856: 266). “All excessive and premature protection is expiated by a diminution of national prosperity” (List, 1856: 78). When List makes a warning about premature protection and raising duties gradually being mandatory, he makes the implication that protection is neither the only incentive nor the only condition for industrialization. Other conditions and factors should be present and other incentives and policies are required, as mentioned earlier in this paper.

Fourthly, List makes a claim that theory cannot determine the level of protection and there will be no general rule to be drawn. These particular conditions which are concerned by the party should be considered: “everything depends on the circumstances and the relations between the less and the more advanced country” (List, 1856). Yet, some propositions are made by List on the minimum conditions for infant industry protection’s success and the duties level, and he also focuses on the point that some countries might have the key conditions for industrialization, but some other countries might not have such conditions.

As a general rule, it may be said that a country in which a branch of manufacturing cannot succeed with the aid of a protection of, from forty to sixty percent in the beginning, and sustain itself afterwards with twenty or thirty, does not possess the essential conditions for development of a manufacturing industry (List, 1856).

Among the conditions which were considered by List is a certain development level of the “forces of production” beyond the other factors' importance, which were mentioned earlier. Where these forces' development is at inadequate levels, protectionist measures “prevent the necessary stimulation of the productive forces”. The size of the market and the climate zone were other conditions. In List's point of view, it is “only the large and populous states in the moderate climate zones [our italics] were capable of development”, and that hot zone States “ought to specialize in the provision of foodstuffs and agricultural raw materials” (Senghaas, 1991: 65). The logic of List on climate is unclear, and there is past experience in Asia in which hot countries have the ability to make successful industries. As far as there being concerns about the question of size, there is a solution proposed in the discussion below.

There was no advice on sudden prohibition, however List focused on the point that there should be a determination of the scale of protection duties made beforehand in order that there might be a guarantee of "safe business" for the producers (List, 1856).

Fifthly, List insists that duties should not be imposed on raw material imports. He makes a speculation of a system of duty drawbacks which are imposed on raw materials or intermediate goods with cotton yarn as an example (List, 1856). He also states that there should be little or no duties imposed on capital goods at the beginning of industrialization when a country is still in need of industrial capacity. Yet, such duties on machinery could be imposed later on when the “country shall not be inferior in the construction of machines to the most skillful nation” (List, 1856).

Finally, List realized that “monopoly” power has the danger of arising from protection, however, he insists that, as protection should be temporary, continuation of monopoly power should be dropped at that time as well; in this sense he talks about the importance of the eventual introduction of competition. He makes an emphasis that absolute privilege should be provided “neither for the benefit of producers nor for the detriment of consumers” by leaving the protected industry in the hands of monopolists (List, 1856: 251-252). Therefore, after an initial period, the first thing that should be encouraged is domestic competition so that there will be a price reduction in the light of experience (dynamic economies of time) which combines with competition (List, 1827). List also says that “competition at home and protection against overwhelming competition from abroad have worked wonders, of which the School [classical school] is ignorant” (List, 1856: 460). He has good awareness of the costs of protection to the consumers, however, he thinks that such costs should be incurred in order to obtain the benefits of protection in the long-term in terms of higher productive capacity and lower prices. This is based on the argument that the conditions for protection of Bastable (1903) are presented. According to Bastable, the discounted social costs of protection which happens during the initial period should be over-offset by its discounted social benefits (in which there is a reflection in the lower costs of production) in the following period, for example, after removing protection. In other words, it is inadequate that the country has dynamic CA gains; the benefits which have been gained because of the achievement of dynamic advantage should outweigh the costs affected with the protection during the initial period. It should be noted that because of the problems of quantification, according to the measurements in practice, these costs and benefits are not easy. Apart from that, as maintained by List, we cannot avoid the intergeneration distributional problem.

The introduction of pressure on the protected firms is supported by List, through domestic competition, in exchange for incentives given by the protection of government, as practiced later on in Japan and East Asia (Amsden, 1989). There is support from the x-efficiency theory on the same policy towards firms a century after the publication of List’s book National System of Political Economy. Nonetheless, the condition for realization of domestic competition is the thing that makes large markets exist.

However, List’s theory does not only have a limitation regarding the need for domestic competition. He makes the argument that competition should have an application onwards through trade liberalization and eventually free trade, since protection is to be instantaneous. This is a dynamic theory and thus it is specific to each country, since it depends on the level of development and characteristics of each country at each point in time, as will be explained in the following paragraph.

2.2.4.2 Features of the Infant Industry Argument

There are a few features concerning List's argument on the infant industry that are not yet completely considered in the literature. First of all, he gives his support on any nation's temporary protection within the context of his proposal for a dynamic trade policy over time (List, 1856: 133). The developmental introduction of free trade at its lower levels would have an inter alia improvement on agriculture. At a later stage, there would be an impulse given by import restrictions to manufacture and commerce:

> After having reached the highest degree of skill, wealth and power, by a gradual return [our italics] to the principle of free trade and free competition in their own and foreign markets, they keep their agriculture from inaction, their manufactures and their merchants from indolence, and stimulate them to wholesome activity, [in order] that they maintain the supremacy which they have acquired (List, 1856: 188).

Secondly, in a commercial policy submission, List confirms that one should consider, at each point in time, the particular situation of the nation and its industry and prevailing conditions (Shafaeddin, 2000b: 392). "The measure it [political economy in matters of international commerce] advises must be appropriate to the want of our time, to special conditions of each people" (List, 1856: 63). For instance, whether a system of absolute (quantitative) prohibition of certain products or of import duties should be applied, high or moderate, there is no common rule that can be drawn (List, 1856: 386). Likewise, on the point of the selection of type of goods to be protected and on the speed of protection, or liberalization, he makes an emphasis on the importance of specific conditions of the country as well (e.g. Shafaeddin, 2000b: 389-392).

On giving support for infant industry protection to Germany, List emphasized that "if the author had been an Englishman, he would probably never have … entertained doubts of the fundamental principle of Adam Smith's theory. It was the conditions of his [List's] own country which begot in him the first doubts of the infallibility of that theory" (List, 1856: 69-70).

Thirdly, List also gives a firm warning against premature and rapid liberalization of the import system (List, 1856: 388). "Every manufacture ruined by the [premature] reduction or withdrawal of protection, and specially by a governmental measure, is a dead body so exposed as to injure every living industry of the same kind" (List, 1856: 69). In this context he talks about the bad situation which the United States faced, in which the States was led to open its ports to the manufactures of England prematurely after there was fast growth under the protection system that the country had to face (List, 1856: 62). 15 It should be emphasized, however, that List also warns countries of the damages caused by a prolonged and unnecessarily high level of protection.

Fourthly, according to List, the objective of infant industry protection should eventually be the great amount of exports of manufactured products. It should have four phases in the development of international trade and industrialization, according to List. In the early phase, the support of domestic agriculture is caused by imports of manufactured goods and the export of agricultural products. In the second phase, while there is a continuation of import of manufactured goods, the beginning of domestic production of these products is caused by the help of protection. In the third phase, home manufacturers supply the domestic market. In the final phase, there is a great dimension of exports of manufactured goods. Yet, the process is not very fast and it happens slowly, since "industrial education" is involved (List, 1856: 77).

Finally, List does not oppose international trade or prefer autocracy. He talks about the important role of international trade for progress and the country's development:

International trade, by rousing activity and energy, by the new needs it creates, by the propagation among nations of new ideas and discoveries, and by the diffusion of power, is one of the mightiest instruments of civilization, and one of the most powerful agencies in promoting national prosperity (List, 1856: 70-71).

In this sense, there is a comparison of List's ideas on the importance of trade for development with such ideas as Mill's (1948). Nonetheless, the tool which can distinguish List's ideas is that he emphasizes the sole instrument of development as trade, which is not yet the culmination. Progress, development and independence are the final goals. It is in this aspect that he is referring to in this following example regarding the domestic supply of machinery needed during a war (List, 1856: 392). Hence, his proposal for protection has one of the reasons, which is strategic consideration:

To preserve, to develop, and to improve itself as a nation is consequently, at present, and ever must be, the principal object of a nation's effort (List, 1856: 70).

Likewise, List's point of view on restrictions is as a means in order to create development, independence and ultimately liberty, i.e. free trade. "Restrictions are but means … and liberty in its proper sense is the end" (List, 1856: 64). Yet, he makes the emphasis that "liberty should not be reached without carrying human welfare with it" (List, 1856: xi). "The system of import duties is … a natural consequence of the tendency of nations to seek for guarantees of their existence and prosperity, and to establish and increase their weight in scale of national influence" List, 1856: 73). List says that finally progress and development bring universal association, insofar as nations have achieved the same degree of culture and power (List, 1856: 71). In the case that some nations have lower stages of development than others, universal association cannot have an achievement by free trade if it is not preceded by protection from countries at early stages of industrialization. In fact, there is a statement by Professor Schumpeter that: "List's argument about protection issues into free-trade argument: if this is not obvious, we can convince ourselves of it by noticing the fact that J.S. Mill accepted the infant industry theory, evidently realizing that it ran within the free-trade logic" (Schumpeter, 1952: 505).

2.2.5 Market Size

List had the awareness in his restriction of the argument concerning infant industry in its ability to apply to small countries towards their small scale markets. Nonetheless, he still had the speculation that, even in the case of small countries, it was vital to develop the manufacturing sector since the inevitability to absorb of surplus labor in agriculture by that sector would prevent starvation of the expanding population (Yaffey, 1998). Actually, List attributed Ireland's great shortage of food, which was mainly caused by the lack of industrialization and overpopulation, on small holdings in the country (Yaffey, 1998). As he stated:

A large population and an extensive territory endowed with manifold national resources, are essential requirements of the normal nationality … A nation restricted in the number of its population and territory, especially if it has a separate language, can only possess a crippled literature, crippled institutions for promoting art and science. A small state can never bring to complete perfection within its territory the various branches of production. In it all protection becomes mere private monopoly. (List quoted in Yaffey, 1998: 98)

However, it is unnecessary to think that the development of manufacturing industries, through the protection of infant industry, is ceased by their smallness. There were many solutions proposed by List that a country could use to solve such size problems through being in alliance with other countries whether small or large. At this point, he raised an argument in favor of Germany in the German Zollverein, which was once a custom union of German-speaking cities. Talking about countries such as Belgium, Denmark, Holland and Hungary, he presented "the union of the interest of various states by means of free convention" (Yaffey, 1998: 99). That topic is called regional integration, or custom unions, in modern language. Although regional integration has failed in the case of Africa, among the factors that are the causes of this failure are transport infrastructure shortages to make connections among other countries, individual and collective industrial policy, and the division of labor among the member countries so that a variety of products can be shared between their markets. Only in cases where there is no ability to solve the size problem through alliances with other countries, "…did List prescribe that a country should give up hope of pursuing its NS (national system) and hope for the best in the world market" (Yaffey, 1998: 98).

It should be noted that the question of size, as a factor of limitation, should not have any exaggeration concerning this matter. It is important to have large size for industries involving vital economies of scale. Nonetheless, existing medium- or small-sized industries can still have efficiency. Besides, within this category are existing industries whose products are required by the public at large, such as food-processing, clothing, etc. Accordingly, if the market is not so petite, there might be the possibility of development of some industries through infant industry protection. A small country with experience, such as Switzerland, is an indication that industrialization in some lines of production, through initial protection, has feasibility.

2.2.6 Theory and History

List was honored that his theory's main source was based on history and experience, rather than on unrealistic assumptions. He makes the statement that "political economy in matters of international commerce must draw its lessons from experience" (List, 1856: 63). According to List, there is no reason for complete freedom of international trade in all circumstances, this is supported by the classical school and history (List, 1856: 394). In fact, his book starts with a review of the history of these following states; commercial policies in Italy, the Hanseatic cities, Flanders and Holland, Spain and Portugal, France, Germany, Russia, the United States and, in particular, England (Book I). "Great Britain borrowed from all the countries of the continent their special arts and gave them a home under the shelter of her protective system" (List, 1856: 113). "Theorists have since [early 1700] pretended that England has become rich and powerful, not on account, but in spite of, her commercial [protective] policy" (List, 1856: 114). Moreover, he stated that an attempt to make a security of foreign markets of England happened after the development of its industries by using the Navigation Act, for the support of free trade pursuant by other countries, and to dampen its industrial products in foreign markets (List, 1856: 14-17).

List proposed an argument that it is mandatory for the political economy to rest upon philosophy, policy and history, however, he focuses on the particular role of history:

History, for its part, assists in no equivocal manner in providing exigencies of future, by teaching how, in every epoch, progress, material and intellectual, has kept pace with the extent of political association and commercial relations. … [It shows] how a commerce entirely free with nations more advanced has been of advantage to those still in the first phase of their development; also how those which had made some progress have been able by proper regulations in their foreign trade, to make still greater progress and to overtake those which had preceded them. History thus shows the way of reconciling the respective exigencies of philosophy and Government.

However, in practice and theory, such as actually exhibited, take their sides, the former only for specific exigencies of nationality, the latter for the complete requirements of cosmopolitism (List, 1856: 63-64).

The experience of the United States during the time he lived there was the most influential history lesson to List. “The best book on Political Economy in that country [the United States] is the volume of life”. There he witnessed the gradual development and industrialization of the country with regulation of foreign trade and government intervention in the economy. “That book I have read earnestly and assiduously, and lessons drawn [drawing lessons] from it I have tried to compare and arrange [sic] with the results of my previous studies, experience, and reflections” (List, 1856: xi-xii).

2.2.7 Theory Conclusion

The purpose of this section is to make a clarification of the contents of the infant industry argument presented by List, since there is some confusion about his theory and the common infant industry argument, in the literature it indicates that there is a dynamic scale in List’s theory, with dimensions of time and geography. In these present days, it is important to have infant industry protection for countries at their early stages of industrialization if some countries “have outdistanced others in manufactures”. His point of departure from the classical theory of international trade is that there is a distinction made by him between “universal association” and national interests when all countries are at different levels of development. Yet, he is neither against international trade nor against export expansion. In fact, he focuses on the vitality of trade and regards free trade as an absolute objective of all nations; yet, he sees temporary protection as an instrument to achieve development, massive export expansion and ultimately free trade. Trade policy is not the only means of industrial and development policy to him; in fact, there is a requirement for a host of other measures. When there is an application of protection, it should be temporary, selective and targeted, and not excessive, in contrast to the widely held belief that across-the-board protection of the whole manufacturing sector, which was not recommended by List. In order to fight against monopoly power development, there should eventually be the introduction of domestic competition, preceded by planned, gradual and targeted trade liberalization. List was concerned about size limitations to protect infant industries, but he raised the argument that in most cases obstruction could be solved through a variety of types of alliances with other countries, large or small, including regional integration.

Is List's infant industry argument still valid?

The fact that there is a failure of the "traditional import substitution strategy" in many developing countries has sometimes been accounted, in the literature, to defects concerning the argument of the infant industry. Besides, there are some arguments that WTO rules block pursuance of trade policies in line with the infant industry argument. According to the first point, it should be noted that "across-the board" import substitution, which has emerged in many developing countries, has been a reaction to import restrictions because of balance-of-payment problems, not because of clear industrial and trade policies. There was a presentation from Reinert (2000) that the nearest mode of protection to infant industry protection is that of East-Asia, labeled "good protection", as opposed to "bad protection" applied in Latin America. Prebisch, the founder of the "import substitution strategy", himself, gave a warning against "bad protection" (Shafaeddin, 2000a).

There should be a focus on two points regarding the second argument. First of all, there is still some space for maneuvering within the framework of WTO rules for selective intervention (Amsden, 2000). Secondly, such rules' existence is not a reason to argue against infant industry protection. These rules need a revision in order to achieve a fair trading system, in which there should be more analysis, taking into account the different situations of countries at various stages of development.

Finally, sometimes there is a recommendation of universal free trade on the grounds of easiness, as it is hard to implement a dynamic rule and be selective at trade policy, particularly since this happens during the low periods of the bureaucracy in many developing countries in the beginning stages of development. Yet, "easiness" cannot take the place of "soundness" in opting for trade and industrial policy. Nevertheless, trade policy is not a panacea, this should be the main point, and there should not be any exaggeration in its role. Trade policy is merely a part of industrial and general development policy. Successful trade policy forces a host of other socio-economic factors and conditions outlined by List, including the development of agriculture, infrastructure, institutional and organizational set-up, science know-how, research and development, entrepreneurship, predictable and efficient domestic policies, political and cultural factors, morality, a sense of national unity, and above all "liberty".

It should be noted that active, targeted, industrial policy is still advantageous in various forms in most developed countries, including the United States, the most advanced industrial economy (Reinert, 2000).

It can be argued that while Washington's institutions stepped up their ideological crusade against government intervention in the Second and Third Worlds, domestically, the US actually increased government assistance to business. The Small Business Administration financed 26,000 companies in 1992; in 1997 the number of companies receiving subsidized finance from this federal office alone had grown to 58,000. Washington institutions have managed the de-industrialization of the Second and Third Worlds during the 1990's – under the theory that "all economic activities are alike".

Within the US there is a plethora of theories that "all economic activities are alike" – within the US there is also a plethora of government support programs specifically targeting manufacturing. Manufacturing industries with investments below 40 million dollars are eligible to receive loans at about 50 per cent of prime rate, subsidized by the federal government. In July 1999 there were 821 different income tax credit schemes promoting investments in the real economy operating in the 50 states of the US (Reinert, 2000: 18–19).

Joseph Stiglitz, former Chief Policy Adviser in President Clinton's Administration, stated that: "I found myself in the uncomfortable position of an American saying 'do as we say, not as we do'" (Reinert, 2000: 16).

More recently, a complaint from ECE has been taken into consideration by the WTO that widespread tax relief was being given by the government of the United States to US companies on their income from exports, and ruled that that act was against WTO trade rules. Although there is no availability of official figures, there is an estimation that in fiscal year 1999 there was $3.5 billion worth of tax reduction given to between 3,000 and 7,000 companies in the United States on about $250 billion worth of exports (Shafaeddin, 2000b: 7). It is worth mentioning two features of this kind of subsidy assistance to these companies. One is that the beneficiary companies are not only small or new companies, and the subsidy assistance provided is not only for companies with new products. There is a wide range of these subsidies and the companies they cover. The subsidies cover such multinational companies as General Electric, Microsoft, Ford, Exxon/Mobile, Motorola, Boeing, Procter and Gamble, and Monsanto, and such mature products as petroleum products, cars and basic consumer goods (Shafaeddin, 2000b: 7).

A subsidy assistance system specially designed for exports is another feature. Any US company whose exports have at least 50 per cent US content can set up a Foreign Sale Corporation [FSC], a shell company established in a tax haven, … letter box companies will offer to manage an FSC for $2,000 a year…The US company “sells” its exports to the FSC which then “exports” them. However, no physical transaction takes place. Instead, the FSC subcontracts the physical handling of exports and other economic activities back to the parent company … Part of the FSC’s income – as much as 65 per cent – is exempted from US tax. The remainder of the income is taxed by the tax haven (minimally). Dividends paid by the FSC to the parent company are also not taxed. Using an FSC can reduce a company’s tax bill by between 15 and 30 per cent (Shafaeddin, 2000b).

Apart from the fact that the subsidy assistance is provided by the government to its “mature” companies for their “mature” products, it can be implied from this specially designed subsidy system that the government of the United States, who owns the most important currency among convertible international currencies, focuses on export earnings, across the board, as a comparison to earnings derived from domestic sales. A shortage of foreign exchange affects developing countries, hence, the relative importance of foreign exchange earnings, in comparison to the earnings in domestic countries, is more significant to them than developed countries such as the United States. Therefore, it is unsurprising that many developing countries question why a highly industrialized country justifies assistance provided to its “mature” industries, but developing countries are expected to forego such assistance to their infant industries.

There is no restriction of provision of assistance to producers and exporters to the United States. An example of the mentioned topic is the enormous amount of subsidies provided to producers in ECE countries under common agricultural policies (Shafaeddin, 2000a).

In brief, the argument of the infant industry which was developed by List within the context of its general theory of "productive power" (development) is still valid with proper application. However, it should be noted that List emphasized that, after a point in time, trade should be liberalized selectively and gradually, with its objective being the ultimate goal of free trade when all nations are at the same level of development, which can be summarized by the following:

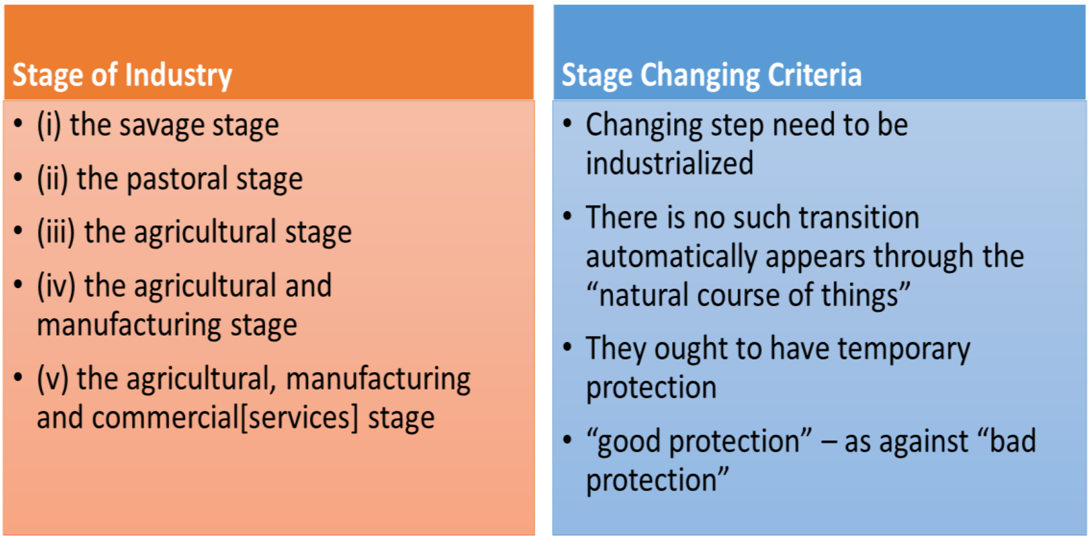

Figure 2.1 List Theory Summarized

2.2.8 History of Industrial Policy

The theory and practice of industrial policy have gone through three main waves, each of them characterized by extreme variety, both within and across countries (especially according to their stage of industrial development), although common/recurring themes do exist.

After the Second World War, during the so called 'golden age of capitalism', industrial policy was adopted as one of the main tools for countries' indicative planning. It took many forms, from import substitution to export promotion, from infant industry protection to state ownership of enterprises in strategic sectors or national champions' development (Cimoli et al., 2009). This 'picking winners' approach was grounded in the idea that market failures are pervasive (especially in developing economies) and that governments have to take a role in countries' structural transformation.

During the so called 'Washington Consensus era', the idea that government failures might be even worse than market failures and structural coordination problems became dominant. As a result of this radical shift in the academic debate, the industrial policy discourse changed and industrial policy increasingly became a banned word. The reality is different however, in even more neoliberal countries where mainstream economics was dominant, government interventions were reduced only to a certain extent, or simply reshaped or scaled down.

The third turning point can be identified in the influential East Asian Miracle Report (World Bank, 1993) and the acknowledgment that the fastest catching-up economies, like Japan, Taiwan, South Korea, Singapore and Hong-Kong, were adopting a variety of industrial, trade and technology policies based on 'wrong' economic theories and rationales (Chang, 1994; Stiglitz, 1996).

The new modern debate on industrial policy started a long run towards a slow process of increasing 'normalization' (Rodrik, 2007), in which the history of industrial policy could be summarized with the following:

Main features	First wave 40s to mid-70s	Second wave Mid-70s to 90s	Third wave 2000s	Emerging themes 2010s
Development as/through	Industrialisation and structural change	Stabilisation, liberalisation, and poverty reduction	Global knowledge economy	Learning economy and Innovation in production
Policy target/s	Creating markets Structural change and diversification	Specialisation and modernisation (Market-led)	Innovation Increasing productivity Diversification and specialisation	Industrial ecosystem development
Policy framework	Import Substitution/Export oriented Selective industrial policies Sectors development Gradual opening to competition	The best industrial policy is "no industrial policy". Horizontal policies Exposure to competition FDI attraction	Targeted strategies in open economies Increasing national competitiveness Enabling business environment Strategic management of FDI	Smart (new selective) policies Value creation in glocal systems Value capture in production networks Competences/capabilities
Policy model	Top-down Centralised system National agencies/councils Developmental institutions	Minimal state (Weakening and/or dismantling of national institutions)	Multi-layered (Top-down/Bottom-up) Public-private identification of priorities. Science institutions	Multi-layered Institutions for public-private coordination Multi-level implementation Regional/cities clusters development
Policy package/s	Capital movement management Production-oriented finance National champions development Infant industry protection Hard infrastructure development Public funded research Compensation policies for lagging areas.	Innovation policies ICT diffusion Competitiveness programmes Human capital SMEs support (regional level)	Credits and grants for production development and innovation Public procurement Promotion of entrepreneurship (venture capital, angel investors and support to business capabilities) Hard and soft infrastructure Technical competences and skills development	Technology infrastructure & intermediate R&D&M institutions Manufacturing research Scaling up Strategic public procurement General purpose technologies Key enabling technologies Risk reduction Manufacturability challenges
Policy rationales	Market failures Structural coordination	Government failures > Market failures	Market failures System failures	Learning and System failures
Policy space	High room of manoeuvre and high political legitimacy of national development strategies	Reduction in the room of manoeuvre (WTO, TRIPS commitments, etc.) and low political legitimacy of national development strategies.	Moderate room of manoeuvre in traditional fields; regain of legitimacy of national development strategies	High room of manoeuvre in emerging fields

Figure 2.2 History of Industry Policy Summarized

Source: Rodrik, 2007.

The debate on industrial policy has traditionally focused on two main sets of rationales justifying government intervention, namely market failures determined by information asymmetries, externalities and public goods, and structural coordination problems related to demand and technological complementarities, resource scarcity and production factor specificity.

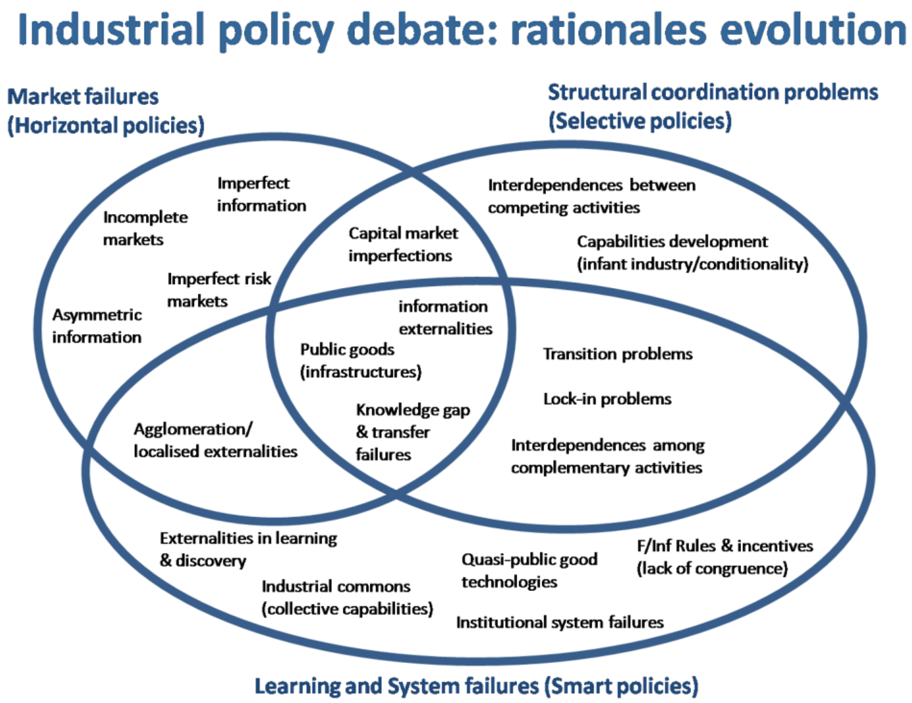

Figure 2.3 Rationale for Industry Policy Debate
Source: Rodrik, 2007.

Political feasibility can measure the policy solution problem and how well it will be accepted by a set of decision makers and the general public. In order to be implemented, policy must be politically acceptable, or feasible. A policy alternative which gains little support or much opposition might face problems if implemented. Alternatively, a politically feasible alternative is one that has the greatest probability of "receiving sufficient political push and support to be implemented".

Steps in a political feasibility analysis

Every policy has unique properties and characteristics. The policy feasibility steps, as identified by Meltsner (1972), are outlined in the following three steps.

1) Identify the Policy's Environment

For this research the policy environment will identify conjunctionally with already used elements of the policy regarding Thailand’s steel industry. The matter regarding the area of public policy was already mentioned in the former part regarding industrial policy.

2) Assemble Information and Organize it

Political scenarios surrounding the proposed policy will be analyzed in this step, which will be analyzing the key players for the proposed policy and the issue of decision making. In this research, Porter's Five Forces will be used to analyze the factors that affect the steel industry, including the already proposed policy itself.

3) Analyze the Data

Once the data has been collected it will be analyzed and a proposal made for the most suitable policy regarding the information gathered.

For the case of the Association, the same procedure will be applied but in terms of action of the Trade Association.

2.3 Contemporary Literature Regarding the Steel Industry

In this part, contemporary issues regarding the World Steel Association and government action in other countries will be updated in order to reach current issues regarding the steel industry.

2.3.1 The Stage of the Global Steel Market

In this part the updated situation of important regional developments will be summarized according to the World Steel Association (2018).

1) Asia

In China, since 2017 there has been a demand of steel use in the real estate and infrastructure sectors, this has prevented any decrease in steel demand, but in the near future a decrease in investment and environmental issues could affect a deceleration on China's steel demand.

In India, demand in steel use is gradually increasing as India's economy is recovering.

In ASEAN countries, since there has been strong growth since 2016, steel demand in ASEAN is predicted to continue growing in 2018–2019, with Vietnam and the Philippines showing the highest growth.

Although the Japanese economy, together with the demand in steel, has been stable, a lack of labor in construction work and a predicted 2019 consumption tax could have an effect on the use of steel in Japan.

Despite the South Korean government's effort to enhance consumption by using income enhancement policies, the issue of high household debt still affects the consumption rate, together with regulations on the real estate sector concerning a rise in housing prices, this limits steel demand in South Korea.

2) EU

Demand in the EU for steel is positive along with GDP growth, as is a good mechanical engineering industry sector and a rise in the construction sector, although the automobile sector seems to have decelerated.

3) NAFTA

In the United States, the growth in steel demand shall face deceleration in 2018 and 2019, however, its demand could be enhanced if there is an announcement to start infrastructure projects.

Since there have been political issues and a decrease in government spending, steel demand in Mexico might decrease.

4) South America

Although there has been an economic recovery in Latin American countries (with the exception of Venezuela), the political uncertainties in Brazil, Mexico and Colombia could affect steel demand in this region.

Brazil's economy has been slowly recovering since 2017, the construction sector, on the other hand, has not been recovering. Steel demand shall grow moderately, however it shall recover steadily in 2018–2019.

5) CIS (Russian Commonwealth) and Other Europe

In CIS, a steady recovery continues showing up gradually in Russia, since there has been little concern over sanctions, however, the sanctions will still affect growth.

There shall be stability in steel demand growth in Turkey since there has been investment enhancement by the government and health in the auto sector.

6) MENA (Middle East and Northern Africa)

Steel demand in GCC shall recover since there has been a rebound in construction projects.

Steel demand in North Africa, especially Egypt, shall improve because of further projects in housing and infrastructure.

To sum up, demand in global steel use will grow moderately without high risks because of a strong global economy, however, this growth is in expectation of lower stages in GDP growth.

According to “The current capacity shake–up in steel and how the industry is adapting”, by Avetik Chalabyan, Lapo Mori and Steven Vercammen in Metal and Mining Practice, January 2018, their analyses concerning the steel industry is that the industry will be in an undulating stage since the rate of growth is not on the rise, although steel demand is gradually going up. Hence, many players in the market are likely to reserve a level playing field stage in the market. Leaders in the market will move to another level by manufacturing sophisticated products and competing with each other on their efficiency of operation. However, not all players can compete in such levels since there must be a standard by which players can use advanced technology in steel production. This analysis expects that in the future, players who can adapt themselves to the era of new technologies will gain business opportunities, and others that cannot adopt the use of new technologies in the digital era won’t. This analysis suggests that new opportunities will open up for players with efficient operations that can adapt in this disruptive era.

2.3.2 Trade Association Action

According to a press release from Alacero (Latin American Steel Association) issued on 13rd July 2015, they commented in an Open Letter on the issue of swift action from governments in eight national and regional associations to vouch for a level playing field with China in the steel market. The Open Letter had been co–signed by associations and clubs of Latin American steel entrepreneurs, which included the Latin American Steel Association (Alecero), the Argentine Chamber of Steel, the Brazil Steel Institute, Alacero Chile, Fedemetal Chamber and the Colombian Committee of Society of Industries (Metal – Mechanic Committee of

Peru). The Open Letter underlined that China's subsidized steel had caused damage to the careers of Latin Americans, together with its domestic entrepreneurs, and that subsidized steel was considered to be a substitute for domestic steel products.

By focusing on the Latin American steel industry's need for fair competition on a level playing field, the Open Letter also made the claim that their governments should handle the issue promptly with a comprehensive approach, the request in various aspects will be explained in the following paragraph.

The first aspect is customs, Latin American steel entrepreneurs made a request that effective inspections must be carried out in order to prevent illegal steel product importation and avoidance of antidumping duties. Quality standards were the second request, that domestic products and imported products must be regulated under the same standards and requirements. Unfair trade was the third request, that the WTO's instruments must be applied in due time and with effectiveness. Commercial diplomacy was the fourth request, as the governments need to force China to play within the market conditions. The WTO was the fifth request, that according to China's actions it had caused an overcapacity in steel, China should not be acknowledged as free enterprise, its action has shown that the economy of China is still centrally planned. The Open Letter also asked for vision, political will and apparent regulation as an assurance for the industry in order to create quality jobs and assure the Latin American region's progress economically.

Looking back to 16th June 2015, there was another joint industry statement. In the Organization for Economic Cooperation and Development's (OECD) meeting, which took place in May 2015 in Paris, France, global steel entrepreneurs agreed that there had been a rise in exportation from the Chinese steel industry, which is owned, supported and controlled by the State. The report on the circumstances, which were presented at that meeting, contained similarities, whether from Asia, the Americas or European steel industry associations, that the damage from a skyrocketing rise of unfair importation of steel products meant the situation had worsened due to an overcapacity of steel products, and which had occurred globally. China was the major cause of this issue, with its huge and continuously rising steel product overcapacity, causing an upset in stability of steel markets globally, together with trade flows, especially in an era of decelerated growth.

There were also comments made by eight steel trade associations, consisting of the United States, Canada, Mexico, Latin America and Europe. The comments were on China's Steel Adjustment Policy, the eight steel trade associations saw the use of China's policy as a reflection of its industry status, which is in form of top–down, and dominated by the State, which affects the industry.

The OECD Steel Committee also saw this situation as an urgent concern, according to the closing statement made by Chairman of Steel Committee, Risaburo Nezu. Concerns regarding structural issues should be taken into consideration abruptly in this era in which growth on demand increases slowly while exports continuously escalate. The closing statement also added that failing to take market distortions seriously or stop them was causing enterprises which are subsidized and supported by states to forereach those competent and low stage support enterprises, causing the loss of those low government support companies (Nezu, 2015).

The associations that signed the statement opined that in this circumstance, action must be taken immediately and effectively because of its urgency. The said associations firmly stated that they needed their governments to take the issue into consideration and they should make an endeavor to avoid confrontation by using trade diplomacy and regulations to fight government policies that cause overcapacity, which was the source of the steel crisis, and create a level playing field in the steel industry market.

The challenge that governments have faced is the insistence of China that WTO members should treat China as a market economy. The decision of each WTO member greatly affects the injured parties from China's dumping on their imports, and whether those injured parties would be able to make a recovery from such damages. China's steel sector vividly shows that the test on the market economy has not been tested on China. Overcapacity with approximately 425 million metric tons, together with ineffective policy to help reduce such overcapacity, has shown that a top–down and State driven economy still operates in China.

Those associations expressed their concern that overcapacity caused by China was a serious issue that must be considered urgently. The said associations will continue collaborating with each other, to make their own effort individually, in order to address this issue to their governments before making the premature recognition that China is a market economy.

2.3.3 Government Action

According to "UK steel industry: statistics and policy" by Chris Rhodes, in 2015, the steel industry in the UK was in a crisis, as major plants located in Redcar, Scumthorpe, Scotland and South Wales were closed or were in the stage of capacity decreases. As a consequence, the UK government provided measures in order to enhance the industry and reduce the affects from plant closures. The situation of the UK steel industry in 2016 was that the steel industry contained 600 businesses related to the industry, with an employment numbers of 32,000 people, or 0.1 percent of the UK overall employment rate. Looking at the international aspect in 2016, 8 million tons of steel were produced in the UK, while in China 808 million tons of steel were produced. In 2015, the steel manufacturing rate in the EU was at 166 million tons, in which the UK was the fifth ranked steel producer in the EU, and Germany was the first, Italy, France and Spain followed, respectively. Recently, there has been a fall in international steel demand, together with the excessiveness of international steel products, which have worsened the situation of a price drop. Besides, expenses of steel manufacturing in the UK are higher than those produced in some countries.

"UK steel industry: statistics and policy" by Chris Rhodes, also mentioned the UK 2015–2016 steel crisis. There was an announcement from Sahaviriya Steel Industries (SSI) in September 2015 that the company would halt its principle steel plant in Redcar on Teesside located in the northeast of England. The announcement, together with other key steel manufacturers like Tata Steel and Caparo industries, caused UK production capacity to decrease, at the expense of approximately 7,000 jobs lost in the crisis.

Another announcement was made by Tata Steel in March 2016, that it was considering selling its steel plant in the UK. Its long products division had been put on sale, that division holds 4,400 jobs. The said sale was temporarily halted with an attempt to make a merger of its operations, which has 9,000 people working along with other steel manufacturers. However, Tata announced that the sale of a specialty steel business with 2,000 jobs, ThyssenKrupp, a German manufacturer, had made an announcement in September 2017 about its take-over of Tata's European steel operations, together with Port Talbot steel works.

As written in "A bright future for UK steel, a strategy for innovation and leadership through up–cycling and integration" by Julian M. Allwood, University of Cambridge, the steel industry at the global level holds high steelmaking capacity from iron ore. Despite a decline in the economy, steel demand on a global level should continue expanding. But because of higher labor costs than those in China, European steel manufacturers are in tough shape.

Since the halt of plants in the UK from Tata Steel, duty shifts to UK taxpayers who have to purchase a subsidy, or those taxpayers have to bear the loss of jobs and the effects of plants closures. "A bright future for UK steel, a strategy for innovation and leadership through up–cycling and integration" by Julian M. Allwood presents more options for this situation, like a reformation of the UK steel industry by using 2 innovative approaches. The first one is, in the next 30 years, steel supply on a global level will be at a threefold increased level or higher. However, the recycling process is not innovative enough. Currently, in general, used steel has been downgraded to the steel products that have the lowest value. The strong point of UK in materials innovation should be used to upgrade used steel to become high technology materials. The second point is that major steel manufacturers produce similar intermediate products, which results in low margins, for instance, the manufacture of plates, bars and coils. The ones that add value to steel by conversion of stock products to adjusted products cater to the needs of end users. This report suggests that an integration of business models should be applied in order to link steel products to the skills that the UK is expert in, which include architecture, construction, aerospace, automotive, et cetera, for the sake of adding new value and innovation.

As stated in "Overcapacity in Steel, China's Role in a Global Problem" by Lukas Brun, the situation of the steel industry sector worldwide is one of an overcapacity state, this situation was led by the expansion of China starting in 2000 with a capacity rate of supply of over 2,300 million metric tons, while the demand is only 1,500 million metric tons. This situation has caused low profits with cheap steel flooding into global markets with bad effects to companies, workers and the trading system on a global level. The countries responding to such overcapacity have been making commitments with China that it should decrease overcapacity and cease its action of subsidies. Despite the commitments made, the situation of overcapacity continues. Apparently, China's steel sector still has overcapacity, which is shown in its documents, in the meantime, 532 million metric tons of steel capacity has increased in China, the said amount is seven times the 2015 United States' steel production rate.

During 1970s and 1980s, there was overcapacity in the steel sector worldwide, which European nations solved by deciding to do a difficult thing: subsidy reduction, which led to unemployment, and an attempt to enhance competition in the market. This decision has a downside in that it results in profit loss, job loss and a rise in belligerence in relations concerning trading among nations. Conflicts in trading leads to trade cases, when even with winning the case, high litigation costs have to be paid, resulting in profit reduction.

The "State capitalism" model in China is the root of the overcapacity issue in the steel sector and is still happening currently. In order to acknowledge the issue of overcapacity, a reformation to decrease the form of this stage–led system maintains that China must play by market economy principles, which is the system that is generally used by other global players in the steel sector.

According to "China's Steel Sector Supply Reform", the long–discussed issue on the Chinese steel industry is capacity. From 1990–2016, the major implementation of trade measures and policies were on China, with more than 320 policies and measures. Almost half of such policies and measures were about capacity control. Yet, these attempts to solve the capacity problem on China have not been successful. In February 2017 there was an effort by the Chinese government on steel industry restructuring, and by the beginning of 2017 there was an announcement that steel capacity in China had been successfully deducted by 65 million tons in 2016, with further reductions planned in 2017 at the rate of 50 million tons. There have been mergers and acquisitions in China's steel industry, the merger of Baoshan Iron & Steel and Wuhan Iron & Steel, for example. Such mergers and acquisitions have reduced the capacity of China's steel industry, which was predicted as competitiveness enhancement. There was further major reformation in China's steel industry as its government made a decision to close all steel manufacturing sites based on IFFs (intermediate frequency furnaces) by 30th June 2017, hence, shutting down those IFFs base plants should result in an effective deduction of China's steel capacity, the IFFs' capacity rate in China is about 10% of China's overall steel capacity, with 3.7 percent of China's total steel products.

Regarding of the reduction of China's steel capacity in the amount of 65 million tons in 2016, together with the target to decrease 50 million tons of steel production and the shutting down of IFFs in 2017, the steel capacity worldwide would reduce to 1,021 billion tons in 2017. China's steel overcapacity is predicted to gradually decrease from its 2015 peak with the implementation of China's restructuring plan, and the global steel overcapacity is also predicted to decline gradually.

Despite the positive factors mentioned above, oversupply is still looming over the global steel sector since it is questionable whether the capacity cut of China is real and whether it will really contribute to a steel manufacturing reduction. Moreover, despite China's acts of aggressive steel supply reformation, the production of steel supply in China rose in 2016, conflicting with the achievements claimed by the Chinese government that it was able to reduce 650 million tons of capacity.

Although government is key in the steel industry, its role should be limited to only in the early steps of restructuring, since market mechanisms are the best tools to select who is to survive and who should be out of the market. Moreover, mergers and acquisitions are the better mechanism of competitiveness enhancement, rather than government's decisions.

As written in "Unsustainable: Government Intervention and Overcapacity in the Global Steel Industry", the global steel industry is facing overcapacity at rates like they have never confronted before. This excessive overcapacity has continued to rise, which has caused grave injury to the United States steel industry, as in 2015 when 12,000 workers were laid off. Hence, action must be taken immediately in order to decrease capacity, especially in China. During the 1997–2001 import crisis, worldwide steel overcapacity contributed to cheap imported steel products overflowing into the United States. The cause of overcapacity was mainly because of high government intervention and ownership in steel businesses, this happens mainly in China which is at the root of steel overcapacity globally. China's government policies and plans to reduce capacity are just a subsidy of its steel industry in disguise. The Chinese government's actions have caused a further rise of capacity and production in its steel industry sector.

This excessive overcapacity problem must be swiftly solved, however there is a question of where that restructuring should take place and whether the states, mainly China, will be responsible for their actions? Will the market–oriented steel producers all over the world have to face such problems and be forced out of the business, shutting down their plants and going for further layoffs?

In order to confront and handle the overcapacity crisis effectively, countries that are steel producers need to cut non–market–based factors that cause overcapacity. In addition, the Chinese government needs to take the overcapacity caused by them seriously and sincerely. If their action isn't taken, unfair trade practices shall persist and it will be a threat to market–oriented steel manufacturers all over the world.

2.4 Background of Thailand's Steel Industry

2.4.1 General Overview

The steel industry is used by various downstream sectors, i.e., construction, automobiles and auto parts, electrical appliances, machinery and packaging sectors. As a consequence, development of the iron and steel industry to meet lower production costs and higher quality products will enhance production efficiency for the steel consuming sector as well.

These days, iron and steel consumption has increased gradually and in tandem with the continuous growth of many downstream sectors. The growth in steel consumption has been pushed up to reach higher rates than the annual GDP growth rate. Despite such strong growth of both domestic and global steel consumption, domestic steel producers have still encountered under-utilization problems. According to statistical data, Thailand still has to import lots of steel products from other countries, most of which are high quality grade or special grade products which are not yet produced domestically.

In fact, Thai steel producers are facing many difficulties, which can be classified into several issues.

1) Pressure from raw material shortage, especially high quality products.

2) Pressure from steel consuming sectors, who always want high quality grade products and special grade products.

3) Pressure of price competitiveness among domestic steel producers, especially long products for the construction sector.

4) Pressure from the international steel market, including the impact of low-cost upstream production in CIS (Commonwealth of Independent States), dumping pressure from structural overcapacity in Japan, and the threat from uncertainties in the Chinese steel market.

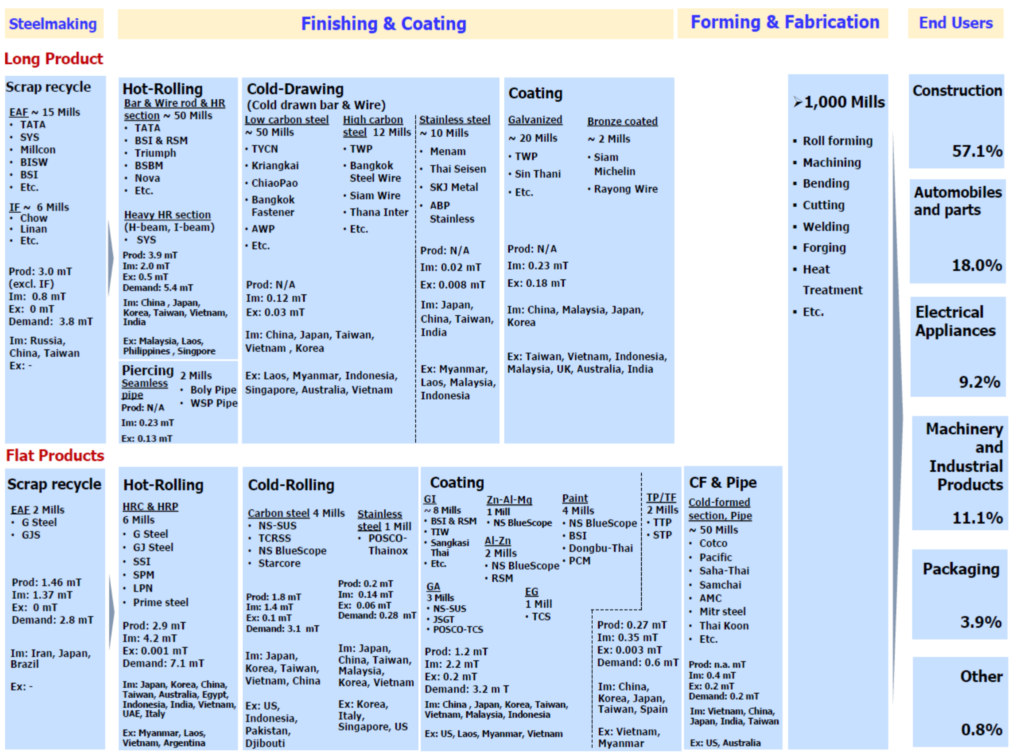

Figure 2.4 Thai Steel Industry Overview

Source: ISIT, 2017.

It can be seen that the structure of Thailand's Steel industry still lacks iron (Iron and steel institute of Thailand), this might cause problems in terms of raw materials. In the case of Steel making, Scrap recycling is presented. For the End users, Construction makes for 57.1% followed by Automobiles at 18%, Machinery and Industrial products account for 9.2%, Electrical Appliances 11.1%, Packaging for 3.9%, and lastly, others 0.8%.

Jan-Dec 17			Production	Import	%y-o-y change	Export	%y-o-y change	Consumption	%y-o-y change
Total Apparent Finished Steel Consumption			**6,865,628**	**11,326,134**	**-10.2%**	**1,553,247**	**20.0%**	**16,638,515**	**-13.7%**
Long Product Finished Steel Consumption			**3,940,866**	**2,614,416**	**-16.3%**	**917,682**	**12.4%**	**5,637,600**	**-25.7%**
Long Product	**Bar**	**Carbon steel**	3,191,366	233,625	0.3%	137,917	3.4%	3,356,796	-34.4%
		Stainless steel		3,897	-59.0%	1,277	-84.9%		
		Alloy steel		396,344	-16.8%	54,139	-3.3%		
	HR section	**Carbon steel**		76,006	-40.7%	353,492	0.9%		
		Stainless steel		2,102	-51.5%	47	-98.3%		
		Alloy steel		328	-99.5%	-	-100.0%		
	Wire rod	**Carbon steel**	749,500	334,884	11.7%	14,320	194.1%	2,033,613	-8.1%
		Stainless steel		61,961	15.1%	80	156.6%		
		Alloy steel		902,676	-32.5%	1,008	420.9%		
	Cold-drawn bar			144,070	135.4%	36,693	78.9%		
	Steel wire			228,790	5.6%	186,956	-1.1%		
	Seamless pipe			229,733	-4.6%	131,753	174.3%		
Flat Product Finished Steel Consumption			**2,924,761**	**8,711,718**	**-8.2%**	**635,565**	**32.9%**	**11,000,914**	**-5.9%**
Flat Product	**HR plate**	**Carbon steel**	206,205	231,714	4.4%	878	-68.8%	649,998	-3.8%
		Stainless steel		21,406	17.7%	562	118.4%		
		Alloy steel		192,889	-27.1%	776	61.1%		
	HR sheet	**Carbon steel**	2,718,556	1,342,444	-33.9%	5,879	-48.2%	6,426,179	-7.7%
		Carbon steel P&O		1,046,530	8.3%	1,467	192.4%		
		Stainless steel		277,522	-0.7%	1,748	-22.5%		
		Alloy steel		1,051,543	-12.3%	1,322	25.0%		
	CR sheet	**Carbon steel**	1,955,528	1,050,834	27.4%	64,106	11.1%	3,334,145	13.0%
		Stainless steel		153,925	1.4%	83,380	-3.2%		
		Alloy steel		369,902	27.9%	48,558	307.2%		
	Coated	**Galv.sheet (HDG)**	860,827	1,284,485	-10.8%	166,817	149.7%	2,104,638	-7.7%
		Galv.sheet (EG)		132,111	-13.0%	5,968	-47.5%		
		Tin plate	134,820	257,566	8.6%	3,616	106.4%	388,770	1.0%
		Tin free	131,757	88,819	-13.2%	20	1.8%	220,556	-19.6%
		Other coated steel	342,943	793,446	0.3%	43,377	-3.2%	1,093,012	0.7%
	Cold-formed section			12,439	-39.1%	9,134	159.1%		
	Welded pipe			404,143	-19.0%	197,957	12.8%		

Figure 2.5 Thai Steel Industry Import, Export and Consumption

Source: ISIT, 2017.

According to the Iron and Steel Institute of Thailand, for 2017, total apparent consumption accounted for 16,638,515 tons, which consisted of 5,637,600 tons, 11,000,914 tons for Long and Flat products, with 13.7% less consumption compared to 2016.

Hence, from this information Thailand's steel industry properties can be verified by the following:

1) Thailand Steel lacks an Iron making process, which must rely on importing or recycling.

2) The demand is rising for imported rather than domestic product.

3) 50% of steel consumed is from the Construction industry, which doesn't require specific standard steel.

2.4.2 Opportunity in Thailand's Construction Market (ISIT)

According to the Iron and Steel Institute of Thailand there are several opportunities for the steel industry, as per the following table:

Table 2.1 Opportunities for Thailand's Steel Industry

Opportunity	Detail
Infrastructure development	Mass transit development
	Irrigation development
Residential and commercial building	New condominiums and housing along subway and sky train lines
	New investment from appliances and machinery sectors
Industrial factory	Factory relocation from Japan
AEC	New Market

Referring to opportunities by the AEC, the characteristics of the AEC can be presented by the following:

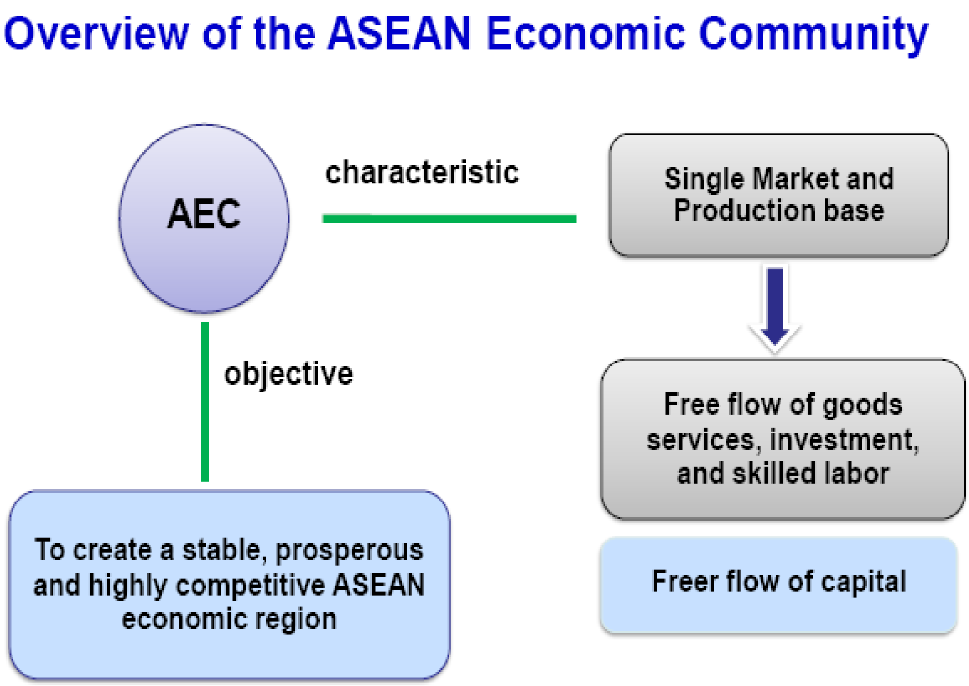

Figure 2.6 AEC Characteristics

Source: ISIT, 2017.

Characteristics of ASEAN steel industry

Fragmented production facilities

Lack of iron making

Scrap base steelmaking limits capability to produce high grade steel products

Net import of semi-finished product, especially slab

Net import of long and flat products, especially high grade products

Rising intra-competition among producers in the region

Implications to the ASEAN steel industry

Private sector roles

Steel trade center/network

ASEAN Joint Venture Firm

ASEAN Holding Firm

Government roles

Rule of Origin (ROO)

Mutual Recognition Agreement

Trade Facilitation

New investment in high grade steel product

Preparation for new trade regulations

2.4.3 Thailand Policy and Government Agencies

2.4.3.1 Ministry of Industry

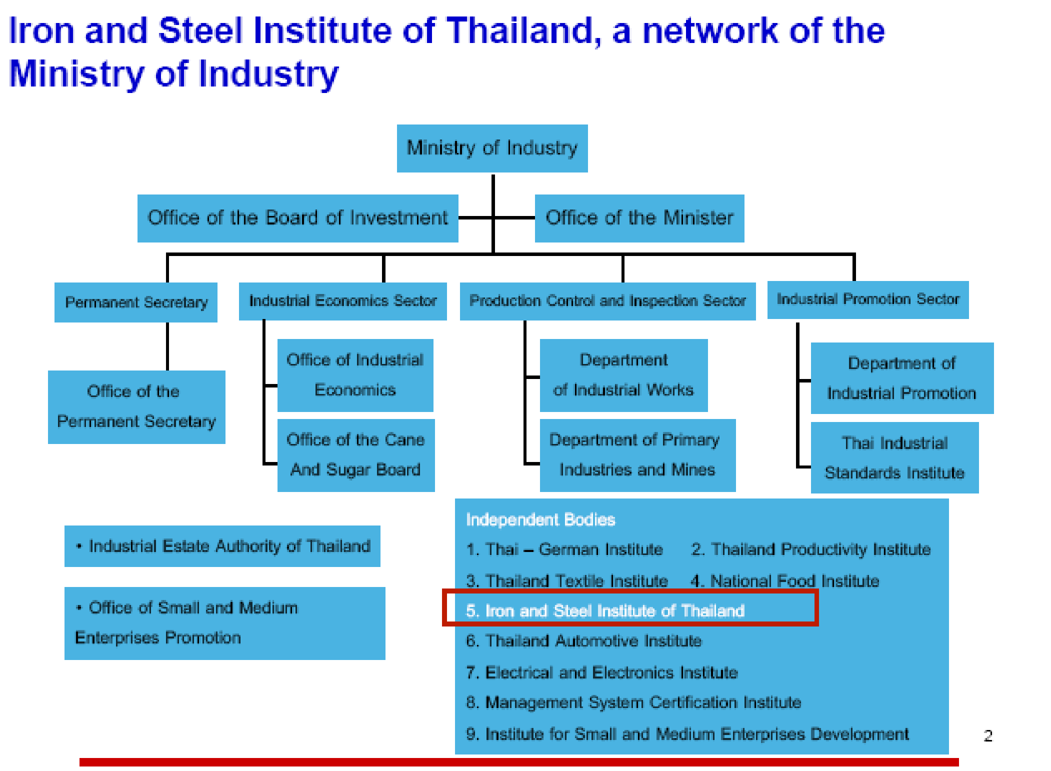

Figure 2.7 Ministry of Industry Organizational Chart

Source: ISIT, 2017.

2.4.3.2 Ministry of Commerce

Mainly, the Ministry of Commerce is responsible for trade measures, especially trade remedies.

According to the direct WTO definition, trade remedies are binding tariffs and applied equally to all trading partners, most–favored-nation treatment, or MFN, are key to the smooth flow of trade in goods. The WTO agreements uphold the principles, but they also allow exceptions — in some circumstances. Three of these issues are:

1) Actions taken against dumping (selling at an unfairly low price).

2) Subsidies and special "countervailing" duties to offset subsidies.

3) Emergency measures to temporarily limit imports, designed to "safeguard" domestic industries.

For trade remedies in Thailand, no agency has been created to be responsible for trade remedies and their implementation in Thailand. For the adoption of trade remedy measures in Thailand, participation is by 2 units.

1) The Department of Foreign Trade, which has the mission of the following:

(1) To study and analyze data, analyze petitions, giving advice to the industry in the process, investigation of dumping, subsidies, increasing the import of goods for processing considerations and making comments for policy implementation.

(2) To study and analyze foreign actions regarding Anti-Dumping, subsidies and safeguards for appealing and assisting Thai domestic industry for foreign trade remedy investigations and hiring consultants or law firms regarding this matter.

(3) To study legislation, disputes and regulations impeding the enforcing of Thai trade remedies, for enhancing their efficiency and establishing new Laws/Regulations under International Agreements or the WTO.

(4) Acts as the Secretary of the Committee of Committee of Dumping and subsidy and Committee of Safeguard Measures.

(5) Follows up on measures of implementation, establishing strategic plans for trade remedy measures and making petitions to foreign governments in cases of Thai industry being investigated in Ad/CVD/SG cases.

(6) Publishes, promotes and encourages learning about anti-dumping, subsidies and safeguards to both public and private sectors.

(7) Works with and supports the work of other related agencies.

2) The Committee: according to the Anti-dumping and countervailing act, BE 2542 Section 72 and Section 73: There shall be a committee called "The committee on Dumping and Subsidy" The Committee is composed of the Minister of Commerce who serves as Chairman, Permanent Secretary of the Ministry of Commerce, Permanent Secretary of the Ministry of Finance, Permanent Secretary of the Ministry of Foreign Affairs, Permanent Secretary of the Ministry of Agriculture and Cooperatives, Permanent Secretary of the Ministry of Industry, General Secretary of the Board of Investment, Director-General of the Department of Foreign Trade, Director-General of the Department of Internal Trade, Director-General of the Department of Business Economics, an appointee from the office of the consumer protection board and 6 expert members to be appointed by the cabinet. The Director-General of the Department of Foreign Trade shall serve as secretary and shall appoint an officer of the Department of Foreign Trade to serve as assistance secretary to the Committee.

The committee shall have the following authorities and duties:

(1) To perform their duties involving anti-dumping and countervailing measures under the Anti-dumping and countervailing act, BE 2542 .

(2) To approve or reject undertakings.

(3) To serve as an advisor with regard to the formulation of ministerial regulations and notification to maintain compliance to the Anti-dumping and countervailing act, BE 2542.

(4) To perform other functions as prescribed by the Act or assigned by the cabinet.

As a safeguard measure, both the committee, which retains most of the same members as the AD/CVD Committee with similar authorities and duties but changes to safeguards instead, and DFT, will act as the Secretary.

Furthermore, the figure below shows the trade remedies for each supply level of steel:

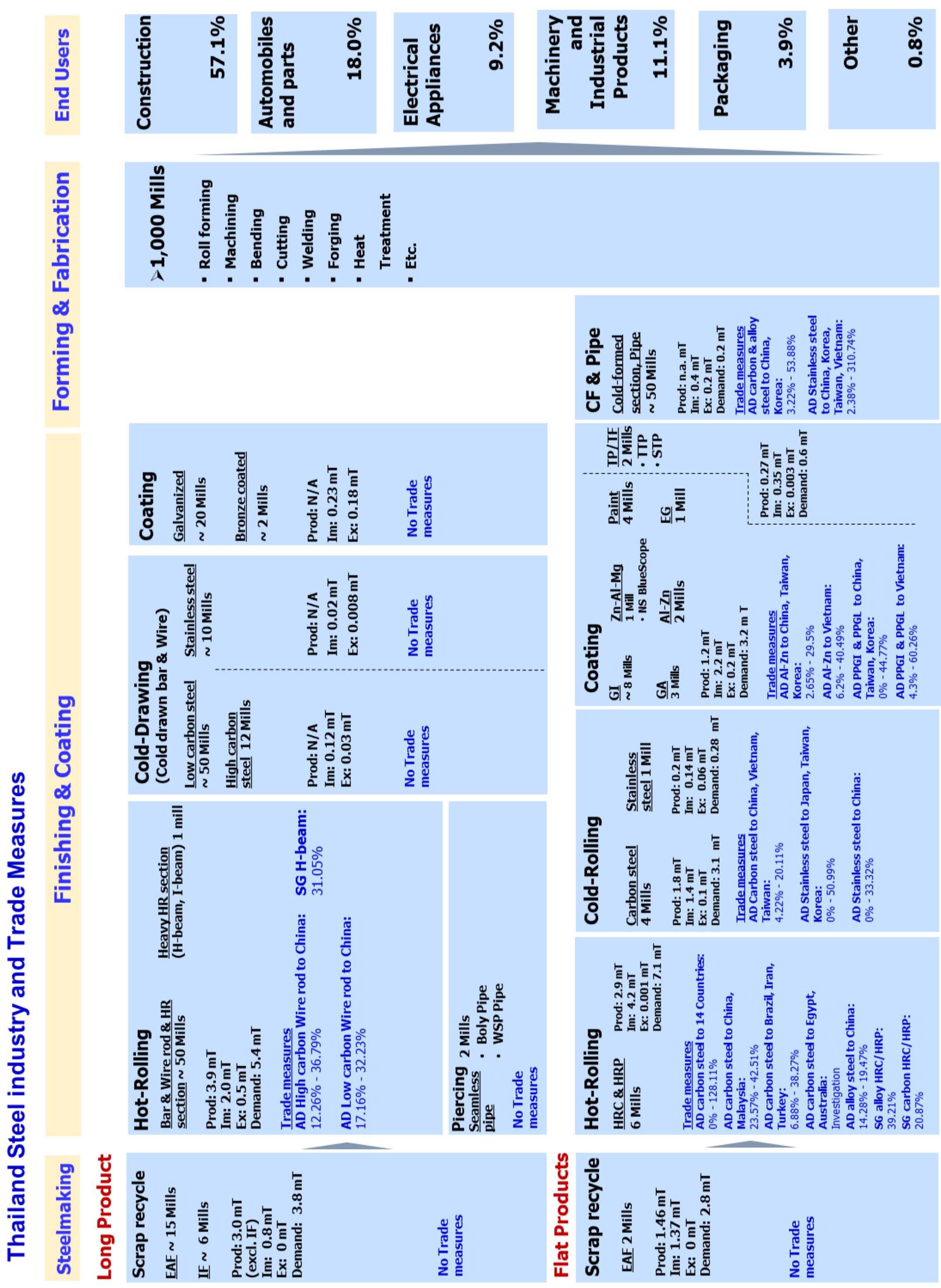

Figure 2.8 Shows the Trade Measures for Each Steel Industry Level. As the Figure Shows, that AD Measure is Almost on all Levels, Especially on the Flat Product, Which is the Main Product of the Thai Steel Industry

The following table shows the responsibility and area of agencies

Table 2.2 Government Agencies Connected with Steel Industry

Agencies		Responsibility
Office of Prime Minister	Board of Investment	So far, the steel industry has been counted among the major sectors for foreign investment, which ranked 2nd after the service industry. For details see table below
Ministry of Industry	Office of Industrial Economics	For approving Cabinet policy. For details see table below
	Thai Industrial Standards Institute	Their policy is to set the standards for steel products, for the classification and link of Thai standards with international ones.
Ministry of Commerce	Department of Foreign Trade	To overlook foreign trade. In the aspect of the steel trade, trade remedies are the emphasized measures for international trade The trade remedies consist of: 1) Anti-dumping 2) Countervailing 3) Safeguards For the Steel industry, Thailand is one of the countries adopting trade remedies to protect steel. 7 out of 11 active products for AD cases are steel products, while another 1 safe guard case is also a steel product.

Table 2.2 (Continued)

Agencies	Responsibility
Department of Internal Trade	To supervise steel trade within Thailand. Such as to provide enough products to meet demand and to prevent hoarding. Moreover, monitoring the movement of steel products closely and taking measures of additional care, especially during an economic recession.

Table 2.3 Office of Industrial Economics Proposed Policy, Steel Policy

Office of Industrial Economics Proposed Policy	
No.	Policy option
1.	Foreign Entrepreneur Invests in Thailand
2.	Thai Entrepreneur Invests in other countries
3.	Both options.

Table 2.4 Department of Internal Trade Proposed Policy, Steel Policy

Department of Internal Trade	
No.	Policy option
1.	The product is steel rebar and structural steel. A control product following the publication of the Committee regarding price of goods and services,, dated March 9, 2547.
2.	The vendor must show the retail price of steel plate, rebar and structural steel in clear and easily readable label. Following the publication of the Committee regarding price of goods and services dated March 16, 2547.

Table 2.4 (Continued)

Department of Internal Trade	
No.	Policy option
3.	Monitoring the 73 items closely and continuing their oversight, adjust to correspond with the situation on a monthly basis.
4	Regulate the entrepreneurs of steel rebar and structural steel to give information to the Internal Trade Department.

In terms of integrated policy, the Ministry of Commerce tries to create a forum for the steel industry and thus results in several policies with a framework on the following dates - 26 January 2015, 13 March 2015, and 28 May 2015, aimed to create an integrated framework for policy, which could be concluded with the following:

Iron Control Measures

1) AD/CVD
2) The price control of the product using AD.
3) Cooperation with China to reduce imports/Dumps.
4) Import volume control
5) Measures to counter circumvention.
6) R&D
7) More benefits and interest
8) Customs control development
9) Campaign for Made in Thailand and branding for Thai Steel

2.5 Variables

2.5.1 Porter's Five Forces and Why it's Used in This Paper

According to "The Five Competitive Forces That Shape Strategy" by Michael E. Porter, knowledge of the five forces model is able to make companies acknowledge industry structure and choose positions which are more beneficial to them while reducing their weaknesses in order to avoid being attacked.

The strategist's role is dealing with competition together with his understanding the concept of competition, however, competition often is misled by managers in the industry as they give it too limited of a definition, like the competition that arises merely amidst present direct competitors. Competition for the sake of profits, on the other hand, occurs not only among competitors in the industry but also with another four competitive forces, which are customers, suppliers, potential entrants and substitute products. The expanding rivalry that is the fruit of these five forces gives a definition to the industry's structure and forms a competitive interactive nature within the industry.

Although each type of industry might look different, there is no difference on the basis of profitability drivers, they are similar. For example, the global automobile industry, the international art masterpieces market and European healthcare delivery which is under strict regulation, might seem to be completely different from one another. However, in order to understand industry competition and profitability in these different industries, the analysis of only one and a similar concept must be carried out, which is the basic structure of "the five forces".

In the case of strong forces in some industries such as airlines, textiles and hotels, there are very few companies earning a handsome income from their investment, in the case of some industries, though, such as software, soft drinks and toiletries, there are numerous companies earning good profits. The structures of industry might be different, for example, there can be a product or service industry, such industry might be emerging or mature, using high technology or low technology, industry with regulations or no regulation, competition and profitability are all driven by industry structure. Although in the short run, a multitude of factors can product effects on an industry's profitability, together with the cycle of business and the weather, industry structure, which is presented in these competitive forces, determines industry profitability in the medium and long run.

Ones needs to understand the competitive forces together with their basic causes in order to get to the foundation of present profitability of the industry during the provision of estimating and ascending competition via a profitability framework. Strategists should equally consider a strong industry structure as a competitive issue, just as the strategists' company position. Additionally, it is important to understand industry structure since it is vital to building successful strategic positioning. It is also a key for the company's strategy to defend against competitive forces and turn them into benefits for the company's sake.

Hence, in this research the Five Force model is utilized in order to see the connection between the Force for its utility at looking into the industry, driving the steel industry, and the external factors.

2.5.2 Portes's Five Forces

This section will discuss the detail of Porter's Five Forces according to Porter's Model of Five Forces, which are divided into:

1) Horizontal forces: Threat of substitutes, threat of new entrants, competitive rivalry

2) Vertical forces: Bargaining power of buyers and bargaining power of customers

1st. Competitive Rivalry

The first factor is rivalry among companies within the industry. A large number of competitors might affect the power within an industry, namely price and product quality due to customers being able to easily switch to another company.
Competitive rivalry may be higher when:

1) Similar sized companies operate in one market
2) These companies have similar strategies
3) Products on offer have similar features and offer the same benefits
4) Growth in the industry is slow
5) There are high barriers to exit or low barriers to entry

2nd. Threat of New Entrants

Not only existing is there competition within the industry, the new player is also a potential factor. Higher profit always attracts new players, unless there is a high barrier to entry. New players can create different situations for the market. The economics of any industry will determine the level of difficulty faced when trying to enter this market, with the good one being a high barrier to entry but with a low exit barrier.

Barriers to entry may stem from things like:

1) Patents and proprietary knowledge
2) Access to specialized technology or infrastructure
3) Economies of scale or government driven obstacles
4) High initial investment needed
5) High switching costs for consumers, loyal consumers
6) Difficulty in accessing raw material and difficulty in accessing distribution channels

3rd. Threat of Substitutes

As defined by Porter, a substitute product means a different product, but it can be substituting the same thing, an example is canned juice vs. fresh juice. Therefore like any horizontal force, it reduces the ability to set the price of the industry.

4th. Bargaining Power of Buyers

The buyer holds different influence over the industry, especially when they're buying in large amounts or with a limited amount of buyers. A limited number of strong buyers may be able to show influence over a seller.

5th. Bargaining Power of Suppliers

The supplier is the one who provides the industry with the raw material for production. As such, with a limited supply the supplier can give itself more power over the industry, both in terms of price and quantity. Furthermore, a patent or knowledge of the supply product may be a factor that restricts the supply too.

2.5.3 The 6th Force and 7th Force

In this part, the Trade Association and government policy will be discussed as a Force for the industry's survival.

The 6th Force. Complementors

As mentioned earlier, government policy plays a crucial role in the industry's survival. However, there are some academics namely, Stewart Neill, and similarly, the likes of ABC, Kevin P. Coyne and Somu Subramaniam, who have challenged Porter's five forces, for example the relation between each actor and supply doesn't exist in Porter's model.

Moreover, Adam Brandenburger and Barry Nalebuff expand the concept of the Porter model with complementors (also called "the 6th force in order to explain the strategic alliance). Complementors can be explained as the impact of related products and services which exist in the market.

Moreover, regarding the Trade Association, theoretical literature concerning how welfare can make an impact on trade associations is quite hard to find. There are negative opinions from experts and academics from various fields such as industrial organizations, the legal sector, economics sectors and the public sector, who emphasize that trade associations can be a place for their members to gain more bargaining power in many ways, for example, price publication, quota allocation and goods reduction, which can harm the consumer (Vives, 1990; Döner & Schneider, 2000; Motta, 2004). Moreover, an association can do lobbying with politicians in order to gain favors for their businesses. (Besley & Coate, 2001; Tucker, 2008; Pyle, 2011). Olson's (1982) study on group action might be the most well–known theory concerning associations. His opinion on associations is that they are a gathering for specific interests. Large associations are better at presenting the economy, hence, large associations often make an effort on reformation that is beneficial for everyone, however, since their members' interests are very dissimilar, large associations are short on lobbying power, which can be considered as their weakness. Small associations, on the other hand, are more likely to have better skills and influences on people in power, since they are the associations in which their members gather for specific and similar interests. Hence, small associations are easier to benefit their specific group of members.

On the contrary, most literature concerning institutional and organizational economics principles is positive by emphasizing that there are private ordering institutions that can affect positively on the transactions involved. In the aspect of theory, which includes the cost of non–contractibility or prohibitive transactions, this can cause legal enforcement using a trial in court in order to enforce a business agreement, which is unavailable for companies and private governance institutions. For example, exchanging information or arbitration tribunals, which are handled by associations, are options which are an avoidance of troubles concerning a social dilemma caused by immaterial exchange. This factor is considered a reduction in market breakdown risk and an escalation in business transactions with efficiency as a whole.

More particularly, Prüfer's (2014) analysis in how a private, formal business association interacts with an informal social network shows circumstances where there is effective cooperation, however there is no equilibrium in one-shot interactions. The vital characteristic, which is borrowed from Dixit (2003), is that there is socio-economic distance among traders. Prüfer (2014) illustrates that traders only commit their trade with other transactors under the circumstance that there is little socio-economic distance between them, since intimacy can arouse the chance of confrontation in the future, contributing to the temporal motives of cooperation in the present transaction. According to the model, associations with solely imperfect access to public oppression can be assumed to have features of information intermediaries or arbitrators. They are the illustrators of the rise in the cooperation's scope and welfare by connecting each penalty or stringent payment from damages occurred from traders that violate their obligations in contracts. Even in circumstances where there have been casual social network connections among traders, such results still occur. However, there is the mitigation of association membership value in the circumstance that the transactor has a better casual connection. Accordingly, although the transmission of information can be conducted in different channels, the substitutes regarding supporting cooperation are social networks and associations. The results of this model are the encouragement granted, and it is the explanation of recent empirical findings, for example, that members' viewpoint toward associations is that the associations tend to be less valuable in more competitive industries (Pyle 2005, 2006).

In order to manage their collective reputation, welfare is an enhancement of the function of associations in circumstances where quality is a vital factor. Tirole (1996) presents how a new negative reputation of past members can cause damage to members of a group, who can suffer from even those past members who had quit a long time ago, which can create stereotypes and history dependence. Hence, an association is able to exclude those members who resist cooperating in a transaction in order to maintain the reputation of the group. Tirole illustrates how threatening to exclude members can control each member's behavior, and it is a vital factor for the group to reach a good reputation.

Therefore, from the mentioned paragraph we can conclude that the Trade Association does have connections with the industry.

The 7th Force (Government)

Besides the mentioned industrial policy, which shows its relation with the industry's survival, according to most references the seventh force is government or the public. Martyn Richard Jones developed a model based on Porter's model and includes government (national and regional) as well as pressure groups as the notional 6th force.

Hence, Porter argues that government is a "Factor," rather than a force, along with subordinate variables like the industry growth rate and complementary products and services. As his statement mentions:

"Government is not best understood as a sixth force because government involvement is neither inherently good nor bad for industry profitability," and,

"The best way to understand the influence of government on competition is to analyze how specific government policies affect the five competitive forces. For instance, patents raise barriers to entry, boosting industry profit potential. Conversely, government policies favoring unions may raise supplier power and diminish profit potential… Government operates at multiple levels and through many different policies, each of which will affect structure in different ways."

However, according to Dan McGinn (2010), government policy is an indirect impact factor for each force rather than a direct impact force. Therefore, nowadays CEOs spend time worrying about government regulation and policy.

Therefore, from the mentioned paragraph we can conclude that government policy does have connections with the industry.

6th & 7th Factors

Hence, even though it can be seen that the Trade Association and government policy do affect the survivability of the steel industry, these variables will check the relation with each of Porter's forces. Thus, creating the model by the following:

2.6 Model and Framework

According to the scope of this research, the model will be constructed in multiple layers, one for each layer of the supply chain in the steel business in order to see the effect of government policy on each factor affecting the survival of the steel industry in each layer.

The dependent variable is survivability of the company.

The 5 Forces for Porter's model and company properties will act as the independent variables

The 6th and 7th Forces of government and the Complementors will be tested in order to check their effect on the dependent variable and whether there should be listed another factor.

1) Model and Framework

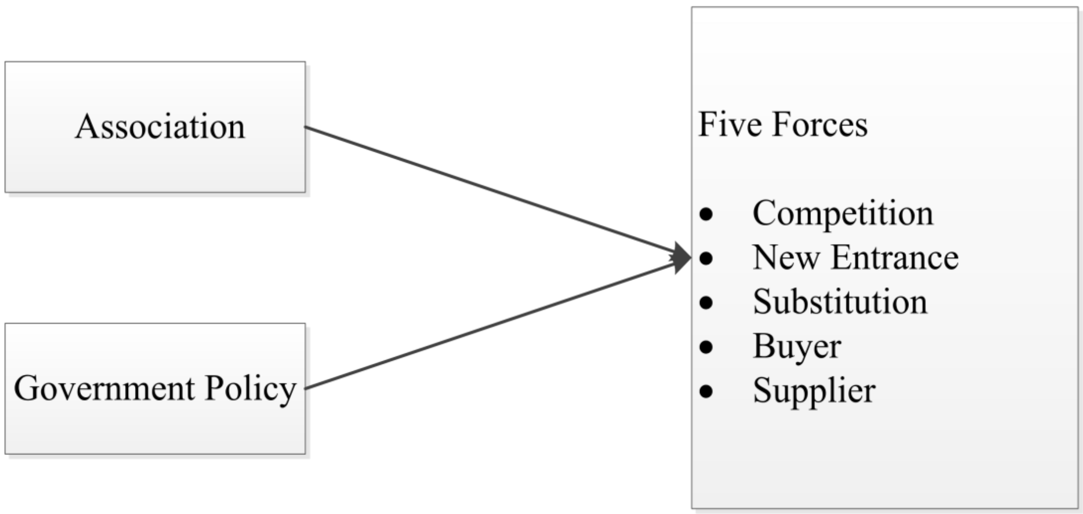

Figure 2.9 Research Framework

This model was created in order to oversee the effect of the 6th and 7th forces, including government policy to the industry separately from each of Porter's forces.

2) Conclusion

This chapter began with the history and debate over Interventionism and industrial policy. Following the creation of the model and variable with Arnold Meltzer by identifying the policy environment, this research used Porter’s five forces to identify the survivability of the steel industry and the external factors, namely government policy and the Trade Association were used as independent variables, so as to find out whether they affect the steel industry or not.

CHAPTER 3

RESEARCH METHODOLOGY

The goal of this chapter emphasizes the justification of the research methodology used to investigate the research questions. The structure of the chapter consists of a conceptual framework, operational definition, research design, data collection, research instrument, and data analysis used in this research. Additionally, validity and reliability is represented to ensure credibility and trustworthiness of the research.

3.1 Conceptual Framework

According to the literature reviews and discussion of related studies, the model is constructed in multiple layers, one for each layer of the supply chain in the steel business in order to see the effect of government policy on each factor affecting the survival of the steel industry. The proposed conceptual framework developed in this chapter shows the impact of associations and government policy on each force. Based on this, it allows the author to develop the hypotheses as follows.

H1: Associations have a positive impact on the five forces factors.

H2: Government policy has a positive impact on the five forces factors.

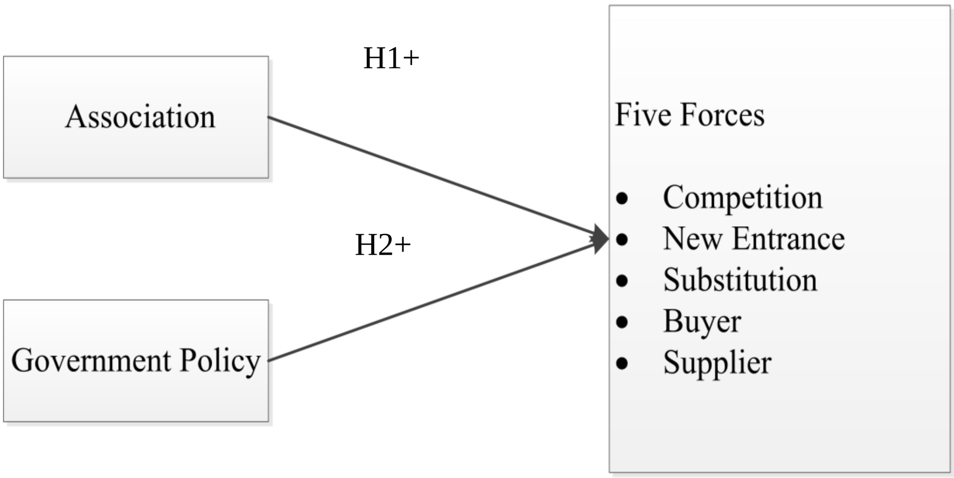

Figure 3.1 Conceptual Framework

3.2 Operational Definition

An operational definition is provided to explain the assessment of each variable in order to prevent ambiguity. In this part the author presents two independent variables, which are government policy, and "complementors", or associations belonging to the steel industry according to the framework. The dependent variable for this research includes the five force factors of Porter's five force model.

Table 3.1 Overview of Definitions and Dimensions of Measurement

Variable	Definition	Dimension of Measurement
Complementors or associations	The importance of Complementors or associations for the steel business	1. The indirect relation between Complementors or associations and the survival of the steel industry through each of the mentioned 5 forces 2. The direct relation between Complementors or associations and the survival of the steel industry

Table 3.1 (Continued)

Variable	Definition	Dimension of measurement
Government Policy	The importance of Government policy for the steel business	1. The indirect relation between Government policy and the survival of the steel industry through each of the mentioned 5 forces 2. The direct relation between Government policy and the survival of the steel industry
Competition	The importance of Competition for steel businesses	1. The level of competition in the steel industry
New Entrance	The importance of entering the steel business	1. Knowledge required regarding the steel industry 2. Rules and regulations regarding the steel industry 3. Financial aspects regarding the steel industry
Substitution	The importance of Substitution for steel businesses	1. Is there any alternative for products of the steel industry
Buyer	The importance of Buyers for steel businesses	1. Availability of Buyers in the steel industry 2. Bargaining power of Buyers in the steel industry
Supplier	The importance of Suppliers for steel businesses	1. Availability of Suppliers in the steel industry 2. Bargaining power of Suppliers in the steel industry

3.2.1 Independent Variables

1) Government Policy

In this research, government policy is defined as any policy related to the steel industry in government agencies of Thailand, namely, the Board of Investment, Ministry of Industry, and Ministry of Commerce.

2) Complementators/Associations

Another prominent player is the trade association, which includes any trade association which can be defined as "a body representing organizations within the same trade. It aims to protect their collective interests". In the case of Thailand the prominent trade association is the FTI (Federation of Thai Industries).

3.2.2 Dependent Variables

1) Competitive Rivalry

Competitive rivalry refers to competition among companies within an industry, a large number of competitors might affect the power within the industry, namely price and product quality, due to the ability of customers to easily switch to another company.

2) Threat of New Entrants

Not only existing to accost the competition within the industry, the new player is a potential factor. Higher profit always attracts new players, unless there is a high barrier to entry. New players can create different situations for the market. The economics of any industry will determine the level of difficulty faced when trying to enter that market, with a good condition being a high barrier to entry but a low exit barrier.

3) Threat of Substitutes

As defined by Porter, a substitute product means a different product, but can be substituting a type of the same product, for example canned juice and fresh juice. Therefore like any horizontal force, it reduces the ability to set the price of the industry.

4) Bargaining Power of Buyers

The Buyer holds different influence over the industry, especially when they're buying in large amounts or with limited numbers of buyers. A limited number of strong buyers may be able to show influence over a seller.

5) Bargaining Power of Suppliers

The Supplier is the one who provides the industry with the raw material for production. As such, by limiting supply it gives the supplier itself more power over the industry, both in terms of price and quantity, and as such can be counted as another factor. Furthermore, a patent or knowledge of the supply product may be factors that restrict the supply too.

3.3 Research Design

Saunders et al. (2015: 131) explained research design as a plan that provides procedures to answer a research question. It can be considered as the overall strategy that is implemented in research to ensure it has effectively acknowledged the research problems (De Vaus, 2001: 8). Furthermore, Parahoo (1997: 142) stated the design of research includes a set of data collection methods, measurements, and data analysis. There are three types of research design, consisting of exploratory research, explanatory research, and descriptive research (Robson, 2002; Saunders et al., 2015). According to the definition given by Robson (2002: 59), it refers to a way of finding out new phenomena. The principal of exploratory research consists of seeking out the literature, as well as acquiring data through interviewing experts or from the arrangement of focus group interviews (Saunders et al., 2015: 133). In the case of descriptive research, Robson (2002: 59) defined it as portraying information of individuals, situations or events. For explanatory studies, it aims to study the situation or clues by examining the relationships between variables (Saunders et al., 2015: 135). De Vaus (2001: 2) also mentioned that explanatory research involves developing causal relationships by assuming hypotheses.

The objective of this research is to investigate the factors affecting the survivability of the steel industry in Thailand, as well as discover if there are any externalities that affect the survival of the steel industry. Thus, the research design is considered to be of explanatory and exploratory research. Also, a mixed-method research design is appropriated to gather both qualitative and quantitative data for solving the research problems. This strategy offers strong evidence to support the conclusion by giving a narrative and non-textual information in order to attach meaning to the numerical data (Burch & Heinrich, 2016). Moreover, the advantage of applying a mix of quantitative and qualitative data is offering a better opportunity to improve the findings of research and insure trustworthiness (Tashakkori & Teddlie, 2003). Hence, this study uses a mixed methodology, which includes both quantitative and qualitative data in the methodology for identifying the impact of trade remedies as a factor that influences the development of the steel industry. It would be a benefit to apply quantitative approach to formulate the conceptual framework for assigning a relationship between the factors affecting survivability and properties from Porter's five forces model and testing hypotheses. Also, the collection of qualitative data supports the argument with new understanding of the problem.

The research principally analyzes the primary data that was obtained from the respondents via a survey and interview strategy. For surveying, a questionnaire was selected as a research instrument that could be distributed to the target population of the steel manufacturer in every tier. Moreover, in-depth interviewing and conducting of focus groups were used in order to find out the significant factors for confirming the relationship between each variable in this research, and for the policy formulation agencies or associations regarding the steel industry. Furthermore, secondary data were gathered from available textbooks, journals, online databases and records from the Federation of Thai Industries. Finally, the data collection approach is discussed below.

3.3.1 Population

Zikmund (2008: 387) classified the term population as "any complete group of entities that share some common set of characteristics". Moreover, Churchill and Iacobucci (2003: 321) stated that a study of a population includes all possible cases that have the same designated specifications. Since this research was scoped on the background of the Thailand Steel Industry, the populations of this study belong to two responsible associations that are related with steel industry manufacturers in every tier and their agencies or associations. It consists of The Trade Association connected with steel and any company connected in the Federation of Thai Industries (Steel Group), which in total equals 219 steel manufacturers.

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3.3.2 Sample Size

Sample size refers to the possible number of observations being chosen in order to figure out the overall possible population (Zikmund, 2008: 435). In order to receive accurate and credible results, Kothari (2004: 174) explained that a sample size must be appropriate to represent the overall population for generalizing the findings. Since the population in this study is finite, exactly known as it consists of 219 manufacturers, Yamane's method of sample size determination is chosen for calculation (Yamane, 1967: 886). In this study, the confidence level was expected at 95%.

$$\text{n} = \frac{n}{1+N(e)^2}$$

Where

N = Population under the study

n = sample size

e = Acceptable precision level or marginal of error

In this study, at a confidence level of 95% the precision level was expected at 7-10%. Therefore, the recommended sample size would be 104 or 67, respectively. Then, a sample size of 67 was set as the minimum sample required in this study to ensure the sample could essentially represent the whole population.

3.3.3 Sampling Design

A sampling design refers to the plan for accessing a target sample from a given population (Kothari, 2004: 55), which consists of units, parameter of interest, and procedure. Zikmund (2008: 391) suggested that a sample could be drawn from the entire population with the criteria or randomized selection. There are two procedures for the sampling technique, probability sampling and non-probability sampling. Probability sampling refers to the way that every element in the population has a chance to be selected, while non-probability sampling is when any particular representative of the population is unknown and it relies on the personal judgment of the researcher (Zikmund, 2008: 395). Saunders et al. (2015: 215) mentioned that the choice of sampling techniques depends on the objective of the research. It is essential that the selected sample be a representative of the total population in order to figure out a miniature cross-section (Kothari, 2004: 55). Since the research has a small population, non-probability sampling is more appropriate.

Purposive sampling or judgmental sampling refers to the practical way of using personal judgment to select a sample which best enables the reaching of the research goal (Saunders et al., 2015: 230). This sampling technique is useful when selecting cases that have a very small representative population that is particularly informative (Neuman, 2000). In this study, a purposive sampling is used to select those who could be regarded as key informants and provide relevant data, which is divided into two groups, the Trade Association connected with steel companies in Thailand and the companies that are registered in the association.

3.4 Data Collection

In terms of quantitative primary data, a structured questionnaire was comprised of both closed-ended questions and open-ended questions to achieve this goal. For the closed-ended questions a five-point Likert scale with multiple choice questions was developed based on general questions related to the steel industry in Thailand, policies, five forces and survivability, combined with secondary data of the properties of each organization's remedies. For data collection, it was distributed to the target population of the steel manufacturers in Thailand, as well as using the information from The Federation of Thai Industry (FTI) as a resource. Hard copies of the questionnaire were sent out to the entire population in the industry through the secretary of the Federation of Thai Industries (Steel Group). The secretary monitored and distributed the questionnaire via a circular to all members of the steel group. The period of the survey was from January to April in 2018.

Qualitative primary data and secondary data were collected in order to identify the connection between government policy and the steel industry's five forces and their survivability. There were three approaches applied in this research. Firstly, an in-depth interview was conducted on the 19th of January, 2018 in order to explore issues of survivability of the steel industry in Thailand. The interviewee was the secretary of the Thailand Iron and Steel Industry Club, The Federation of Thai Industries.

Secondly, an arrangement of focus groups was done on the 16th of January, 2018 in order to dig down to a deeper level of attitude or reaction that couldn't be found using only face-to-face interviewing. The participants were representatives from the Entrepreneurs of Steel Industry Manufacturers (Billet and Slab), Federation of Thai Industries. Lastly, a non-participant observation was done by gathering secondary data, which is related to Steel Policy Suggestions on Steel Industry in the age of 4.0. It would help to investigate in initiation of the trade remedies in the steel industry.

3.5 Research Instrument

Measurement is one of the most important aspects of research. Measurement is the assignment of numbers to things. Recording the data collected through numbers is a common sight to be seen. As a result, precision and exactness in measurements are essential for research, especially for the hypotheses testing. A researcher needs good measurements for both independent and dependent variables (Babbie, 2007). A Likert scale (Likert, 1932) is a measurement concept that is usually adopted in social science research to explore a participant's opinion and agreement toward statements in the structured questionnaire (Zikmund, 2008: 302). A Likert scale can be assessed in five, seven or nine scales, but five ordered response levels is commonly used in psychological research (Brown, 2001: 40-42, 44-54; Burns and Burns, 2008: 250), ranging from "strongly disagree" to "strongly agree", with "neutral" or "neither agreed nor disagreed" placed at the middle point between "agree" and 'disagree". Some researchers argue for using a four or six-point scale, to force the respondent to answer between "agree" and "disagree", where a neutral option is removed to ensure that respondents can distinguish the difference between measurements (Jamieson, 2004). In some cases, a larger scale is better for giving information about the attitude and opinion of respondents. Nunnally (1978) argued that having a larger scale can offer a good balance between having enough score and discrimination. However, a larger scale such as a seven or nine-point scale is difficult for the survey respondents to understand the difference among agreement levels (Jamieson, 2004). Thus, this study applied a five points Likert scale, which is appropriate for allowing respondents to choose their option easily. Additionally, a Likert scale was useful to estimate the reliability with a Cronbach's alpha test (Brown, 2011: 14), which ensured the creditability of the research outcome.

As to the structure of the questionnaire, it included closed-end questions and open-ended questions. For assessment of the dependent variable and independent variable, the five-point Likert scale was employed in order to understand the respondent's opinions with the list of statements, ranging from "strongly disagree" to strongly agree". The questionnaire was comprised of three sections, 1) general information, 2) factors related to survivability of steel manufacturing companies, and 3) effects of complementators and government policy. For the first section, it covered information on the steel manufacturing companies, consisting of type of manufacturing, capacity, and manufactured products. The second section employed the five-point Likert scale items for asking opinions toward factors affecting survivability in regards to five force factors. The last section included both an opened-ended question and a Likert measurement to ask about the relative roles of complementators and government policy that affect steel manufacturing companies.

3.6 Data Analysis

3.6.1 Quantitative Data Analysis

The author planned to explore the factors affecting survivability of steel manufacturing companies in Thailand, so carrying out the quantitative output with a statistical approach was suggested. In this study, descriptive statistics and inferential statistics were chosen for statistical treatment. According to Zikmund (2008: 413), descriptive statistics refers to a statistical technique that employs the summarization of data and makes it simple. Saunders et al. (2015: 313) stated that this technique is an approach used in exploratory research which allows describing or comparing data numerically. This study employed frequency and percentage to summarize any questions that employed multiple choices, which includes the general information in section 1, and the effect of government policy and collaboration in section 3. Furthermore, mean and standard deviation (S.D.) was applied to measure the tendency of respondents' attitude and opinion toward questions that employed the five points-Likert scale measurements.

Inferential statistics were used for inferring characteristics from the sample to the whole population (Zikmund, 2008: 413). Saunders et al. (2015: 440) mentioned that this technique is related to the test hypotheses by assuming a relationship between the determinants. In this study, Ordinary least squares linear regression (OLS) was chosen as the methodology of the mean, to find the correlation between the independent variable and dependent variable. This is a parametric statistics technique that provides an overall estimate of the explanatory value of the proposed model of trade remedy dependency. The methodologies selected can explain the relationship between theory and research and whether the theory guides the research or whether a new model or theory is an outcome of this research. Methodology for a study finds out which data to be collected and utilizes analysis (Babbie, 2007). Since a parametric statistical method is used for this research, distribution of data should be normally distributed. It refers to a function that defines the distribution of scores in a population with respect to the population parameters. A normal distribution is used in statistical analysis for ensuring standardized comparisons across different populations. (Tabachnick and Fidell, 1997)

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3.6.2 Qualitative Data Analysis

Causal networking was selected as the technique for the qualitative side of this research. This technique is best used to study the causal effects and their relationship in the study. Causal networking was used to analyze the data that was collected by interview and observance in order to explain a phenomenon. Miles and Huberman (1994) defined the causal networking technique as one that is used to compare the analysis of all samples, which uses variables that tend to affect the result. For each outcome measured, the stream of variables affecting the result is examined. Both similar and different streams are extracted and interpreted. The basic principle is that of developing one or more meta-networks that relate to the individual case networks from their source. Furthermore, cross-case causal networking can be broken down into successive analytic steps, as follows:

1) Assemble the causal networks.

2) Isolate the causal “streams” for each case, which leads to the dependent variable being analyzed.

3) Match the variable streams to other cases with the same result.

4) Verify the scenarios for similar and different results.

According to (Miles and Huberman, 1994) whether cases are matched or belong to the same phenomena is determined by the following:

1) All (or all but one or two) of the core predictor variables on the stream share the same properties.

2) The most immediate predictor variables—the two or three closest to the outcome measure—are the same and are in the same sequence.

3) The common predictors have the same ratings, which consist of high, moderate, or low.

4) The result is likely to be the same.

5) The narrative confirms the similarity or identity of the result's theme derived from the stream of variables in the network.

6) The outcome themes are different (or absent) in cases with a differently rated result variable.

7) In these differently-rated cases, the predictor variables closest to the result variable are different or, if the same, are rated differently.

3.7 Validity and Reliability

As is usually done in research, the questionnaire's validity and reliability must be pre-tested in order to ensure its accuracy and creditability of findings (Saunders et al., 2015: 149). Reliability is the consistency of the findings if measured on the same sample, while validity is the ability to transfer the findings into truth.

Table 3.2 Reliability and Validity Assessment

Questionnaire's Criteria	Assessment
Reliability	Cranach's alpha
Validity	content-validity analysis

In terms of reliability, standardized or clarified measurement instruments can reduce user error. For reliability of continuous data like a Likert scale, this can be assessed by using Cronbach's alpha coefficient. This statistic is commonly applied to check the internal consistency among tested variables by calculating the correlation coefficient between the two scores on the same group and reporting it as the reliability coefficient (Babbie, 2007). The internal consistency values or reliability coefficients range from 0 to 1.0. But in reality, Cronbach's alpha never reaches 1.0. According to the rule of thumb, a value of 0.8 is considered reliable, on the other hand, it should not be below 0.5 to guarantee acceptable reliability (Nunnally, 1978).

A study can be reliable without validity, while validity without reliability is impossible (Babbie, 2007). Moreover, there are many criteria to ensure validity as well as reliability, but the first factor for consideration is to ensure internal validity by the following:

1) Criterion-Related Validity is used to predict future or current performance - it matches the result for the test with another criterion of interest.

2) Construct Validity is used to confirm that the measurement is actually measuring the right thing.

3) Content Validity is used to ensure the match between the tested-content and the objective.

For validity, the pretesting technique selected is to check the test as to whether the instrument, survey, or measure is of the same group of people at different points in time, as well as correct any mistakes at the same time. Also, both the structured questionnaire and structured interview questions were estimated and adjusted by the advisor.

CHAPTER 4

QUANTITATIVE DATA ANALYSIS

4.1 Introduction

As mentioned in the previous chapter, the methodological choices used in this research have been scoped on conducting mixed approaches for accomplishing the objective of the study. In this chapter, the author provides data analysis to investigate trade remedies as a factor that influences the development of the steel industry in Thailand. Statistical techniques applied in this chapter include both descriptive analysis and inferential analysis. Data analysis was carried out by Statistical Packages for Social Science (IBM SPSS v.23.0).

For the structure of quantitative findings, it contains two sections. It will begin with the descriptive analysis in section 4.1, which explains the characteristics of survey participants and their perceptions toward determinants from Porter's five forces, government policies, and related associations in the steel industry. Consequently, section 4.2 represents the results of inferential analysis, which aims to analyze the effect of complementors or associations, and government policies on each of Porter's forces.

4.2 Descriptive Analysis

In this section, descriptive analysis was selected to summarize the overall collected data from representatives of the steel manufacturers in Thailand. In order to collect data, questionnaires were delivered to 103 respondents within the period of August to December, 2017. Afterward, 83 questionnaires had completely responded. Also, the descriptive analysis was carried out and represented in three subsections, consisting of 1) company profiles, 2) the determinants of the Five Forces Model, 3) complementors or associations, and 4) government policies. Applied descriptive analysis includes frequency, percentage, mean ($\bar{x}$), and standard deviation (S.D).

4.2.1 Company Profiles

From the table below, it found a slight difference among the respondents' portions on categories. The percentage shows that most of the participants were manufacturers (83.1%), followed by the rest of users (10.8%) and sellers (6%). According to the type of industry, this study contains most representatives from slab products (44.6%), followed by billet product (37.3%), and continuous production (12%). Most of them are from a limited company (72.3%), and 27.7% of the entire respondents are public companies. Additionally, the result shows that the majority of companies have belonged to the steel industry for 21-30 years (47%), followed by 31-40 years (15.7%), 11-20 years (13.3%), 41–50 years (10.8%), more than 50 years (7.2%), and less than 10 years (6%).

Table 4.1 Descriptive Summary of Company Profiles

Company Profiles	Frequency	Percent
Categories		
Manufacturer	69	83.1
Users	9	10.8
Seller	5	6.0
Type of industry		
Slab product	41	44.6
Billet product	35	37.3
Continuous production	10	12.0
Others	1	1.2
Company		
Company Limited	60	72.3
Public Company	23	27.7

Table 4.1 (Continued)

Company Profiles	Frequency	Percent
Experience in the industry		
Less than 10 years	5	6.0
11 - 20 years	11	13.3
21 - 30 years	39	47.0
31 - 40 years	13	15.7
41 - 50 years	9	10.8
More than 50 years	6	7.2

From table 4.2, it shows that most of the participants' companies use hot rolled steel in their manufacturing (24.1%), followed by scrap (18.1%), hot rolled stainless steel (14.5%), steel wire (12%), billet and cold rolled steel (7.2%), slab and Ferro alloys (6%), high carbon steel wire rods (4.8%), steel plate, coated and painted steel (3.6%), ingot, cold rolled stainless steel, and stainless flat bar (1.2%).

Table 4.2 Respondents' Raw Material Use in Manufacturing

Raw Material	Frequency	Percent
Hot rolled steel	20	24.1
Scrap	15	18.1
Hot rolled stainless steel	12	14.5
Steel wire	10	12.0
Billet	6	7.2
Cold rolled steel	6	7.2
Slab	5	6.0
Ferro Alloys	5	6.0
High carbon steel wire rods	4	4.8
Steel plate	3	3.6
Coated and painted steel	3	3.6

Table 4.2 (Continued)

Raw Material	Frequency	Percent
Ingot	1	1.2
Cold rolled stainless steel	1	1.2
Stainless Flat Bar	1	1.2

Regarding the manufactured product, it shows that most of them manufactured billets, which found the largest proportion being steel wire (25.3%), followed by steel pipe (24.1%), and rebar (18.1%). For slab product, it shows most of them manufactured steel sheet (19.3%), followed by hot rolled steel (7.2%) and cold rolled steel (4.8%). 9.6% of the rest produces structural steel.

Table 4.3 Respondents' Manufactured Product

Manufactured Product	Frequency	Percent
Finish Steel Products		
Slab		
Hot rolled steel	6	7.2
Cold rolled steel	4	4.8
Steel sheet / Coated steel sheet	16	19.3
Billet		
Rebar	15	18.1
Steel wire / Coated steel wire / Stainless wire	21	25.3
Steel pipe	20	24.1
Bloom, Beam		0.0
Structural Steel	8	9.6
Scrap	1	1.2
Others	36	43.4

4.2.2 Determinants of Five Forces Models

In terms of bargaining power of the supplier (table 4.4), it shows that participants have a sufficient number of suppliers ($\bar{x}$ = 3.67, S.D = 0.94) and they explained that those suppliers take their companies as a main priority ($\bar{x}$ = 3.96, S.D = 0.76). They also acknowledged that information concerning suppliers' goods and the market was very good ($\bar{x}$ = 3.79, S.D = 0.75). Moreover, they agreed that suppliers are easy to access (3.34, S.D = 1.14). However, the lowest score was found on ability to conveniently change suppliers ($\bar{x}$ = 3.32, S.D = 1.15).

Table 4.4 Perception Toward Bargaining Power of Supplier in the Steel Industry

Bargaining Power of Suppliers	Minimum	Maximum	Mean	S.D
There are sufficient companies of raw material suppliers.	2	5	3.67	0.94
Principle material suppliers take your company as their priority.	2	5	3.96	0.76
Easy access to suppliers	2	5	3.34	1.14
Ability to change suppliers conveniently	2	5	3.32	1.15
You acknowledge information concerning suppliers' goods and market very well.	2	5	3.79	0.75
Average mean	2.40	5.00	3.62	0.72

In the case of buyers (table 4.5), it explained that this industry has a sufficient number of customers, even if it lost one customer it would have no effect on their company ($\bar{x}$ = 3.51, S.D = 0.76). They were agreed on the uniqueness of their product features ($\bar{x}$ = 3.05, S.D = 1.13). Moreover, they were agreed on there being less chance that buyers would make their purchases with competitors. ($\bar{x}$ = 2.93, S.D = 0.77). The table also reveals that this industry is complicated for buyers to switch to their company ($\bar{x}$ = 2.85, S.D = 0.77). The result also shows the lowest score was found on buyers' lack of knowledge concerning markets and products ($\bar{x}$ = 2.70, S.D = 0.70).

Table 4.5 Perception Toward Bargaining Power of Buyers in Steel Industry

Bargaining Power of Buyers	Minimum	Maximum	Mean	S.D
You have sufficient customers. The loss of one customer has no effect to your company.	1	5	3.51	0.76
Buyers lack knowledge concerning your market and products.	1	5	2.70	0.70
Your product's features are very unique.	1	5	3.05	1.13
It is less likely that your buyers will make their purchase with competitors.	1	5	2.93	0.77
It is complicated for your buyers to switch to your company.	1	5	2.85	0.77
Average mean	1.20	4.20	3.01	0.64

From table 4.6, it shows that participants have the highest agreement regarding difficulty of entrance into this industry to compete ($\bar{x}$ = 4.22, S.D = 0.52). It requires high capital and large amounts of assets to start this business, accounting for a mean score and standard deviation of 4.17±0.49 and 4.01±0.62, respectively. Also, it requires very specialized knowledge to enter the business ($\bar{x}$ = 3.78, S.D = 0.69), as well, it shows new entrants face difficulties in finding customers ($\bar{x}$ = 3.73, S.D = 0.45). However, the average score shows the lowest score is whether customers have loyalty to their brand/products ($\bar{x}$ = 3.00, S.D = 0.83).

Table 4.6 Perception Toward Threat of New Entrants in the Steel Industry

Threat of New Entrants	Minimum	Maximum	Mean	S.D
Customers have loyalty to your brand/products.	2	4	3.00	0.83
It requires high capital to start the business.	3	5	4.17	0.49
It requires a large amount of assets to enter the business.	2	5	4.01	0.62

Table 4.6 (Continued)

Threat of New Entrants	Minimum	Maximum	Mean	S.D
Very specialized knowledge is required to enter the business.	2	5	3.78	0.69
New entrants face difficulties in finding customers.	3	4	3.73	0.45
It is difficult for new players to compete.	3	5	4.22	0.52
Average mean	3.00	4.50	3.82	0.35

In terms of threat of substitutes in the steel industry, the results from table 4.7 shows that steel products play an important part in the buyers' continuous production ($\bar{x}$ = 4.50, S.D = 0.53). But it is somewhat easy to replace products of their company with others ($\bar{x}$ = 4.11, S.D = 0.65).

Table 4.7 Perceptions Toward the Threat of Substitutes in the Steel Industry

Threat of Substitutes	Minimum	Maximum	Mean	S.D
There are large amounts of substitute products.	3	5	4.11	0.65
Does steel product play an important part in the buyers' continuous production?	3	5	4.50	0.53
Average mean	3.00	5.00	4.30	0.50

According to table 4.8, the results reveal that some participants agreed that the market of the steel industry does grow rapidly ($\bar{x}$ = 2.88, S.D = 0.69). The mean score shows they were lacking in agreement toward existence of an obvious leader in the market ($\bar{x}$ = 2.78, S.D = 0.77). Additionally, they agreed that there is a large number of competitors in the steel industry ($\bar{x}$ = 4.23, S.D = 0.65).

Table 4.8 Perceptions Toward Competitive Rivalry in the Steel Industry

Competitive Rivalry	Minimum	Maximum	Mean	S.D
There are many competitors in the industry	3	5	4.23	0.65
Obvious leader in the market	1	5	2.78	0.77
Your market grows rapidly	1	4	2.88	0.69
Average mean	2.00	4.00	3.30	0.39

Based on this overview of the steel industry, it shows that most of the respondents perceived the highest level of threat coming from substitutes ($\bar{x}$ = 4.30), followed by threats of new entrants ($\bar{x}$ = 3.82, S.D = 0.35), and the high bargaining power of suppliers ($\bar{x}$ = 3.62, S.D = 0.72). But it is somewhat lacking of competitive rivalry and bargaining power from the buyers side, accounting for a mean score and standard deviation of 3.30±0.39 and 3.01±0.64, respectively.

Table 4.9 Summary of Company Perceptions Toward Five Forces Determinants in the Steel Industry

Five Forces	Minimum	Maximum	Mean	S.D
Bargaining power of suppliers	2.40	5.00	3.62	0.72
Bargaining power of buyers	1.80	4.20	3.01	0.64
Threat of new entrants	3.00	4.50	3.82	0.35
Threat of substitutes	3.00	5.00	4.30	0.50
Competitive rivalry	2.00	4.00	3.30	0.39

4.2.3 Complementors or Associations

The result shows that all the participants belong to The Association of Thai Steel Industries (ATS). The largest proportions were the Metal Tube Cold-forming Steel Association (14.5%), Thai Long Steel with Electric Arc Furnace Association (9.6%), and Thai Stainless Steel Development Association (TSSDA) (7.2%). However, only 18.1% agreed that associations can increase an opportunity to survive in the market, while 74.7% disagreed with this argument. Additionally, the result reveals that only 6.1%, or five representatives hold authority in decision making in the association, while more than half of entire respondents had no rights on making decisions (53.7%).

Table 4.10 Company's Association and Authority

Complementors or Associations	Frequency	Percent
Names of the Associations in the Steel Industry		
The Association Of Thai Steel Industries (ATS)	83	100
Thai Cold Rolled Steel Sheet	1	1.2
Thai Galvanizing Association	2	2.4
Metal Tube Cold-forming Steel Association	12	14.5
Thai Stainless Steel Development Association (TSSDA)	6	7.2
Thai Coated and Painted Steel Association	4	4.8
Thai Long Steel with Electric Arc Furnace Association	8	9.6
Thai Hot Rolled Steel Sheet Association	5	6.0
Thai Steel Wire Manufacturer Association	2	2.4
Thai Auto Parts Manufacturers Association	2	2.4
Effect of associations on increased opportunity to survive in the market		
N/A	6	7.2
Yes	15	18.1
No	62	74.7
Company holds authority in decision making of the association		
Strongly disagree	44	53.7
Disagree	26	31.7
Neutral	7	8.5
Agree	5	6.1

Furthermore, the results from table 4.11 shows that respondents have the highest agreement with the impact of companies joining the association being the increased accessibility to information or news in the business sector ($\bar{x}$ = 4.06, S.D = 0.72), as well as it providing an opportunity for giving opinion/data to the government sector ($\bar{x}$ = 4.01, S.D = 0.79). Furthermore, joining an association allows them to decrease business obstacles ($\bar{x}$ = 3.74, S.D = 0.67) and maintain their business's benefits ($\bar{x}$ = 3.66, S.D = 0.69). However, it shows that joining lacked any enhanced opportunities for building new business alliances ($\bar{x}$ = 2.44, S.D = 0.74).

Table 4.11 Perceptions Toward Complementors or Associations in the Steel Industry

Complementors or Associations	Minimum	Maximum	Mean	S.D
Increases accessibility to information/news in the business sector	3	5	4.06	0.72
Increases opportunity for giving opinion/data to the government sector.	3	5	4.01	0.79
Enhances the opportunity to build new business alliances	2	4	2.44	0.74
Decreases business obstacles	3	5	3.74	0.67
Maintains business's benefits	3	5	3.66	0.69
Average mean	2.80	4.80	3.58	0.62

4.2.4 Government Policies

In terms of government policies (table 4.12), the results reveal that a majority of representatives agreed that anti-dumping (AD) by the Bureau of Trade Interests and Remedies (DFT) was the most prominent policy issued by the government for the steel industry (53%), followed by BOI (28.9%), Thai Industrial Standard (26.5%), Safeguard Measure (SG) (14.5%), price control (13.3%), and control of goods (8.4%). However, there are few companies who participate in imposing new government policy, as only five companies, or 6%, imposed anti-dumping policy in this industry. Additionally, the result reveals that anti-dumping (AD) by the Bureau of Trade Interests and Remedies (DFT) was considered as supportive, or opposed to, government policies for the steel industry, accounting for 31.3%, or 26 companies, who agreed with this argument. Additionally, 77.1% agreed that government policies help the company's survival, while 12% and 7.2% disagreed or were not sure, respectively.

Table 4.12 Government Policies and Applications in the Steel Industry

Government Policies	Frequency	Percent
Related government policies in the steel industry		
Anti-Dumping (AD) by Bureau of Trade Interests and Remedies (DFT)	44	53.0
Control of goods by Department of Internal Trade of Thailand (DIT)	7	8.4
Energy efficiency plan by Department of Alternative Energy Development and Efficiency (DEDE)	1	1.2
Price control by Department of Internal Trade of Thailand (DIT)	11	13.3
Safeguard Measure (SG) by Bureau of Trade Interests and Remedies (DFT)	12	14.5
Thai Industrial Standard by Thai Industrial Standards Institute (TSI)	22	26.5
The Board of Investment (BOI)	24	28.9
Trade negotiation by Department of Trade Negotiations (DTN)	1	1.2
Trade Remedy Measures by Department of foreign trade (DFT)	1	1.2
Participation in imposing new government policy		
AC/Import licensing by Department of Foreign Trade (DFT)	4	4.8
Anti-Dumping (AD) by Bureau of Trade Interests and Remedies (DFT)	5	6.0

Table 4.12 (Continued)

Government Policies	Frequency	Percent
Free trade area/tax free	2	2.4
Industrial Development Efficiency Plan by Ministry of industry	2	2.4
Safeguard Measure (SG) by Bureau of Trade Interests and Remedies (DFT)	1	1.2
Steel Industry Strategic Plan by Office of Industrial Economics (OIE)	2	2.4
Thai Industrial Standard by Thai Industrial Standards Institute (TSI)	3	3.6
The Board of Investment (BOI)	1	1.2
Support or oppose government policies		
AC/Import licensing by Department of Foreign Trade (DFT)	3	3.6
Anti-Dumping (AD) by Bureau of Trade Interests and Remedies (DFT)	26	31.3
Safeguard Measure (SG) by Bureau of Trade Interests and Remedies (DFT)	2	2.4
Thai Industrial Standard by Thai Industrial Standards Institute (TSI)	2	2.4
The Board of Investment (BOI)	11	13.3
Government policies help the company's survival		
N/A	3	3.6
Yes	64	77.1
No	10	12.0
Not sure	6	7.2

Additionally, the results from table 4.13 shows that respondents have their highest agreement toward the crucial role of government policies on competitiveness in the steel industry ($\bar{x}$ = 3.65, S.D = 1.01), followed by enhancing opportunity for creating income or business in the enterprise ($\bar{x}$ = 3.33, S.D = 0.65) and increasing competition in this industry ($\bar{x}$ = 3.23, S.D = 0.43). However, it found that respondents think government policies are less related to enhancing innovation, technology and new knowledge for the companies ($\bar{x}$ = 2.67, S.D = 0.81). However, it shows that they disagreed that government policies can enhance the accessibility to the main raw materials in their business ($\bar{x}$ = 2.15, S.D = 0.69).

Table 4.13 Perceptions Toward Government Policy

Government Policy	Minimum	Maximum	Mean	S.D
Enhances opportunity for creating income or business to the enterprises.	2	4	3.33	0.65
Enhances accessibility to the main raw materials for the business.	1	4	2.15	0.69
Increases competition in the industry.	3	4	3.23	0.43
Competitiveness in the steel industry	2	5	3.65	1.01
Enhances innovation, technology and new knowledge for the companies	1	4	2.67	0.81
Average mean	2.20	3.80	3.01	0.43

4.2.5 The Characteristics of the Steel Industry Related to the Five Forces and the Impact of Government Policies and Joining an Association

According to table 4.14, it shows characteristics of the steel industry related to the Five Forces and the impact of government policies and associations based on three categories, including billet, slab and steel users. The average score shows the billet group having the highest agreement toward the threat of new entrants ($\bar{x}$ = 3.82, S.D = 0.36), followed by the high bargaining power of suppliers ($\bar{x}$ = 3.79, S.D = 0.87), and competitive rivalry ($\bar{x}$ = 3.34, S.D = 0.45). Similar to billet, slab companies shared their highest agreement on the threat of new entrants and the bargaining power of suppliers, accounting for 3.89±0.32 and 3.60±0.59, respectively. It was slightly different between billet and slab in terms of substitutes, as the slab product group has higher concerns on this aspect ($\bar{x}$ = 3.30, S.D = 0.27). In the case of users, the average score shows that the billet group has the highest agreement toward the bargaining power of buyers ($\bar{x}$ = 3.56, S.D = 0.41), followed by the threat of new entrants ($\bar{x}$ = 3.52, S.D = 0.28), and competitive rivalry ($\bar{x}$ = 3.26, S.D = 0.28). It shows that those three sectors have higher impacts from joining an association when compared to government policies. Additionally, it shows that users have the lowest agreement on both impact from joining an association and government policies, accounting for 3.08±0.34 and 2.63±0.36, respectively.

Table 4.14 A Summary of the Steel Industry Based on Product Characteristics

	Billet Product (n = 33)		**Slab Product (n = 42)**		**Users (n = 9)**	
	Mean	**S.D**	**Mean**	**S.D**	**Mean**	**S.D**
Bargaining power of suppliers	3.79	0.87	3.60	0.59	3.20	0.32
Bargaining power of buyers	2.83	0.69	2.99	0.58	3.56	0.41
Threat of new entrants	3.82	0.36	3.89	0.32	3.52	0.28
Threat of substitutes	3.09	0.26	3.30	0.27	3.11	0.49
Competitive rivalry	3.34	0.45	3.27	0.35	3.26	0.28
Complementors or associations	3.56	0.70	3.73	0.56	3.08	0.34
Government policy	2.87	0.40	3.20	0.36	2.63	0.36

4.3 Inferential Analysis

This section applied inferential analysis to identify the relationship effect of complementors or associations, and government policies on each of Porter’s forces. The use of statistics assessment was comprised of a Pearson correlation coefficient and OLS linear regression analysis. There were two independent variables, including complementors or associations, and government policy; the dependent variables were five determinants from the Five Forces Porter model.

4.3.1 Normality Test

The assumption that needs to be examined before conducting parametric analysis is normality of the variables. It was assumed the variables must be normally distributed. Normality can be assessed by visual inspection, such as Q-Q plots or a histogram, or using statistical values in relation to the distribution of data, like skewness and kurtosis. In order to test the normality of the predictors, Q-Q plots were the graphical methods employed in this study, which is represented in appendix A. Obviously, the distribution of data represented in each Q-Q plot fairly fits along the regression line. Hence, all seven variables can be accepted as normally distributed.

4.3.2 Multicollinearity Diagnostic

It was suggested to test the relationship between variables using a Pearson product-moment correlation coefficient before conducting regression analysis. The correlation coefficient (r-value) can help to estimate the level of relationship among variables. The usefulness of a bivariate correlation test is that it can assess the strength and direction of the relationship. For assessment of the relationship, Hinkle et al. (1988) recommended the interpretations of r-value as such: $r = 0.81$-1.00 – very high, $r = 0.61$-0.80 – high, $r = 0.41$–0.60 – moderate, $r = 0.21$–0.40 – weak, and $r = 0.00$–0.20 – very weak relationship. In order to avoid the multicollinearity issue, the r-value should not be above 0.90 (Hair et al, 2013: 196).

From table 4.15, the author represents the relationship among five forces, associations, and government policies. The p-value of the relationship between associations and five forces found that three forces significantly correlated ($p < 0.05$), consisting of the threat of new entrants ($r = 0.552$, $p = 0.000$), the bargaining power of suppliers ($r = 0.399$, $p = 0.000$), and competitive rivalry ($r = 0.399$, $p = 0.000$). This finding represents the threat of new entrants as a positive and moderate relationship with associations, while the bargaining power of suppliers and competitive rivalry was weakly correlated. Consequently, the p-value of the relationship between government policies and five forces found that three forces were significantly correlated ($p < 0.05$), consisting of the threat of new entrants ($r = 0.694$, $p = 0.000$), competitive rivalry ($r = 0.381$, $p = 0.000$), and bargaining power of buyers ($r = 0.272$, $p = 0.014$). This finding represents the threat of new entrants with a moderately positive relationship with government policies, while competitive rivalry and bargaining power of buyers was weakly correlated. Furthermore, the coefficients of the seven variables ranged from 0.009 to 0.694, which is less than 0.90. Thus, the findings confirmed no multicollinearity among the tested variables, which provides supportive information to identify the impact of associations or government policies on each force by using linear regression.

Table 4.15 Correlation Matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**
1. Bargaining power of suppliers							
2. Bargaining power of buyers	-.418**						
3. Threat of new entrants	.097	.448**					
4. Threat of substitutes	-.032	.455**	.308**				
5. Competitive rivalry	-.045	.306**	.402**	.227*			
6. Complementors or associations	.399**	-.078	.552**	.009	.399**		
7. Government policy	.177	.272*	.694**	.123	.381**	.641**	

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4.3.3 Regression Analysis

In this section, OLS linear regression was applied to identify the impact of complementors or associations and government policies on each force of Porter's, which are represented in tables 4.16 & 4.17.

According to the adjusted R-square (table 4.16), the summary of the regression model represents 0.7% to 29.6% of variation in associations that can impact the five forces. The F-statistic of 14.767, 34.207, and 14.730 represents that the bargaining power of suppliers, threat of new entrants, and competitive rivalry were significantly predicted by the association at 0.05. Base on a coefficients test, the result shows a significant level of associations that impact on bargaining power of suppliers (p = 0.000, Beta = 0.456), threat of new entrants (p = 0.000, Beta = 0.306), and competitive rivalry (p = 0.000, Beta = 0.251) have below 0.05 ($p < 0.05$), while the bargaining power of buyers and threat of substitutes have a p-value above 0.05. Thus, it explains that the bargaining power of suppliers, the threat of new entrants, and competitive rivalry can increase if they get more support from complementors or associations; but it found associations had no impact on other forces, such bargaining power of buyers and threat of substitutes. The beta coefficient also indicated that associations are the most effective way of improving the bargaining power of suppliers, followed by the threat of new entrants and competitive rivalry.

Table 4.16 The Impact of Complementors or Associations on Five Forces

Dependent Variable	**Model Summary**			**Coefficients**				
	Adjusted R^2	**F**	**p-value**	**Constant**	**Beta**	**S.E**	**t**	**p-value**
Bargaining power of suppliers	.148	14.767	.000	2.005	.456	.119	3.843	.000
Bargaining power of buyers	-.007	.472	.494	3.298	-.080	.117	-.687	.494
Threat of new entrants	.296	34.207	.000	2.731	.306	.052	5.849	.000
Threat of substitutes	-.013	0.007	.936	4.280	.007	.092	0.081	.936
Competitive rivalry	.148	14.730	.000	2.402	.251	.065	3.838	.000

Note: Independent variable: Complementors or associations

From table 4.17, the summary of regression model indicates 0.3% to 47.5% of variation of government policies can impact five forces. The F-statistic of 6.313, 73.356 and 13.428 represents that the bargaining power of buyers and threat of new entrants were significantly predicted by government policies at 0.05. Based on a coefficients test, the result shows a significant level of associations that impact on bargaining power of buyers (p = 0.014, Beta = 0.062), threat of new entrants (p = 0.000, Beta = 0.475), and competitive rivalry (p = 0.000, Beta = 0.134) have below

0.05 ($p < 0.05$), while the bargaining power of suppliers and the threat of substitutes all have a p-value above 0.05. Consequently, it reveals that the bargaining power of buyers, threat of new entrants, and competitive rivalry can increase if they get more support from government policies; but it found that government policies had no effect on other forces, like the bargaining power of suppliers and threat of substitutes. The beta coefficient also indicated that government policies are the most effective way of improving the threat of new entrants, followed by competitive rivalry and bargaining power of buyers.

Table 4.17 The Impact of Government Policy on Five Forces

Dependent Variable	Model Summary			Coefficients				
	Adjusted R^2	F	p-value.	Constant	Beta	S.E	t	p-value
Bargaining power of suppliers	.019	2.545	.115	2.748	.293	.184	1.595	.115
Bargaining power of buyers	.062	6.313	.014	1.776	.409	.163	2.513	.014
Threat of new entrants	.475	73.356	.000	2.128	.564	.066	8.565	.000
Threat of substitutes	.003	1.206	.275	3.868	.144	.131	1.098	.275
Competitive rivalry	.134	13.428	.000	2.258	.347	.095	3.664	.000

Note: Independent variable: government policy

4.4 Conclusion

To sum up this chapter, this chapter began with Utilizing Porter's Five Force Model, which consists of Bargaining Power of Suppliers, Bargaining Power of Buyers, Threat of New Entrants, Threat of Substitutes, and Competitive Rivalry, for identifying the forces toward Thailand's steel industry survival. In order to test the effect caused by external factors, namely, Complementors or associations and Government Policy on Thailand's steel industry survival, the Quantitative findings from this chapter came out with the following:

It was found from the collected quantitative data that Bargaining Power of Suppliers, Threat of New Entrants, and Competitive Rivalry have effects on the industry's survival. In the case of Government Policy, it has an effect on the Threat of New Entrants and Competitive Rivalry.

Furthermore, in order to develop more understanding into each factor, the next chapter uses a qualitative method in order to gain insight into the information of the relation for each variable.

CHAPTER 5

QUALITATIVE RESEARCH RESULTS

In this Chapter, the content of the qualitative research will be divided into 3 parts following a mention of the qualitative research method mentioned in Chapter 3.

5.1 In-Depth Interview

5.2 Focus Group

5.3 Non-participant observation

5.1 In–Depth Interview Summary

Informant: Mr.Korrakod Padungjitt, Secretary of Thailand Iron and Steel Industry Club, the Federation of Thai Industries

Interview date: 19th January 2018

Interview subject matters as follows:

5.1.1 Structure of Thailand Iron and Steel Industry

Steel industry structure consists of 3 main parts, which are the Upstream industry, Midstream industry and Downstream industry. In Thailand, the beginning point of the steel industry is from the Midstream industry. This beginning point is the process of recycling and re–use of steel scrap by melting steel scrap, then adjusting the chemical elements and casting it into semi–finished steel products of Billet, Slab and Bloom.

Semi–finished steel product will be further processed in each step by Hot forming, Cold forming and Coating, respectively, in order to become various kinds of steel products such as wire rod used for construction, low carbon wire, high carbon wire, hot rolled structural steel, galvanized wire, galvanized steel wire, high tensile strength steel, hot rolled steel, cold rolled steel, galvanized steel sheet, galvanized steel, zinc coated steel sheet, electro–galvanized steel sheet, coated steel sheet, cold rolled structural steel and metal pipe to be used in various industry sectors (such as construction, production of automotive parts, electrical component manufacturing, structural production, cans used for food containers, molds, shipbuilding and ship repair, et cetera.

In the past, Thailand used Mini Blast furnace technology by Tata Steel (Thailand) in the production processes of the upstream industry. Tata Steel (Thailand) is an Indian steel manufacturer which made an acquisition with a Thailand steel manufacturer. However, at present, the upstream steel manufacture by Tata Steel (Thailand) has been ceased, and only steel production by melting steel scrap continues.

The structure of Thailand's steel industry is fragmented, which means each steel manufacturer conducts only one or two steel manufacturing processes, for example, in hot rolled steel manufacturing, there is Sahaviriya Steel Industries Public Company Limited (SSI), which is Thailand's biggest manufacturer, it imports slab to be manufactured by only the hot rolled process (with no other manufacturing processes in the factory). In foreign countries, each company might start its steel manufacturing process by smelting iron ore until it turns into hot metal, and then continue to the process of intermediate steel manufacturing until it turns into crude steel and casting it into slab, then rolled in the same factory in order to produce hot rolled steel, cold rolled steel and coated steel sheet.

The structure of Thailand's steel industry can be divided into two main categories, long product and flat product.

In the long product category, manufacturers start from those who have a blast furnace in order to produce billet and continue their production using the hot forming process in order to obtain rebar, bar, wire rode and hot–rolled sections. For those with no blast furnace in possession they import billet from overseas to be processed by hot forming in order to get steel products.

Limitations in Thailand's manufacturing because of using steel scrap as the raw material has uncertain origins, such as obsolete scrap, prompt scrap, et cetera, causing contamination in the steel scrap with other materials due to inadequate screening processes. Thus, steel products manufactured by such processes, such as rebar, low carbon wire rod and hot–rolled sections, are used only for construction or structural work. These steel products cannot be used in rigid chemical elements work with strict product features like steel products such as wire rod used for tire support or wire rod used for product forming.

Cold formed steel product is a manufacturing process in which wire rod is processed at room temperature. Main products in the cold formed steel category are steel wire and cold drawn bar. Products in the steel wire category contain diversity, both in product nature and in product use (such as general use low carbon wire rod such as nails, floor grates, barbed wire, et cetera. Wire rod is used for product pins like nuts, screws, welding wire, medium carbon wire used for auto parts such as motorcycle wheels and high carbon wire used for twisted construction work such as slings, springs, automobile tires, et cetera.

Apart from these products, there are products in the stainless steel category, in Thailand the manufacturing of stainless steel products include stainless wire and stainless shaft. The manufacture of these products uses imported stainless steel from overseas and uses a cold–rolled process. This type of product is used in work that needs erosion prevention and in circumstances with a high chance of erosion such as beach work, the petroleum industry, chemical related work, high temperature resistant work, and so on.

In the flat product category there are manufacturers that use a furnace to melt steel scrap to produce slab and continue with a hot–rolled process until it turns into hot–rolled sheet. However, there are only 2 manufacturers in this category, the 4 remaining manufacturers are those which produce hot–rolled steel by importing slab. Generally, midstream and downstream manufacturers are in smaller numbers than those that are in the long product category. Moreover, most flat product manufacturers hold more capacity than long product manufacturers.

Another steel sheet category is cold–rolled sheet, which is the process of bringing in hot–rolled sheet to cleanse its surface, then taken into a cold–rolled process to flatten the sheet in order to get a shinier surface. Some cold–rolled sheets will be further taken into a metallic coating process where it can be coated with various kinds of metal, such as galvanized coating, galvanneal coating, aluzinc coating, tin–plated coating, including taking coated metal steel sheets into a pre–painting process for work that needs a beautiful surface.

There is another product category, that being stainless steel sheet, in Thailand there is a sole manufacturer that operates by importing hot–rolled stainless steel and putting it through a cold–rolled process. This product category is used in erosion prevention work, for example, work that needs a special chemical durable quality or a hot temperature endurance quality (such as exhaust pipes used in vehicles, kitchenware, decoration work, et cetera).

5.1.2 Overall State of the Steel Industry

The use of steel and iron in Thailand has been rising continuously. In 2016, the need for steel and iron use was 19 million tons per year, approximately. That amount is less than 280 kilograms per person per year, which is a level with further growth potential. In industrial countries or developed countries, the need of steel and iron use is 400–500 kilograms per person per year, approximately. Steel and iron use in developed countries or industrial countries can skyrocket to 800–1,000 kilograms per person per year for heavy industry countries such as South Korea.

Looking roughly, it may seem that there is no development in steel products since those products might have similar looks. However, by studying steel products closely, we can find that steel products themselves are continuously developed and adapted. A clear example on a global level is there has been development for steel products to compete with other materials. For example, aluminum is used in the manufacture of Tesla's EV car in order to manufacture light–weight cars. Steel manufacturers such as Japan and Europe give priority to their steel products' strength. In the past, the strength of steel used for car manufacture was 590–790 MPa, at present, that strength has been developed to be more than 900 MPa in order to obtain lighter steel with the same strength. Moreover, steel used in huge bride structure work is aimed at becoming 1,500 MPa or more.

Steel coating technology is another example of development in steel products, in the past, a hot dip galvanized method was used to extend the lifetime of steel by using zinc to be eroded instead of the steel, at present, the technology has evolved with various methods using other kinds of metals which are patented products. For example, aluminum, zinc and magnesium coatings can be used to withstand erosion and are good in alkaline conditions, such as use in animal farms. In Thailand, there has been investment from major investors at the international level such as NSSM, JFE, POSCO, et cetera, since Thailand became a center of Asian development and is now a manufacturing exporter, both in vehicles and electronic equipment.

However, in a market development aspect, Indonesia and Vietnam hold growth at a higher rate than Thailand, including in the primary steel industry. In comparison, Thailand lacks primary steel manufacturing. Those factors have brought Indonesia and Vietnam to appeal more to investment in the future.

Regarding the concept of steel industry development on a global level, major steel manufacturers focus on the “Circular Economy” concept, which could cause a reduction in the intensity of steel use from these following factors:

1) Reduce, Reuse, Recycle, Remanufacturing
2) Sharing Economy

For example, in the future, the need of owning vehicles will be less, since everyone can share their vehicles, especially when technology reaches an “autonomous vehicle” state.

In the aspect of the global steel industry, at present, China is the biggest global steel manufacturer, Japan and India are the second and third biggest global steel manufacturers, respectively. Issues in the global trade industry are China’s surplus in manufacturing capacity, which has caused trade issues all over the world, such issues include China’s avoidance of trade measures.

In China, its capacity was approximately 1,100 to 1,200 million metric tons per year, at present, its capacity is at 800 million metric tons, which can be separated into domestic use at 700 million metric tons, and the remaining 100 million metric tons are exported globally. Trade measures have been enforced with China accordingly.

In the past one to two years, there have been news report or Chinese government policy announcements that China will limit its capacity at 100–150 million metric tons, however, even with the lower capacity as announced, the production of Chinese steel does not lessen since its surplus capacity is almost 400 million metric tons over its own capacity.

There is another concern with the halt of China’s manufacturing capacity, all of its manufacturing technology is outdated, with low efficiency in both manufacturing and environmental management. According to data from Japanese steel manufacturers, by co–discussion between the Thai steel industry and Japanese steel industry under the supervision of JTEPA, the Chinese government is clearly imposing a policy whereby the transfer of halted manufacturing capacity to another county is prohibited, however, there is no prohibition in the export of manufactured machines. Hence, Thailand and other ASEAN countries are at risk of importing used machines to produce similar products that have already been manufactured domestically, and with outdated technology that can be harmful to the environment in Thailand and other ASEAN countries.

Concerns over China’s surplus capacity and its unfair trade practices have been widely discussed among EU countries, including developed countries in the OECD. The concerns have been discussed annually via the Steel Committee and those concerns will be raised in national negotiations.

In ASEAN, there is the ASEAN Iron and Steel Council, which is an association of ASEAN steel industries under the South East Asia Iron and Steel Institute (SEAISI), it arranges annual forums with China’s steel industry through the China Iron and Steel Association (CISA). The main issues of these forums are the continuous dumping into ASEAN countries conducted by China’s steel industry, including various tactics used to evade anti–dumping policies, for example, modification of product elements in order to change customs tariffs, or using ASEAN countries such as Vietnam as a “springboard” for conducting dumping as a subrogation of Chinese steel products that are facing anti–dumping policies. Those tactics include exporting China’s steel products that are in demand by ASEAN steel manufacturers, such as semi–ready made products, to be processed and add value, instead of exporting steel products or investing in high technology products.

Most of the past discussion lacks progress since it involves forums among private sectors, however, in the upcoming discussion, this has been upgraded to the governmental level, which includes delegates from ASEAN countries and China, moreover, the outcome of the discussion will be reported to the ASEAN–China Joint Committee. The upcoming discussion is positive progress in that both government sectors will be joining. The Department of Trade Negotiations, Ministry of Commerce, has played an important role for such an upgrade, the general director of the Department of Trade Negotiation will be a co–chairman of the ASEAN– China Joint Committee.

5.1.3 Steel Industry Competition

Competition in the steel industry is strong since almost every product type is in surplus capacity status, even domestic manufacturers are not at their full capacity of production, with a total rate at 30–40 percent, however, there is tough competition from imported products, especially Chinese steel products, whose exports increase every year. Although Thailand's steel demand is in a positive direction, the import rate excels more than market expansion, causing a rise in the Chinese product proportion, with the obvious effect of a decrease in the domestic manufacturing rate. Even the demand in steel consumption is rising, and that demand goes to the imported products instead of the domestic products.

Steel used in construction sites is a strongly competitive product since there are a variety of choices for consumers, both domestically manufactured steel and imported steel. Especially in the market of general construction work, which is non–government construction work or large private sector construction projects, such general construction work is price–competitive, which steel buyers and contractors prioritize more than other factors.

On the point of steel used in manufacturing industries such as vehicle parts or electrical appliances, competition in this product sector is not as strong as steel used in construction sites. However, there are obstacles in entering this market since there are some conditions that need to be met, the products need to meet both general standards and buyers' conditions (which are stricter than general standards), besides, steel used in this sector has to pass standard tests, for example, metal sheets from new manufacturers must be tested to insure that they are able to be molded at the same amount or more than metal sheets currently used before changing the molds.

In the aspect of competition with imported products, most of the manufacturers in the same industry coordinate among themselves in order to gain government support to create trade fairness by using applicable mechanisms, such as filing for the use of an Anti–dumping policy or Safeguard policy. In some products, mandatory industrial standards shall be enforced. These policies shall be enforced according to related government organizations such as the Department of Foreign Trade, Ministry of Commerce or Thai Industrial Standards Institute (TISI), Ministry of Industry.

However, in the past few years, some trade remedies cannot be enforced efficiently over various products since exporters abroad and domestic importers seek to evade the trade remedies, causing unfair trade practices, while other countries enforce their own trade remedies but restrict the trade remedies that are used in other countries. For example, India sets a Minimum Floor Price, and the United States is considering the enforcement of Section 232 in order to define whether imported steel influences their national security. These trade policies are used beyond the enforcement of AD, CVD, AG and AC. Hence, the current lack of a comprehensive trade policy can cause damage to Thailand since, when trade remedies are enforced, those products get flooded into Thailand and ASEAN countries.

There is information for manufacturers in the countries that produce tin plates and chrome coated steel sheets which are used in canned-fruit packages and canned food. In 2017 there was a decrease in the production of these products because of dumping from China, causing the inability to compete and manufacture among the manufacturers. Currently, there might be the consideration as to whether anti–dumping legal action will be taken.

5.1.4 Factors from Raw Material Suppliers

Since steel manufacturers in each product category use different raw materials or similar product categories with different manufacturing processes, the raw materials used are different. For example, wire rods that are used in construction work; in the case of manufacturers that use furnaces, steel scrap is their main raw material, in order to continue to further process it as billets and construction wire rods. However, for factories that use hot iron with no furnace, billets are their main raw materials.

According to the previous paragraph that steel scrap is the main material for manufacturers with furnaces, in Thailand there is a shortage of steel scrap, however, purchasing domestic steel scrap is cheaper than importing steel scrap, hence, tough competition in the domestic steel process is an issue, while the importation of steel scrap contains no issues. Since the price of steel scrap abroad is higher than domestic steel scrap, there has been an exportation of steel scrap, which can cause a steel scrap shortage, which can lead to proposals to prohibit steel scrap exportation.

In the aspect of semi–finished steel product importation, such as billet, splat or bloom, importers are able to import with no prohibitions of importation. In terms of product, billets used for general steel manufacturing work such as billets used for construction wire rods can be purchased widely, since their manufacturing process is uncomplicated. Billets used for specific work such as high carbon billet used for high carbon wire rod manufacturing, on the other hand, is rare for purchase, since it requires high technology to manufacture it. Moreover, manufacturers that are able to produce those high quality billets tend to continue their manufacturing processes in order to create added value.

The same situation occurs in hot–rolled steel sheet manufacturing, in cases where domestic manufacturers have to import slab from other countries. In the case of slab used for general hot–rolled steel sheet, it is easier to purchase slab than to manufacture hot–rolled steel sheet that's used for deep drawing or extra deep drawing work. Hence, in the case of buyers of vehicle parts or electrical appliance manufacturers, slab origins might be specifically identified. Those specific slabs are harder to purchase, which is a limitation of Thai steel manufacturers who lack primary steel production, causing hardship in new product development or producing distinctive products.

Since there are many processes in steel manufacturing, hot–processed steel is the raw material of cold–processed steel, for example, hot–rolled steel sheet is the raw material in the production of cold–rolled steel sheet, hot–rolled steel sheet and cold–rolled steel sheet are the raw materials in producing coated–steel sheet, hot–rolled steel sheet and cold–rolled steel sheet are also raw materials in producing steel pipe. Therefore, there are always conflicts in cases of trade policies.

Another factor that affects the steel industry is that the price of steel products depends on market mechanisms, however, in terms of steel production and its carriage, there is a "lead time" which depends on trade factors and raw material supply, including a carriage period, which can be 2–3 months in the case of importation. Hence, since steel prices in global markets fluctuate with various factors, there is price speculation of steel in providing raw material supply and a “lead time” factor, causing a skyrocket in profit for importers and exporters, on the other hand, such factors can also cause massive losses to importers and exporters.

5.1.5 Market Factor and Consumer Target Factor

Recently, high quality products have been more popular in the market and there have been changes in distribution methods, causing changes in the form of product distribution of steel manufacturers. Moreover, there have been changes in product development since the profits from middlemen have lessened, steel manufacturers are trying to create more opportunities in distributing their products to end users such as distribution through modern trade, building their own sale representatives, including product PR to make consumers more familiar with their products and make their products distinct from others. These trends seem to be continuing.

Steel manufacturers are trying to add value to their products and focus on responding to consumers’ needs by producing more ready–made products. Currently, it is hard to find the manpower and wages have risen, hence, steel products which are the most used in construction work need to develop themselves to respond to labor issues. For example, instead of selling only wire rod, wire rod manufacturers could also sell cut and bend wire rod in order to boost efficiency in construction work, lessen labor costs and add value to their products.

In the aspect of consumers’ bargaining power, since consumers can access more information than in the past, especially pricing information, it brings a rise in consumers’ bargaining power. Moreover, at present, importation can be done more conveniently and its cost has decreased, especially import tariffs, which have decreased in almost every product category in FTA and ASEAN, such as ASEAN–China, ASEAN–South Korean, Thailand–Japan, and Thailand-Australia, most of them have been decreased to a 0 % tariff in the past 3–4 years.

Nowadays, it is easier for buyers to switch to other products in the category of general use and highly similar products, especially, at construction sites where general grade steel is used. In this product category, steel sellers focus on pricing while end users cannot differentiate products such as wire rod used in construction sites, though all are qualified by the Thai Industrial Standard Institute.

However, in the product category, which requires a lot of know–how in manufacturing processes or strict product specifications, which includes very specific products like galvanized steel wire, steel wire used for vehicle tires, anti-gravity steel sheet used for vehicle parts, there is less probability of the buyers of these products to switch to an opponent's products since in changing the supply, there are more processes to examine, test and certify those products. Hence, price is not the main issue for this product type.

5.1.6 Business Entry for Newcomers

In order to set up factories in the steel industry, it requires both investment capital and high cash flow, including the ability to find raw materials and a market. In the process of intermediate steel manufacturing and hot processes, this requires a large scale factory with production capacity at the rate of hundreds of thousands to millions of metric tons per year, while downstream steel production, which contains various production lines, requires smaller factories with a production capacity of ten thousand tons per year.

At present, the trend in setting up factories for intermediate and downstream manufacturing is not high. Most of them include remaining manufacturers that invest to improve their machines' efficiency, both as replacements for their old machines or newer technology to manufacture new products to replace their current importations. Yet, there is a rise in the investment of machines used to process steel since it requires much less capital.

However, competition is a limitation for newcomers, since there is tough competition in the market, making it hard for the newcomers to compete with former investors. Because of tough competition that causes hardship for the newcomers to compete in the current situation, it is easier to import (than to manufacture downstream steel product), especially with downstream steel manufacturers who face capital pressure, since they have to import raw materials at global market prices which are high, while they have to compete with imported products which are much cheaper. For example, to manufacture coated steel products or cold formed structural steel

(steel pipe, light lip channel), raw materials such as hot-rolled steel sheet and cold–rolled steel sheet are expensive because the raw materials price of hot–rolled steel sheet and cold–rolled steel sheet is high on the global market. High priced raw materials come from the expensiveness of ore and charcoal on the global market. However, when those raw materials are manufactured to coated steel sheet, steel pipe and light lip channel, domestic manufacturers have to face dumping from overseas, especially from China, which has many raw materials in its country, hence, it is already profitable for China, allowing them to conduct price dumping, including their exportation advantages by using loopholes of trade policies and exportation policies that set distinctiveness in tax refunds of each product.

5.1.7 Entrepreneurs' Association in Federation of Thai Industries

The Thai Iron and Steel Industry Club, Association in Federation of Thai Industries, is the gathering of iron and steel industry entrepreneurs with 104 member companies. Thai Iron and Steel Industry Club is under the Association in Federation of Thai Industries' supervision. It is one of 42 groups under the Association in Federation of Thai Industries.

Most of the members are intermediate and downstream steel manufacturers, both small and large companies. Company members consist of Thai nationality and joint ventures. A small amount of members are secondary companies who use steel or cast iron companies.

The association of Thai steel industry aims to support each member's business by coordinating between members and the government sector in a policy aspect. The objective of the Club is also to build connections among members. Most of the Club's activities are discussion forums, updating steel industry–related information and presenting information and opinion to government sectors. Such information and opinions are legal, industry development policies and trade negotiation issues. This information and opinion, prior to the submission to government sectors, must be circulated among members for their approval.

Every decision made by the Club must be approved by its board, which consists of representatives of the member companies. Each board consists of approximately 100 representatives, the monthly meeting consists of 30–40 representatives joining the meeting, thus, no one company can hold decision making power by themselves.

A principle of the Club is to protect members' interests by respecting and taking each other's opinions and proposals as their own priority. Such opinions and proposals must not influence whole members. For example, a proposal related to free trade and customs tariffs must be presented by the manufacturing companies of such products. Even companies that import those products cannot make their proposal unless they are the manufacturers of such products. These rules aim to avoid conflicts in the Club.

On the point of negotiations with suppliers or buyers, that information is kept secret in each company, since the companies' will is to keep it confidential from other companies. Concerns related to government policies, such as trade policies, trade measures, negotiations in Free Trade Areas, domestic products support, support of steel products, human resource development and laws related to industry, environment, energy and work safety, can have a huge effect on the whole industry. On the other hand, discussion has been made among members to find their proposals, oppositions or comments, including explanations with government sectors, to represent the whole group. Members agree to make co–decisions since the Club is a systematic and big association with expert members who understand how to work with the government sector.

At present, there are other steel product associations, however, they are not related with the Thai Iron and Steel Industry Club, except for the Metal Tube and Cold–Forming Steel Association, which is a Thai Iron and Steel Industry Club member. In issues related to metal tubes and cold–forming steel, the Thai Iron and Steel Industry Club takes Metal Tube and Cold–Forming Steel Association a priority, since they are a member of the Club.

There are other associations with the specific nature of a subordinate industry, such as the Electric Arc Furnace Association, and the Thai Hot Steel Plate Association, these are the associations of electric arc furnace steel entrepreneurs and hot steel plate entrepreneurs. Their objectives focus on specific steel categories. Since they are associations with the same product category, there is no conflict with other associations.

Associations for products in the downstream supply chain, on the other hand, still have conflicts, for example, the Wire Rod User Association's objectives conflict with the Prestressed Concrete Wire Association, since wire rod is under anti–dumping measures, and end users oppose the enforcement of trade remedies.

5.1.8 Government Policy Toward Industry Development

Related government policies with industry development consist of investment support, trade remedies, industrial standards, industry development strategy, energy usage improvement, FTA negotiations, domestic steel product use, import tax structure adjustment, steel manufacturing labor skill development, co–ordination of setting industrial standards, et cetera. This support is co–conducted with these following government organizations:

1) Ministry of Industry: Office of Industrial Economics, Department of Industrial Works, Thai Industrial Standards Institute, Department of Industry Promotion, Iron and Steel Institute of Thailand.

2) Ministry of Commerce: Department of Foreign Trade, Department of Trade Negotiations, Department of Internal Trade.

3) Ministry of Finance: The Customs Department, Fiscal Policy Office.

4) Ministry of Energy: Department of Alternative Energy Development and Efficiency.

5) Office of the Prime Minister: Office of the Board of Investment (BOI).

6) Ministry of National Resources and Environment: Thailand Greenhouse Gas Management Organization.

Recently government policies have been the key to industry development and have been a great impact on the business development of iron and steel entrepreneurs, especially in the entrepreneurs' role, as they have to adjust themselves to the country's business progress and demands in more advanced products and technology. This adjustment reflects in the investment from international steel manufacturers, both joint ventures and direct investment, in order to contribute newer products which require more advanced technology and the survival of industry, which is the main pillar of the country's development. According to these previous years, the steel industry in Thailand has faced hardship, which is the effect from global economy fluctuations and unfair trade from foreign steel investors. Hence, without help and support from related government organizations, Thailand's steel manufacturers might not have survived, since they have faced unfair trade from foreign steel manufacturers.

In 2015, Thai Iron and Steel Industry Club, Association in Federation of Thai Industries and Iron and Steel Institute of Thailand set the following Thailand steel development strategies:

5.1.9 Thailand's Steel Industry Challenges

How can Thailand's steel industry survive through the global steel industry crisis, as the steel price hits its lowest rate in 10 years? Moreover, Thailand's steel industry also faces flooding of steel products from other countries. Thailand's steel industry faces fierce competition from the dumping of cheap steel products from China with the probability of a rise in dumping from other countries. Thailand's steel industry still has to face a Chinese government steel industry subsidy and circumvention, including a surplus capacity problem which remains unsolved.

1) How to attract midstream industry to use domestic steel products?

Thai steel manufacturers need to understand the conditions of midstream manufacturers' use of steel in order to set a business model and mechanism to respond to the real needs of users, other than price competition (delivery, availability, quality).

2) How to attract foreign investors to use Thailand as a high quality steel manufacturing base, as an export base to other ASEAN countries?

Special investment support to high technology steel products and high quality steel products can make the government reach its goal by using them as the supplies of government targeted industry, which include the automobile industry, electrical industry and electronics industry.

3) How to make the Thai steel industry become a center of ASEAN, both in manufacturing and distribution aspects?

The attraction of foreign investors to use Thailand as a manufacturing base shall make a strong supply chain in the automobile industry and electronics industry and remain competitive in its ability to use Thailand as a main manufacturing base on a global level.

5.1.10 Thailand's Steel Development Direction

1) Add value to the steel industry by being a "Service Solution" .

2) Support the use of "Local Content" in domestic automobile parts manufacturing and electrical appliance parts.

3) Support the upstream steel industry.

4) Support domestic investment in order to contribute to high quality and innovative downstream steel manufacturing.

5) Set safety standards to cover steel products which can affect users' safety.

6) Support domestic product use.

7) Improve related legal provisions and legal enforcement to develop the industry.

However, some entrepreneurs see the opportunity in importing machines.

5.1.11 Thailand's Steel Industry Development Strategies

1st Strategy: Add value to the steel industry by developing it into a "Service Solution".

2nd Strategy: Support the use of "Local Content" for the manufacture of domestic automobile parts and electrical appliance parts.

3rd Strategy: Support the start–up of upstream steel manufacturers.

4th Strategy: Support domestic investment in order to produce high quality and innovative downstream steel products.

5th Strategy: Set security standards for steel products which can affect user safety.

6th Strategy: Support the use of domestic products.

7th Strategy: Legal provisions and legal enforcement improvement in order to improve the steel industry.

However, these strategies have not been taken into effect, as time goes by, policies to develop the whole industry have been adjusted. Accordingly, steel industry strategies should be reviewed and substantially put into effect.

5.1.12 Government Policies and the Survival of Steel Entrepreneurs

It can be said that the most influential government policies toward steel entrepreneurs are competition–related policies, since most policies, such as investment support policies, industry development policies, supervision policies and trade negotiations affect the advantages and disadvantages among entrepreneurs in the same industry or continuous supply chain industry. The next government policies that entrepreneurs are likely to focus on are raw materials–related policies, since the inability to find a cost of raw materials that can compete in the market can cause business failure or loss of profits. Government policies used currently are raw materials–related, however, they are not so strict that entrepreneurs are unable to find raw materials.

In bargaining with buyer aspects, there is no strict government policy, as buyers retain their high bargaining power, especially in free trade mechanisms or even in trade remedy issues, such as anti–dumping policy, there is an exception unless such goods are domestically manufactured, or the raw materials are, which midstream manufacturers need to import for their production and their export. The exception is made to remain competitive and attract foreign investors, making a balance in the business sector.

Government policies have low influence on other product replacements and creation of limitations in the newcomers' market entry, since the causes of other product replacements, whether they are the replacements of steel or steel is used to replace other materials, are consumers' behavior and market changes. While government policies never create limitations for newcomers, except on factors that impact the whole country such as environmental aspects for which the government issued stricter rules in manufacturing technology, they do focus on clean technology and increasing the efficiency in energy use. These limitations are beneficial since they build sustainable industrial development rather than gaining temporary benefits that cause long-term bad effects to the environment.

In the aspect of government policy coordination with trade associations, in the past, the aggregation of entrepreneurs focused on business connections while having the Thai Iron and Steel Industry Club as a connection center with the government sector, giving updated government policies to the private sector in the overview aspect of industry. Recently, there has been more aggregation of entrepreneurs in specific products, however, it is not enough to stimulate policy with the government sector. The activities carried by trade associations are their mutual interests, when it comes to individuals' interests or business's confidential information, the activities should be carried out by each entrepreneur individually. Besides, the incitement of any issue to the government sector needs trustworthy and solid data, it should not irresponsibly claim to create trade advantages to any specific group.

5.2 Focus Group Summary

Information providers: Representatives from Entrepreneurs of Steel Industry Manufacturers (Billet and Slab), Federation of Thai Industries

Interview date: 16th January 2018

5.2.1 Issues of Five Forces Model with Entrepreneur Competition

1) Negotiations with Suppliers

There is upstream production in Thailand's steel manufacturers, which is midstream production that uses melted steel scrap for the production of billet, slab and bloom and then continues the process to produce steel products. The benefit of production from steel scrap is that it is recycling, which is good for the environment and energy use (compared to steel production from ore).

There are numerous suppliers for steel manufacturers who use steel scrap as their raw material, both for billet manufacturing (steel rod, wire rod, hot–rolled structural steel) and slab (hot–rolled steel sheet). Hence, it is easy to switch suppliers. Moreover, steel manufacturers need domestic steel scrap since it has shorter lead time than importation and it is cheaper than imported sources. However, strict examination should be conducted by every entrepreneur since they have to prevent contamination from other materials. The limitation is there is not enough domestic steel scrap, thus, they have to import from other countries, with the United States, Australia, Philippines, China, Japan and South Korea as the main sources.

Steel manufacturers which use semi–finished steel products by hot–rolled processes for commercial grade steel rod, wire rod, hot–rolled structural steel and hot–rolled steel sheet, are able to purchase raw materials generally on the global market since there are many semi–finished steel product manufacturers. There is a reference price for purchase, such as the steel business briefing and metal bulletin price. However, steel products used for specific work (automobile parts, low carbon steel, high carbon steel) are harder to purchase and they are more expensive, since there are a limited numbers of suppliers.

In the case of steel rod, cold–rolled steel sheet and coated steel sheet, currently, there is a limitation in finding suppliers because of trade measures (AD, safeguards), causing hardship in finding these suppliers. Hence, steel manufacturers adjust themselves by finding new suppliers. Steel rod manufacturers tend to import from India and Vietnam instead of China, which faces AD measures. Cold–rolled steel sheet manufacturers import raw materials through an exception of measures, which includes exceptions of safeguard use in the case of hot–rolled steel used for cold–rolled products, and AD measure exceptions for cold–rolled materials used in vehicles and electrical appliances.

There are specifications specified by buyers and suppliers in the purchase of raw materials used for cold–rolled and cold processes for specific or bare surface use, such as steel used for vehicles and electrical appliances, which contain stricter rules in product standards.

In the case of cold–rolled structural steel and welded steel pipe manufacturers, which use hot–rolled steel sheet as their main material, there are AD measures used in 4 cases in 21 countries, and 2 safeguard cases, causing struggles in importation, manufacturers thus have to use domestic raw materials. However, there are exceptions in cases of exportation and importation.

In the case of stainless steel, there is no domestic hot–rolled process manufacturer. In Thailand, there are only cold–rolled processes, which include stainless wire rod and cold–rolled stainless steel sheet. Hence, raw materials can be purchased from foreign manufacturers with no trade measures.

However, in the case of domestic cold–rolled stainless steel sheet, there is currently the use of AD measures, causing limitations in buying cold–rolled stainless steel sheet for downstream manufacturers, such as stainless-steel pipe, kitchenware and machines.

In the steel industry, suppliers and steel factories are each other's priority such that they have done business together for a long time. Downstream steel factories' suppliers are midstream steel factories, hence, there is always an information exchange.

In the aspect of information, nowadays, steel manufacturers are able to access more information causing negotiations with suppliers that can be conducted more rapidly, while buyers can also access information more rapidly.

2) Negotiations with Buyers

The ways that steel products that are used directly are distributed, such as structural steel, steel grating, wire, pipe, are via middlemen, some are directly sold to a construction project. Steel manufacturers have tried to find more opportunities to reach end users by establishing modern trades, such as with Global House and Duhome.

Since there are many buyers in each steel company, losing one buyer has no strong impact unless it's their major buyer. Steel companies can lure their competitors' buyers, since steel products used for construction work, such as wire rod or structural steel, have no specific qualifications. Every company's production relies on general product standards, such as JIS or ASTM, while buyers can choose products freely, which are usually their familiar brands. However, each steel manufacturer tries to build recognition and distinction for their brand in order to create more trade opportunities and gain more recognition from customers. While in some products, such as large hot–rolled structural steel (H–Beam, I–Beam) which has a sole manufacturer in Thailand and is hard to import, there is low opportunity for buying products from other manufacturers or importing product.

In the aspect of steel products that require further manufacturing, such as wire rod, hot–rolled steel sheet, cold–rolled steel sheet, coated steel sheet, in normal grade (hot–rolled steel sheet used for structural steel, cold-rolled steel sheet used for furniture, pipes and galvanized coated steel used for structural steel), they have a more specific nature than the former category since, in the further production process, there are requirements from the buyers, making it is harder to switch to other sources.

Moreover, in the case of steel used in manufacturing industries such as automobile parts and electrical appliance parts, more complicated requirements, qualifications and grades of steel are needed, causing low opportunity for customers to switch to competitors' products, as such requirements may be extensive to the performance of the steel in real use. In such circumstances, buyers hold higher negotiation power than new manufacturers, however, after closing the deal, it's a long term purchase.

3) Limitations of Market Entry

Each stage of the steel business, especially in upstream industries, requires capital in land, machines, know–how in manufacturing, and a raw material accessibility network in order to gain continuous raw materials. Moreover, it requires high cash flow, in the steel business, 3 types of cash flow are required: 1.) materials, 2.) goods, and 3.) goods stockpile.

Compared to previous times, these days machines in the steel industry are cheaper and manufacturers can use technology from China, however, there are more problems in factory operations than just technology, since high capital is required, steel factory investors tend to limit their capital spending for machines at low levels.

The current situation in the Thailand steel industry, both in billet and slab, is that there is low production capacity. For example, data from the Iron and Steel Institute of Thailand shows that in the iron wire category, the production capacity is only at 23 percent, while manufacturing capacity is at 9 million metric tons. In hot–rolled steel sheet, which contains a total manufacturing capacity of around 8 million metric tons per year, the use of production capacity is at only 37 percent.

In the case of galvanized steel sheet, including hot–dipped galvanizing steel, galvaneal, iron–sheet coating, production capacity is at around 41 percent. However, when considering only hot–dipped galvanized steel used for construction work, there are 8 manufacturers with a total manufacturing capacity of around

700,000 metric tons per year, and its production capacity might be at less than 10 percent.

Apart from capital and cash flow, the manufacture requires in depth knowledge from experts in many aspects: manufacturing, machines, control systems, since the manufacture needs to operate continuously in order to prevent bad effects on capital. Quality control tools and other control system also need to pass certification.

In the past 5–10 years, the extension of investment has been in the downstream industry category for high technology products. In Thailand and ASEAN, there might be no or very few in that category, for example, galvaneal coated steel sheet used in the automobile industry in major Japanese and South Korean manufacturers, or the investment in seamless pipe, there are just 2 investors who have been promoted to invest in Thailand.

There are former steel manufacturers that focus on improving their machines and production lines by investing in new machines to manufacture higher value products and get over tough competition in the market. For example, wire rod manufacturers investing in high efficiency furnaces, including other tools to manufacture high grade wire rod and steel shaft, which are more expensive than general steel products used in construction work.

However, new manufacturers tend to face hardship in market access and finding customers because of strong competition in the steel market, especially with freely imported products, which many of them imported in the country by conducting unfair trade practices, such as dumping or trade measure evasion. In some cases, foreign importers declare different tariffs on the same products, which is an unfair trade practice. Both trade measure evasion and tariff evasion causes new investors to face hardships in competition.

Apart from that, there is an issue concerning distribution, in that newcomers cannot infiltrate strong bonds of former manufacturers which had already occurred with high grade steel products. Korean steel manufacturers invest in machines and technology to manufacture galvanized steel used with vehicles and with a manufacture capacity of 450,000 metric tons per year, however, they cannot infiltrate Japanese vehicle manufacturers, causing their shifting into hot–dip galvanized steel sheet, which is a general product and much cheaper than galvaneal steel. This factor has caused a surplus, which is hard to compete against compared with hot–dip galvanized steel sheet from China, which is much cheaper.

5.2.2 Substitution from Other Products

Steel is a worthy material in comparison to other materials in the aspect of solidity, hence, steel is still widely used since it is cheaper than others. Steel and the use of steel have been developed successively.

Although many materials can be used instead of steel in construction work, such as wood, concrete or tile, steel tends to be used as those materials' substitution since the development of the use of steel helps the rapidness of construction and also helps in terms of beauty and architecture.

In some types of work, such as vehicles, the use of steel might be substituted from other products such as aluminum sheet, the most vivid example is the Tesla car, in which the whole vehicle is made from aluminum instead of steel. In the future, if the technology used in vehicles turns to BEV or battery used vehicles, the vehicles themselves need to be light, and so steel might be disrupted. However, steel manufacturers are well aware of such threats and therefore develop steel continuously in order to gain more strength and used for more complicated forms, yet, such development and know–how are limited only to global steel manufacturers, not Thai steel manufacturers.

In some work, such as pressure vessels or storage tanks, carbon steel or stainless steel, both, can be chosen, depending on the budget. In the case of a limited budget, carbon steel might be used, since it is cheaper and maintenance methods can be used later.

In some works, such as food packaging, there are more substitutions than other categories like aluminum or plastic.

It is clear that steel is important for midstream industry manufacturing. Each year Thailand uses around 16–17 million metric tons of steel, which is around 250 kilograms for each person, and the use of steel seems to be expanding in the 5 main steel use categories, which are construction, automobiles, electrical appliances, machines and packaging.

5.2.3 Competition in the Industry

Competition in the steel industry is strong in every category. In wire rod and hot–rolled structural steel, the competition is very fierce, since manufacturers hold a surplus of production capacity. In the past 1–2 years, the cost of steel manufacturing with furnaces has increased greatly because of high–priced steel scrap and a lack of graphite electrode rods. The high price of raw materials has caused steel manufacturers with EAF furnaces to see their costs skyrocket, while wire rod steel manufacturers with induction furnaces, though they have issues concerning high energy use in production and inefficient environmental controls, hold their costs down because they do not have to depend on graphite electrode rods, causing high competition in the country, although there is no importation of such products.

In the steel wire category (its main raw material is wire rod), manufacturers claim that because of strong competition in the industry, steel wire manufacturers have been seeking the importation of low price wire rod in order to better be able to compete with imported products. These manufacturers also claim that the Anti-Dumping measure enforced by the Ministry of Commerce has caused affliction to them, since some grades of the products that are not manufactured by domestic manufacturers or some products that add some elements such as Boron, are unable to be produced in Thailand, and are also under the Anti-Dumping measure.

The competition is high in long stainless steel and seamless steel pipe, however the competition is not as tough as with carbon steel, since that's a special use product with a high price. Moreover, seamless steel pipe might be mainly produced for importation purposes rather than domestic use.

In the hot–rolled steel sheet category, it has been specified that there is high competition since even though there is the use of trade measures, trade measure evasion still exists, for example, the importation of hot–rolled steel sheet with stain prevention coating in order to claim that it is in the color–coated steel sheet category, not hot–rolled steel sheet category, or importation from new origins such as Middle Eastern countries.

In the cold–rolled steel sheet category, both carbon steel and stainless steel, there is strong competition in both groups, the competition could be stronger if there was no trade measure enforcement.

In coated steel sheet directly used with construction work, which includes hot–dipped galvanized steel sheet, aluzinc steel sheet and color coated steel sheet, there is tough competition in those products. In the case of hot–dipped galvanized steel sheet, it is under investigation of anti–dumping measures from China, South Korea and Taiwan. In the case of aluzinc steel sheet and color coated steel sheet, although there has been an enforcement of anti-dumping measures with China, South Korea and Taiwan, those three exporters, especially China, have been conducting evasion of those measures. The situation is worse since the products that evade trade measures have seen skyrocketing importation every single year. From the Thai Custom Department, in 2016, the products imported from China totaled 223,303 metric tons, it has since increased in 2017 to 330,177 metric tons.

In steel pipe and cold structural steel, the competition is also tough, since there are high numbers of domestic manufacturers due to these products requiring an uncomplicated manufacturing process and low capital, moreover, there is high importation, especially in steel pipe from China and South Korea, so domestic manufacturers have had to ask the Ministry of Commerce to use anti-dumping measures.

In stainless steel pipe, it faces similar problems as carbon steel pipe since there is dumping from China, South Korea and Taiwan, plus Vietnam.

In the aspect of leaders in the steel business, when considering each product, it shows that each group contains national manufacturers who could be leaders in the market. Players in the market acknowledge that when groups are market leaders, for example, in construction wire rod, there is no importation. Tata Steel (Thailand) is the leader in H–Beam or I–Beam steel, Siam Yamato Steel is a market leader because there is low importation due to high standards. Other products include pipe and cold–rolled steel, although there are main domestic manufacturers, the importation is high, hence, they are not market leaders compared to the other mentioned groups.

In the case of market growth, steel manufacturers opine that, in the construction group, the market growth of steel use grows gradually. In the past, entrepreneurs waited for government mega projects, however, the investment capital slowly goes into the system while agricultural products' price has been low for many years, causing deceleration in household payments, which affects the use of steel in new construction projects. However, there are some groups which gain from business changes, for example, the expansion of condominiums in the past 3–4 years, which benefits pre–stressed wire rod manufacturers, since it is used in post–tension concrete work.

In the case of manufacturing related to markets such as automobiles and automobile parts manufacturing, electrical equipment or tin canned packages, which rely on exportation, it shows vivid market growth recently. Although there might be a slowdown, overall market growth seems to be better than domestic use manufacturing. However, market growth does not mean it is all domestic manufacturers' opportunity, since there is strong competition with imported products such that foreign manufacturers are ready to conduct price dumping, since they also face surplus capacity problems, they need to export by dumping, including dumping in Thailand.

5.2.4 The Affiliation of Joining in Trade Associations, Federation of Thai Industries and The Thai Chamber of Commerce with Industry's Survival

Entrepreneurs that join the Thai Iron and Steel Industry Club or Federation of Thai Industries or sub–groups of the Club for each product category can help their business survive, but it is not the main factor of their survival. The main reason of being members or on the board of the Thai Iron and Steel Industry Club is giving companies updates about government policies, including trade issues related to the steel business or each entrepreneur's product. Moreover, the work and the coordination of the group can convey steel manufacturers' opinions to related government organizations. In some important policies there should be a gathering of members to government organizations, which is important for each company in order to protect their interests.

In the aspect of building business opportunity and business alliances, joining the Club is not the main benefit of these factors since each entrepreneur holds their own business tactics and they are confidential.

In the aspect of the decision making of member companies, each company cannot make decisions in the name of the group, each decision must be carried out at the monthly board meeting or by email circulation to every member. Hence, each company cannot make decisions solely. Coordination is the key factor for protecting the group's interests and reducing conflicts among members.

Moreover, in meeting with the government sector, when giving opinions on each product, the Club's representatives are the coordinators who convey opinions on each product. The duty of the representatives is to report issues in the meeting and circulate emails to related entrepreneurs for their comments.

The decision making in sub–units of each category might be faster than the Thai Iron and Steel Industry Club, since there are smaller numbers of members and they are at the same product level. However, it has issues concerning acceptance, since there are large numbers of small groups with specific interests in each group, this causes hardship in contacting the government sector since the government sector accepts the Federation of Thai Industries and its formal establishment according to the law. The Thai Iron and Steel Industry Club is recognized as a gathering of directly related steel entrepreneurs with expert representatives in many aspects, such as industrial policy, trade negotiation, knowledge in steel products and technology, steel entrepreneur data centers, et cetera.

5.2.5 Government Policies Concerning the Steel Industry

1) Trade remedies such as anti–dumping measures, safeguard measures
2) Product standards and cost and price of steel products declaration
3) Thai Industrial Standards
4) Environmental standards and pollution control
5) Law concerning factory control
6) Investment promotion policy
7) Industrial development policy (steel industry included)
8) Steel quota allocation according to JTEPA
9) Energy saving in the industrial sector (steel industry included)
10) Government procurement policy

5.2.6 Government Policies and the Industry's Survival

1) Government policies increase opportunity for creating income or business opportunities for companies

Recent government policies have taken part in the enhancement of income, profits or sales opportunities. One of the vital policies is BOI investment support, there are large numbers of steel industry investments which gain benefits from BOI, both in duty and non–duty. Duty is the main benefit, which is juristic person duty exemption and cost deduction, long products and flat products manufacturers gain benefits from such exemptions.

Moreover, there are government mega projects which directly create business opportunities for the steel industry. However, in the case of basic structure investment concerning future transportation, steel manufacturers wish that government would focus on domestic products use enhancement.

In the case of policies related to manufacturing businesses, such as manufacture expansion in the automobile and electrical equipment industries, such policies enhance high quality steel in Thailand, which builds business opportunities, including global high grade steel manufacturers and the opportunity to use Thailand as a manufacturing base for ASEAN exportation, which adds value to Thailand's steel industry.

2) Government policies increase main raw material sources to companies.

Government policy to reach raw material sources is still unclear. Mostly, entrepreneurs are people who provide their own raw materials without government support. Government support in this aspect shall take place only in the circumstance of irregular skyrocketing raw material price, however, such problems rarely occur.

On the contrary, manufacturers of certain products face direct negative effects from trade remedies, this includes steel wire manufacturers of both high carbon and low carbon steel wire, which is related to construction projects. Policy that causes such negative effects is anti–dumping policy enforced over wire rod from China, since it causes hardship in wire rod importation, which is the raw material used in steel wire production. In the case of high carbon steel wire, the first announcement of an anti-dumping rate was not high, however, there was a raise in the anti-dumping rate, which steel wire entrepreneurs viewed as unfair treatment.

3) Government policies increase competition in the industry.

At the moment, the government sector has no policy to decrease or get rid of competition in the industry. Both midstream and downstream entrepreneurs are able to invest and open their businesses freely. Standards for steel products are according to regulations or laws, such as environmental regulation and product controls, and standard regulations which abide by WTO agreements. There is no discrimination in the nationality of juristic persons.

However, there are some concerns in the global steel industry which risk causing problems for Thailand. The main problem is the halt of 140 metric tons of induction furnaces in China, which is a large number (2 times the steel used in ASEAN). Those unused induction furnaces are prohibited from being installed in China, however, there is no prohibition in exportation, so if China exports such induction furnaces to Thailand, surplus capacity will worsen and it will cause environmental problems since they are outdated technology. Hence, there has been a proposal from steel wire manufacturers to prohibit induction furnace installation and steel wire factories in Thailand. However, this issue is still under consideration at the Ministry of Industry.

4) Government policies to create trade fairness.

Entrepreneurs view trade fairness is an important factor to keep enormous investment capital and continue operations, especially in this globalization era in which each country can trade more freely, this causes more complicated unfair trade practices. Therefore, rapid adaptation of government policy is mandatory, together with updated in–depth data of trade situations.

On the contrary, the government sector looks after consumers through important measures such as price supervision and product standards support. The government organizations that hold such duties are the Department of Internal Trade, Ministry of Commerce, Thai Industrial Standards Institute, Ministry of Industry and Office of the Consumer Protection Board. The duties of these government organizations create a balance in the market by building trade fairness, which is a priority of the government sector.

5) Government policies to enhance innovation, technology and new knowledge for the companies.

In this recent business stage, there are many manufacturers, especially Thai manufacturers, who focus on general grade steel without focusing on innovation development for newer products or high priced products.

In order to create innovation for distinctive or special grade products, government support is needed, especially investment support, since it is the only mechanism that can be substantially supported by the government sector. Most manufacturers with investment potential or ability to reach technology and innovation are big manufacturers or steel companies that are joint ventures with foreign steel manufacturers. Those companies also focus on exportation since domestic sales is not enough for their product.

There are other factors that are vital for Thai steel manufacturers to increase innovation and technology for newer grades of steel, such as the ability to reach high quality raw materials in order to respond to special grade steel product manufacturing.

Steel entrepreneurs have opined that due to changes in global steel manufacturing technology, which responds to changes in steel users' midstream industry and consumers' lifestyle and thus creates new business models, those changes have affected the need for steel. Moreover, a priority in environmental care, which is related to efficient energy use and the successive decrease in pollution agreed to by the Paris Agreement, those are the factors that accelerate Thai steel manufacturers to adapt themselves by building new technology, innovation and knowledge to move up to high grade steel manufacturing, including value added creation and the use of steel's value chains. Those changes and enhancements need government as a main support in order to develop the Thai steel industry, to be a foundation industry for Thailand's industry development 4.0 and for 10 targeted national industries.

5.2.7 Policies That Steel Entrepreneurs Need to Impel and Require Government Support

1) Value added creation for steel industry development to be a “Service Solution”.

2) Support the use of “Local Content” for domestic automobile parts and electrical appliances manufacturing.

3) Support the use of domestically produced steel for foundation and structural construction of government and state enterprises.

4) Solve problems in surplus manufacturing capacity of the downstream industry of long products.

5) Stability creation in upstream raw materials for the Thai steel industry by considering the processes of domestic upstream steel industry establishments or being in alliances and joint ventures with foreign entrepreneurs for slab and billet supply.

6) Enhance domestic investment for high quality and innovative downstream steel manufacturing.

7) Develop marketing research data, trade strategies, trade updates and foreign investor investment.

8) Conduct WTO trade remedies such as anti-dumping and countervailing measures, safeguard measures, anti–circumvention measures, et cetera.

9) Support efficient technology concerning energy use and environmental effects reduction.

10) Impose on steel factories the establishment of regulations concerning the use of environmentally friendly and efficient energy use technologies.

11) Develop steel product standards to be consistent with international standards.

12) Promote the use of products with Thai Industrial Standards signs.

5.3 Non-Participant Observation Steel Policy Suggestions on Steel Industry 4.0

5.3.1 Short–Term Policies

1) Policies to Solve Problems in Domestic Steel Manufacturing Capacity

Policies to solve both overcapacity and underutilization problems have been issued by the Ministry of Industry, such as prohibitions in establishing or expanding capacity of overcapacity products and suspension in investment support of underutilized products.

2) Policies to Support High Quality Steel Manufacturing

The said policies have been enacted in order to boost domestic steel manufacturing ability and reduce reliance on imported steel products.

3) Boost Domestic Steel Products Demand

The Thai government has set policy to boost domestic steel consumption in order to use in public utilities, government utilities and state enterprises by setting a proportion of domestic steel product use (Local Content Policy) such as “Made in Thailand”, and support the use of products with “Thai Industrial Standard” signs.

4) Trade Remedy Measures

The trade remedy measures under the WTO are Anti–Dumping and countervailing measures, safeguard measures, anti–circumvention measures, restrictions on certain steel product imports, BOI’s surcharge measure and energy subsidy measures. The government also subsidizes marketing research, trade strategy, and updates in trade and investment of foreign steel investors.

5) Cost Subsidy Policy

Energy cost subsidy policy focuses on the steel industry and the provision of loans and joint ventures.

6) Negotiation to Reduce Trade Tariff Effects

Tube and galvanized coated steel

Section 232

5.3.2 Intermediate to Long–Term Policies

1) Policy to Build Stability in Upstream Raw Material Sources

In order to develop the domestic upstream steel industry, there are 2 following ways for government to consider:

The first way is that government sets a policy to build the domestic upstream steel industry by using sustainable industry development with up–to–date, efficient and environment–friendly technology.

The second way is that government supports joint ventures with the existing foreign upstream steel industry by providing advice on efficient co–investors, investment risk management, and co–ordinates with other countries in the aspect of investment.

2) Policy to Support the Use of Steel in Construction Work: government supports development in industrialization of steel construction, by:

Development in construction standards to build sustainability in the domestic steel structure, such as enactment of legal provisions in the Building Control Act and legal provisions concerning fireproof materials, standards in highway and bridge construction, standards in design, construction work, inspection of buildings and steel structured brides.

Measures to boost efficiency in construction work (reduce construction times and increase quality in construction work by supporting measures from doing on–site construction to off–site construction).

Measure to boost environmentally friendly steel buildings (green buildings).

3) Support Value Chains Between the Steel Industry and Continuing Industry

Establish a steel industry cluster in order to link with value chains of other continuing industries, such as a machine cluster and construction cluster.

Develop a connection in value chains by using digital technology such as E–Commerce, Digital Marketing and digital logistics management.

4) Product Quality and Standards

Develop and set standards for steel products to meet international standards.

Improve product standards to meet new technology and innovation, including standards that are related to fundamental infrastructure such as steel structural bridges.

Focus on environmentally friendly steel products.

Promote product designs which can use raw materials at the most productive point by using Generative Design Software.

Improve testing labs to meet international standards.

5) Technology Efficiency

Promote efficient energy use and decrease environmental effects.

Promote Thai steel manufacturers' manufacturing efficiency. Promote high quality steel manufacturing such as J/V Technology transfer with global steel manufacturers in order to improve the ability to manufacture special steel.

Promote technology which creates added value to products and connects with midstream industries.

Support manufacturing technology and capability of energy use research.

6) Energy Conservation and Environmental Protection

Promote the use of Best Available Technologies (BAT) and practices in order to improve energy use efficiency and decrease energy used in steel manufacturing. According to a survey by the Iron and Steel Institute of Thailand, there are 24 factories which are interested in using BAT to improve their energy use effectiveness, out of a total of 470 factories. These 24 factories can be divided into steel manufactured by induction melting factories (EAF), steel manufactured by hot rolling method factories (RHF), steel manufactured by cold rolling method factories, steel manufactured by coated method factories and tube factories, which will be supported financially by the Ministry of Industry and other related government organizations.

Energy conservation and environmental protection can also be promoted by setting rules and regulations for steel factories dictating that they use environmentally friendly and energy worthy technology.

7) Research and Development

Establish steel research units to improve efficiency in steel product manufacturing and new product development to produce high quality steel products in response to a 20 year industrial strategy.

Promote co-research and development between steel product entrepreneurs and other research organizations (collaborative research and development) such as with universities and research institutions.

Financial support provided by the government sector, such as establishing an industrial development fund by collecting fees from the importation of steel.

8) Support Productivity Improvement of Steel Manufacturers

Support domestic steel entrepreneurs by using digitized manufacturing, such as internet of things (IOT), Big Data, Artificial Intelligent (AI), 3D Printing and Robotics, in order to enhance manufacturing processes to “smart factories” or “smart production”. This support is in coordination with various organizations, such as the Ministry of Industry and other related organizations like the Ministry of Science, National Science and Technology Development Agency, Thai Productivity Institute, Thai German Institute, universities and other academic institutes. Those organizations play their roles as knowledge providers and support units for entrepreneurs in the process of manufacturing development.

9) Human Resource Development in Steel Manufacturers

Develop human resource capacity (capacity building) such as arranging knowledge transfer by experts from leading international steel manufacturers.

5.3.3 Benefits of 4.0 Steel Policies to Thailand’s Industry Economy

1) Enhance stability in upstream raw materials and increase competitiveness for domestic steel manufacturers. Increase domestic steel product consumption, decrease importation in order to decrease deficits.

2) Enhance the use of digital technology in smart production processes to improve efficiency and increase productivity of the steel industry and midstream industries which are in the value chain.

3) Build sustainable steel industry development by encouraging environment friendly technology, saving energy, and enhancing the quality of life and safety.

4) Enable domestic steel entrepreneurs to be able to develop their knowledge to improve innovation and technology through research and development.

5) Promote domestic steel consumption in the basic work of the state's infrastructure as an opportunity to build learning processes and steel product development for domestic manufacturers as a recognition of future infrastructure, such as high speed rail to add value to the country's economy.

6) It is a good opportunity to enhance Thailand's construction quality and efficiency as a preparation for urbanization, which will be turned in to smart cities and green cities by using updated software and artificial intelligence to decrease the capital invested in construction work, decrease time in construction work and increase quality of construction work, which is good for its safety.

CHAPTER 6

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

6.1 Conclusion

6.1.1 Research Content

This research studies the effects of external players on Thailand steel industry's survival by doing research on survival factors of the steel industry, together with government policies and associations and the aggregation of the industry sector.

The Significance of this Research

The steel industry is vital to our country since it is a key to Thailand's economic development. The importance of the steel industry to Thailand's economy comes from the use of steel as the main raw material in midstream industry manufacturing. This said midstream industry is a vital part of the growth of the national economy in various industries within the construction sector, the automobile industry, electrical appliances industry, et cetera. Hence, the direction of these industries directly affects domestic steel use.

At present, the steel industry is affected by foreign countries' manufacturing stage and their government policies, especially overcapacity from China, which is a cause of high importation that affects Thailand's steel industry.

Apart from the adaptation of the private sector in the steel industry, external organizations are also influential to the steel industry's survival, especially government organizations as regulators and supporters of industry, together with associations or aggregations of the industry, working as coordinators among entrepreneurs in the industry and coordinators between the government sector and private sector, including acting as a committee in any decision making.

However, in order to proceed with support of the steel industry's survival in current circumstances, the operation of external organizations, which are government organizations that consist of various organizations with different scopes of duty and authority to operate, and industrial associations, must hold clear procedures in order to reach the highest efficiency to support the steel industry.

Hence, this dissertation focuses on building connections between survival factors in the steel industry and the role of external organizations in order to operate with the highest efficiency.

How is it carried out in other countries?

In terms of an overview of the steel industry, in the literature it was mentioned that leaders in the market will need to move to another level by manufacturing sophisticated products and competing with each other in their efficiency of operations. However, not all players can compete in such a level since there are standards that players must meet to advance their technology in steel production.

Trade Association action is the next issue to be considered, the literature mentioned that the Association underlines how subsidized steel has caused damage to the domestic industry together with its domestic entrepreneurs because that subsidized steel is considered to be a substitute of domestic steel products. Moreover, the Association is pushing toward industry needs for fair competition. Furthermore, there were also comments made by eight steel trade associations from the United States, Canada, Mexico, Latin America and Europe. The said comments were on China’s Steel Adjustment Policy, which the eight steel trade associations see as China’s policy of industry status being in the form of top–down and dominated by the State, which affects Thailand's industry. In short, those associations expressed their concerns about overcapacity caused by China.

In the aspect of government action, the case of the UK and China shows that government plays an essential role on the steel industry, based on the environment of each country. In case of the UK, the government provided measures in order to enhance the industry and reduce the affects from plant closures. In the case of China, however, it has to deal with other countries responding to their overcapacity and making commitments with China that it decrease overcapacity and cease its acts of subsidies, despite the commitments made, though, the situation of overcapacity continues. Although government is key in the process of the steel industry, its role should be limited only to the early steps of restructuring, since market mechanisms play the best tools to select who to survives and who should be out of the market.

6.1.2 Research Outcome

In the aspect of the steel industry's opinion to the five forces model, this research has determined the following:

In the questionnaire responses from the steel industry sector, it can be summarized that government policies affect the industry's survival in the aspects of "threat of new entrants" and "competitive rivalry", while the aggregation of industries affects the threat of new entrants, competitive rivalry and bargaining power of suppliers.

Furthermore, for the qualitative part, these issues concerning a five forces model, government policies' influence over industry survival and the congregation of entrepreneurs in the industry that has effects to the threat of new entrants, competitive rivalry and bargaining power of suppliers, those connections can be summarized in these following paragraphs.

6.1.3 Government Policies

The Threat of New Entrants is the first topic to be considered in the scope of government policy. In the aspect of threat of new entrants, there is no government policy aimed at barring new entrants from entering this business since the government holds no intention to reduce or limit industrial competition. Steel entrepreneurs, both midstream and downstream, are able to invest and do their business freely under general business regulations, except in some issues that can affect the whole country, such as environmental aspects, which government prioritizes as environmental conservation. At present, the government sector has pushed forward stricter rules in technology use by focusing on clean technology and its efficiency. The said policy not only applies to the steel industry but also applies to all industrial sectors. Such policy is beneficial for sustainable industrial development, rather than aiming at temporary benefits which can damage the environment in the long run.

Competitive Rivalry is the next issue to be considered. The most influential government policies to steel industry entrepreneurs are competition–related policies, since those policies include investment promotional policy, industrial development policy, supervision policy and trade negotiations that can cause competitive advantages and disadvantages among entrepreneurs in the same industry or continuing supply chain industries.

In the investment promotion policy aspect, there has been the support of both tax–related and non–tax related policies, which has contributed to a large amount of investment in the steel industry on upstream, midstream and downstream levels. Although there is only one upstream industry in Thailand and it has faced hardship in its production, the steel industry in various products has invested a large sum of money in capacity, which is a key factor to accelerate the country's economic development, since steel is considered a key manufacturing factor in many continuing industries**.** Since steel is the key factor in many continuing industries, many steel products which lack manufacture in Thailand have been promoted by the government sector to encourage investment in those products. This is in order to supply Thailand's targeted industries, which include automobiles and electrical appliances, and can contribute to strong supply chains to these targeted industries.

However, the existing investment promotion, in which entrepreneurs in various products have seen marketing opportunities and invested at the same time, is causing surplus capacity which is at the root of tough competition in Thailand's steel industry. Currently, surplus capacity is an issue in the global steel market, especially products from China, which worsen competition toughness, both domestically and internationally.

In industrial development policy there was an industrial development roadmap and formal restructuring of the industrial plan between 2002–2007 with details, vision, quantitative and qualitative analysis, practice plan and indicators. However, there are only some issues which have since been accomplished, there are still many issues which need to be cooperated on between ministries and entrepreneurs, such as the restructure of a wire rod manufacturer's proposal. Since it lacks successive practice, there has been no substantial outcome and it's therefore been unable to solve the industry's issues.

At present, the steel industry development policy that needs to be developed is still invariable. According to these factors: landscape of market trends, competition, steel industry manufacturing development and the changes in steel use technology, an industry development plan should be studied thoroughly in order to be responsive in an emerging industrial context. The most important issue is that related government sectors should impel the plans in order to contribute substantial changes.

In the aspect of regulating policies related to the steel industry, if it is supervised according to operations regulations, such as legal provisions on factory control and chemical controls, such policies do not highly affect competition since they are enforced over all entrepreneurs**.** On the other hand, in the case of policies related to products and their creditability, such as industrial standards, such policies affect competition among entrepreneurs since they are directly related with consumer recognition.

On the issue of fair trade supervision, it is greatly important to entrepreneurs and the industry's competition. Steel products are general use products, hence, unfair trade practices between countries greatly affect domestic entrepreneurs, contributing to a large use of anti–dumping measures. Although there is enforcement of anti–dumping measures, in many cases, evasion by importers and exporters is still to be found, causing unsuccessful supervision. Such problems need to be solved in order to be able to cope with emerging situations.

6.1.4 Complementors or Associations is the next topic to be discussed.

Threat of New Entrants is the first issue to be considered in the scope of "Complementors or Associations". In steel's current business circumstance, information both in a business and government policy aspect does affect business' ability, especially in this globalization era when information can be circulated rapidly, causing fluctuations in business, hence, gathering as an association is needed in order to reach all this information. In case an association gains formal acceptance from a related government organization, it shall enhance its ability to reach information and should appeal to new entrepreneurs to join.

In the aspect of the gathering of entrepreneurs in the industry, such as the Federation of Thai Industries, Thai Chamber of Commerce, Trade Associations, especially being members of the Federation of Thai Industries because it's a strong gathering of entrepreneurs that has been endorsed by government, these supportive frameworks for industrial entrepreneurs, including experts that understand cooperation with the government sector, help to enhance recognition from government organizations.

Competitive Rivalry is the second aspect to be discussed. According to gatherings of entrepreneurs in the same industry, members gain opportunity in information access, which enables discussion among the members and submits their proposals to related government organizations. Companies can use these opportunities to protect their interests. On the other hand, an association of entrepreneurs can appeal to new entrepreneurs, causing strong competition in the industry.

The next topic is “Bargaining Power of Buyers”. In various products, gatherings in the forms of the Federation of Thai Industries, Thai Chamber of Commerce, and Trade Associations create business opportunities among entrepreneurs in the supply chain and create more opportunity to bargain with upstream raw material suppliers**.** However, in case of high conflicts of interests and trade remedy related issues, according to the trade–related legal provisions from related organizations’ disputes, that bargaining is unsuccessful since there are high interests with obvious evidence of unfair trade practice.

Moreover, considering legal issues of Thailand’s trade remedies, in case of the conclusion of some raw materials if their manufacturers are unable to produce them, they are already exempted from trade remedy issues**,** hence, disputes among supply chain entrepreneurs are more likely to be trade–related. In order to have successful bargaining, it shall be conducted between entrepreneurs privately rather than negotiated through the Federation of Thai Industries Thai Chamber of Commerce and Trade Associations, since the trade interests of each entrepreneur are different.

What is the contribution of this research?

This research result can be used as a resource to develop roles and procedures of related organizations, which include government organizations and associations, in order to carry out the work according to steel manufacturers’ priorities by using the data findings of this research.

6.2 Discussion

In terms of the overview of the steel industry, in the literature it was mentioned that leaders in the market will move up to another level by manufacturing sophisticated products and competing with each other on their efficiency of operation. However, not all players can compete on such a level since there are standards that each player must meet to advance their technology in steel production,

According to this research, Thailand's competition in the steel industry is strong in every product type. In almost every product type, there is surplus capacity in which domestic manufacturers do not use their whole capacity. However, the downstream market plays a crucial role in this factor, namely in the market and manufacture aspect, which shall be discussed in the following paragraphs.

In the marketing aspect, steel manufacturers opine that the marketing of construction work is growing gradually by pushing government projects, which is the driver of overall investment and trust of the private sector. Those investment projects have progressed quite slowly, while years of agricultural products' prices have depressed, causing a deceleration in household spending. These factors have been the cause of the limited use of steel in new construction projects.

In the aspect of the manufacturing market, such as automobiles and their parts manufacturing, electrical equipment manufacturing or canned food packaging, which relies on the exportation sector that has clearly grown recently, there has been a slowdown in some periods, though its growth is better than manufacturing for domestic consumption. However, market growth does not mean it is a complete opportunity for domestic manufacturers, since there is tough competition from imported products, causing a market share loss to those imported products because some foreign manufacturers are ready to conduct dumping in their steel price because they also face surplus capacity problems. Moreover, these foreign manufacturers hold a large capacity, hence, it is mandatory for them to distribute their products by dumping them, including the exportation and dumping of products in Thailand.

Trade Association action is the next issue to be discussed, the literature mentioned that the Association underlined the fact that subsidized steel has caused damage to the domestic industry together with its domestic entrepreneurs and that subsidized steel is considered to be a substitute for domestic steel products. Moreover, the Association is pushing toward industry's needs for fair competition. Furthermore, there were also comments made by eight steel trade associations from the United States, Canada, Mexico, Latin America and Europe. The comments were on China's Steel Adjustment Policy, which the eight steel trade associations see as China's policy to define its industry status in the form of top–down and dominated by the State, which affects Thailand's industry. In short, those associations expressed their concerns about overcapacity caused by China. In comparison to those of international associations' roles, in the case of Thailand the focus on the supply side and competitive rivalry is the same, however, Thailand's steel industry does not lean toward international action like other countries, but instead focuses on domestic matters.

In terms of government action, the case of the UK and China has shown that government plays an essential role on the steel industry. In the case of the UK, the government provides measures in order to enhance the industry and reduce the affects from plant closures. In the case of China, however, it has to deal with other countries' response to overcapacity by making commitments with China that it shall decrease overcapacity and cease its acts of subsidies, despite the commitments made, though, the situation of overcapacity continues. Although government is key in the process of the steel industry, its role should be limited to only the early steps of restructuring, since market mechanisms are the best tools to select who to survives and who should be out of the market.

As for the steel industry environment in Thailand, according to the findings, its roles is mainly on Competitive Rivalry and the Threat of New Entrants, due to the fact that Thailand is a big importer and lacking in upstream steel industries.

6.3 Recommendations

The author of this dissertation gives recommendations on each aspect, which will be explained as an act or action of a strategic plan for Thailand's steel industry.

6.3.1 Government Policy

The guideline for each action of each Government Unit shall be mentioned in the following paragraphs:

Integrated Policy. In the aspect of industrial development policy, which is an integrated policy for many agencies, there was an industrial development roadmap and formal restructure industrial plan between 2002–2007 with details, vision, quantitative and qualitative analysis, practice plan and indicators, however, there are only some issues which have been accomplished.

The Board of Investment of Thailand is responsible for promoting foreign investment in the investment promotion policy aspect. It has been supportive of both tax–related and non–tax related issues, which has contributed to a large amount of investment in the steel industry, including upstream, midstream and downstream levels.

The Ministry of Industry focuses on the industry and technology development landscape of market trends, competition, steel industry manufacturing development and changes in steel use technology, an industry development plan should be studied thoroughly in order to be responsive in an emerging industrial context.

The Ministry of Commerce/Ministry of Finance. The Ministry of Commerce is responsible for trade measures and the Ministry of Finance is responsible for measure enforcement. In the aspect of fair trade supervision, it is very important to entrepreneurs and the industry's competition. Steel products are general use products, hence, unfair trade practices between countries greatly affects domestic entrepreneurs, contributing to an increased use of anti–dumping measures. Although there is enforcement of anti–dumping measures, in many cases evasion by importers and exporters is still found, causing unsuccessful supervision. Such problems need to be solved in order to be able to cope with emerging situations.

6.3.2 Trade Association

The guidelines for the trade associations shall be proposed in the following paragraph.

In case an association gains formal acceptance from a related government organization, it shall enhance its ability to reach information and appeal to new entrepreneurs to join. In the aspect of the gathering of entrepreneurs in the industry, such as the Federation of Thai Industries, Thai Chamber of Commerce, Trade Associations, especially being members of the Federation of Thai Industries, which is a strong entrepreneur gathering, the said Federation has been endorsed by government with a supportive framework for industrial entrepreneurs, including experts that understand cooperation with the government sector, which enhances recognition from government organizations.

Hence, The Strategic Plan is to be developed by combining the research results and the Steel Policy Suggestion on Steel Industry 4.0, which would result in the following:

Strategic Plan to Support and Enhance Thailand’s Iron and Steel Industry (co–operation between the Industrial Sector and Government Sector)

1) Solutions for Issues in Downstream Industry.

(1) Palliative Solutions for Downstream Industry

(1.1) Setting criteria for energy use and environmental controls in new factories set up for steel melting and hot steel processing stages, in order to prevent outdated technology importation into Thailand.

(1.2) Putting off investment support for products that use surplus capacity with low domestic capacity consumption.

(2) Mitigate unfair trade practices under WTO mechanisms.

(2.1) Reform Anti–Dumping and subsidy laws in order to enhance their efficiency to regulate trade measures, evasion and subsidies.

(2.2) Follow the iron and steel trade situation closely (Watchlist) in order to acknowledge effects of present situations of a trade war and more severe unfair trade practices.

(3) Measures concerning Domestic Steel Bar Manufacturers’ mergers and acquisitions.

(3.1) Incentives set by the government sector in various forms in order to enhance mergers and acquisitions.

(3.2) State financial institutes’ support for low interest loans in order to make improvements in entrepreneurs’ machine efficiency.

2) Value Enhancement to the Steel Industry by Making Development into Service Solutions in the Construction Sector

(1) Integrate existing scattered construction organizations

The construction industry should contain a standard system and be controlled by an authorized body. The successful example for such a model is Singapore under the supervision of the Building and Construction Authority (BCA), while in Malaysia there is the Construction Industry Development Board (CIDB), which is currently under the draft of a constructional standard system. In Thailand, there is the Department of Public Works and Town and Country Planning, which oversees operation of the drafting of construction standards, while the Thai Industrial Standard Institute (TISI) is the organization that certifies construction standards drafted by the Thailand Council of Engineers. However, there is no authoritative body for construction standards development and regulation.

(2) Domestic construction steel industry support

(2.1) Development of construction standards in order to create sustainable domestic constructional steel use.

(2.2) Support measures in order to boost capacity and quality in construction work by enhancing the use of BIM (Building Information Modeling) to develop construction work together with their management in order to develop from on–site construction to ready–made construction for installation at the construction sites (off–site construction).

(2.3) Measures to enhance environmentally friendly steel buildings (Green Building).

(2.4) Enhance and develop labor skills in various construction works.

3) Creating a Technology Development Landscape and Advanced Steel Product Manufacturing in order to Support Targeted Industries.

(1) Enhance the development of special grade steel products and new products with midstream manufacturers.

Government sector provides capital in order to develop special grade steel products and new products for tracking systems, vehicle parts, agricultural machine parts, machines, energy work and renewable energy parts, molds and tools.

(2) Attract new investment from the world's leading steel manufacturers in high quality and innovative downstream steel products.

(2.1) Set up teams to do research on opportunities to attract new investment from the world's leading steel manufacturers in high quality and innovative downstream steel products.

(2.2) Provide incentives by setting up special investment support measures.

(2.3) Set up a negotiation team to boost new investment from the world's leading steel manufacturers.

(3) Considering 2 options for upstream steel development.

(3.1) First Option: setting government policy to establish domestic upstream development by using sustainable development for the industry with up–to–date, efficient and environment–friendly technologies.

(3.2) Second Option: Enhance co–investment with existing foreign upstream industries. Government's role is to provide recommendations for finding qualified investors, mitigate investment risks, and act as a coordinator with foreign countries to facilitate investment benefits.

4) Continuously Enhance Projects for the Improvement of the Steel Industry

(1) Enhance the use of Best Available Technologies (BAT) and Practices and Digital Technology in order to boost factories' efficiency in various aspects, such as the manufacturing aspect, quality, energy use, environmentally–friendly aspects and machine maintenance.

(2) Develop connecting systems between steel entrepreneurs and midstream industries in the whole value chain to facilitate customers using Digital Technology such as Digital Platform, Digital–Marketing, Smart Logistics and Smart Warehouse.

(3) Focus on steel products development and business formats according to a Circular Economy concept, together with Sharing Economy influence.

(4) Develop the capacity of manpower (Capacity Building), for example, arranging for knowledge transfer from the experts in global steel manufacturers.

This plan can be concluded in figure 6.1

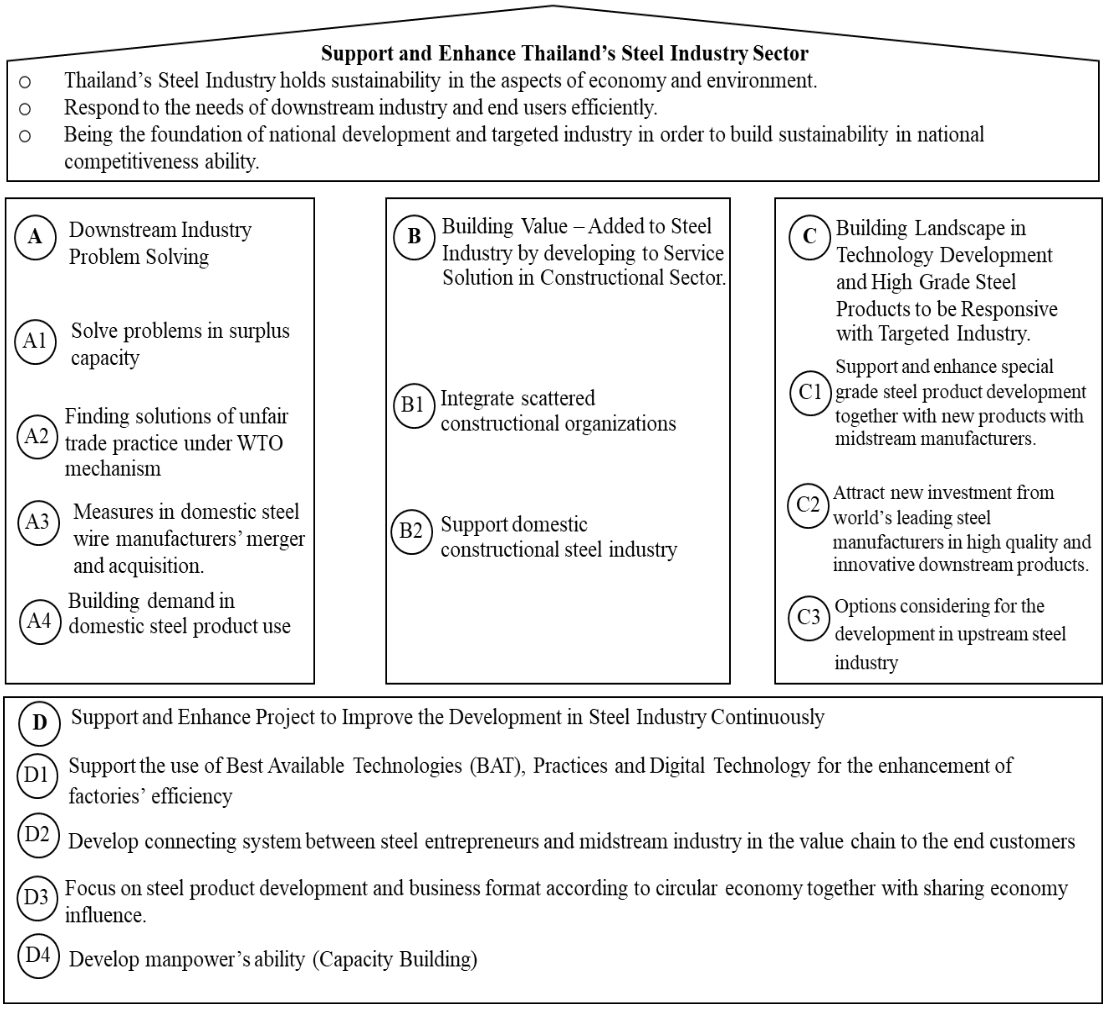

Figure 6.1 Strategic Plan to Support and Enhance Thailand's Iron and Steel Industry (Co–Operation between the Industrial Sector and Government Sector)

6.3.3 Future Research

Future research should focus deep into each policy or action of the external actors in order to reach a deeper and different policy environment regarding each factor, therefore, in terms of separate government units or trade associations, this research has discovered the areas that each agency should focus on, the next research should focus into each agency.

Regarding the limitations of this research, this research used a sampling size by Taro Yamane, who recommended a sample size of 67, the sample size in this research was 83. However, the Krejcie and Morgan method of sample size determination was chosen for calculation (Krejcie & Morgan, 1970: 608). In this study, the confidence level was expected at 95% with a 140 sample. Due to the fact that the sample was mostly asked for their business' confidential information, which is difficult to obtain, the result was a smaller number for the sample.

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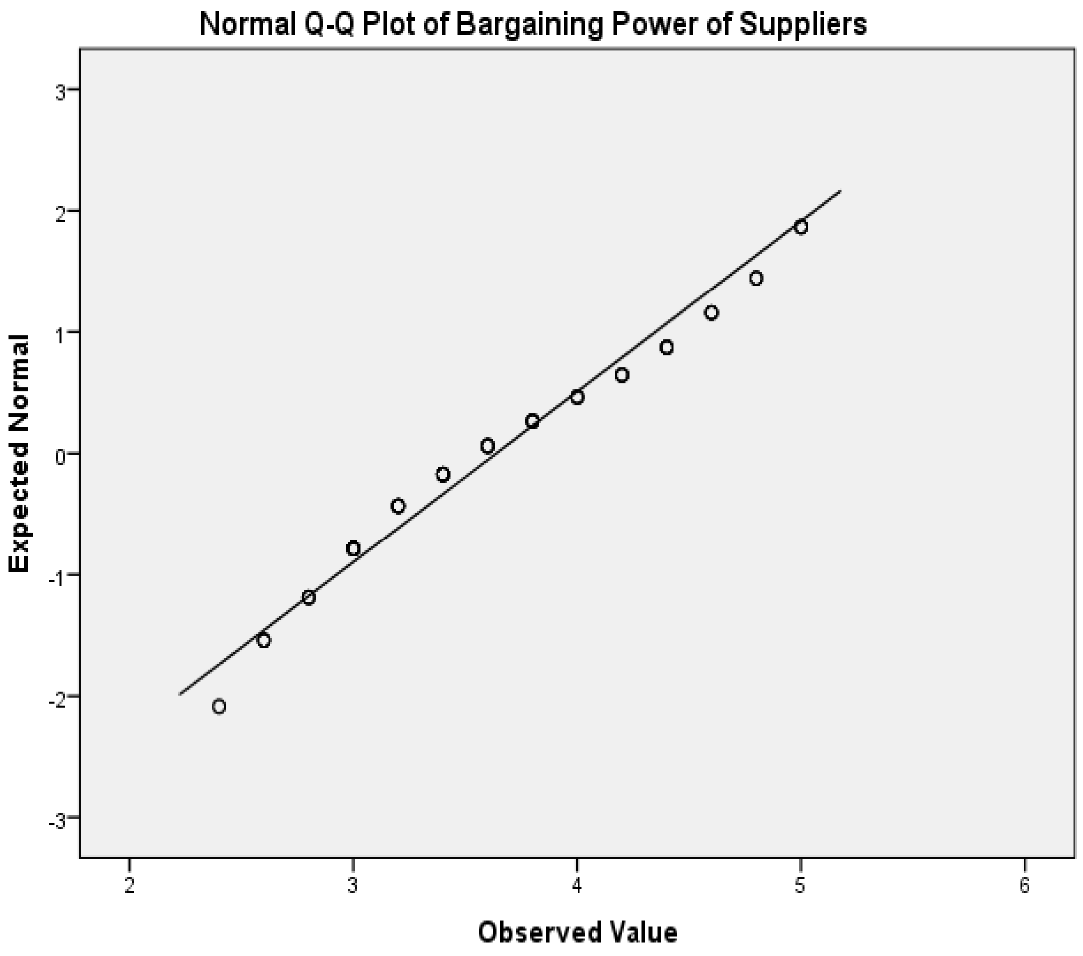
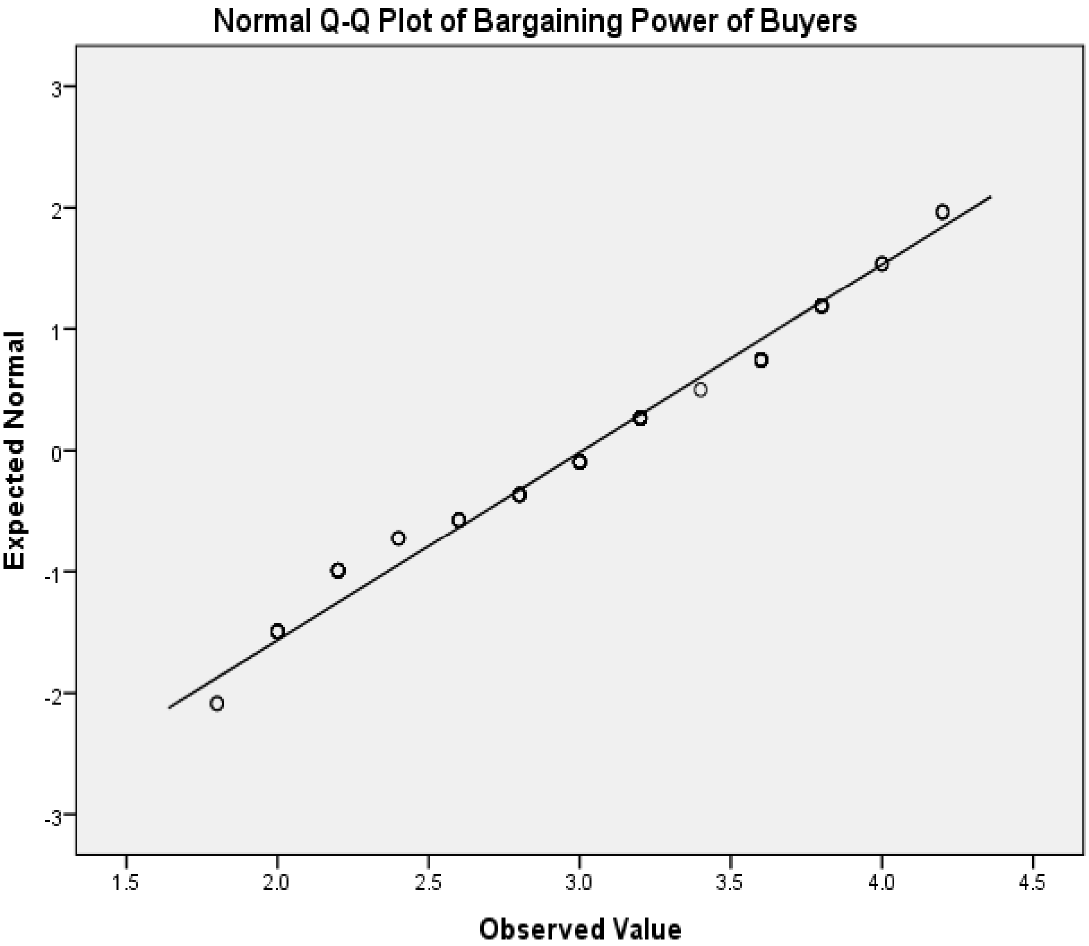
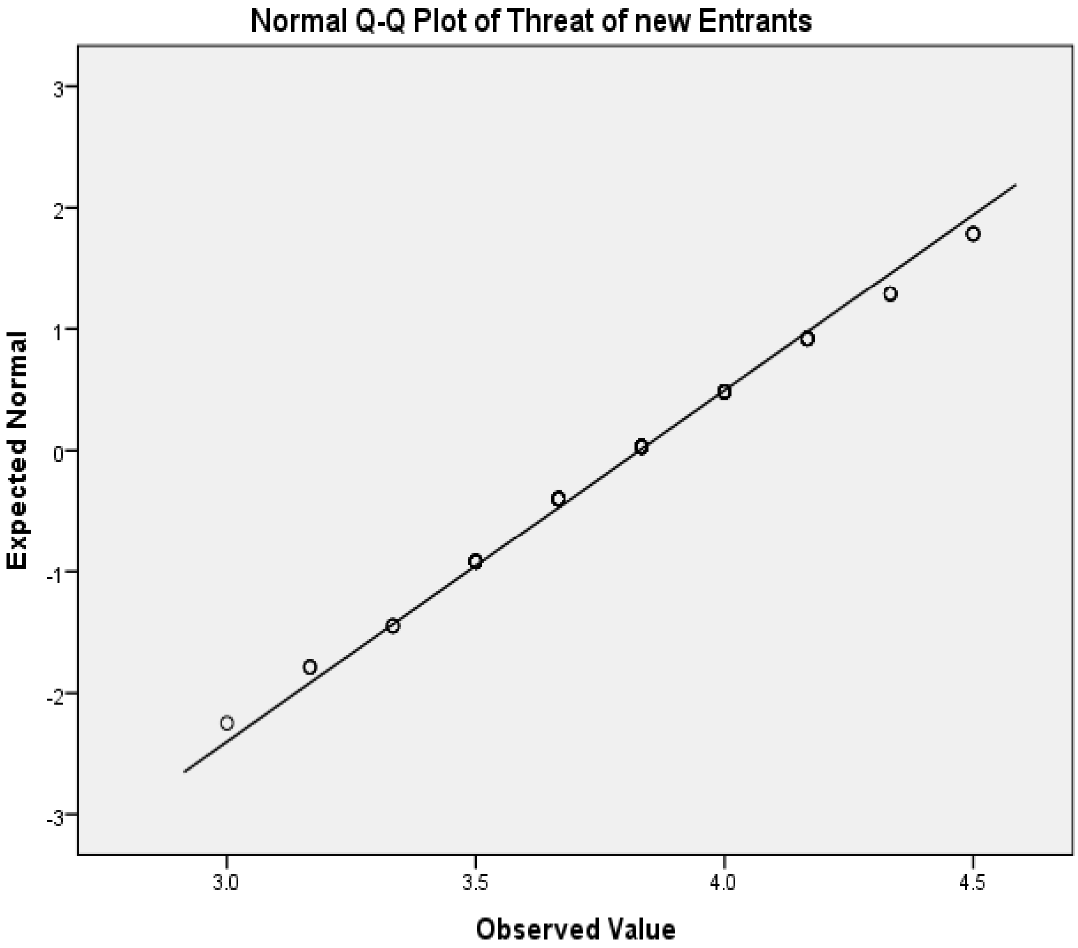
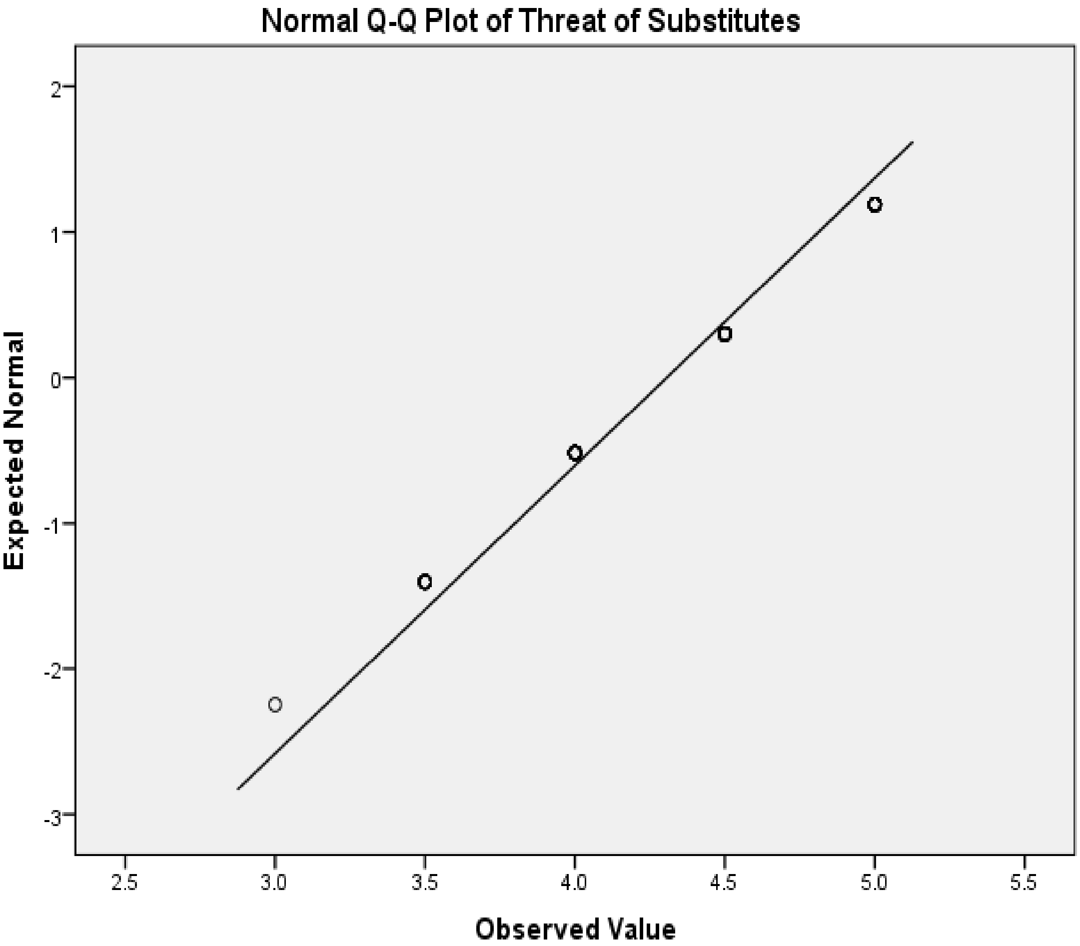
APPENDIX

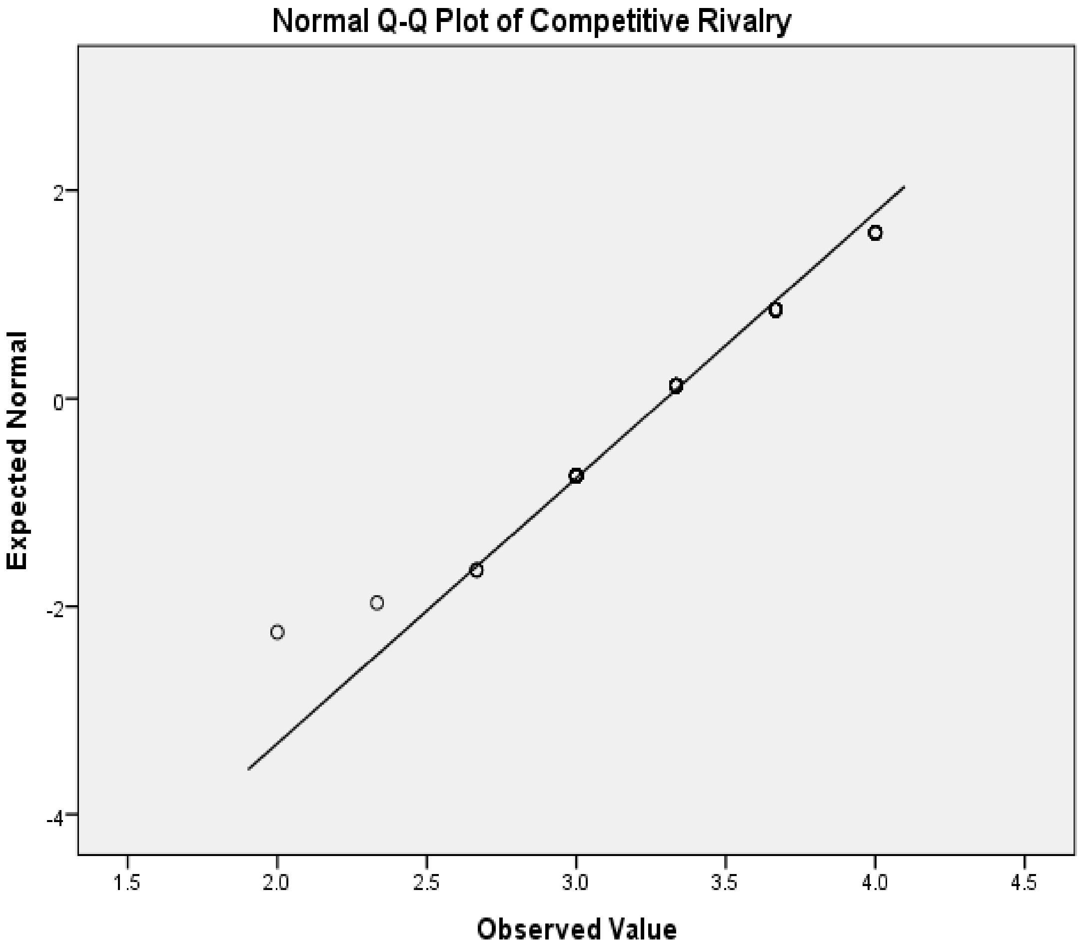
NORMALITY TEST

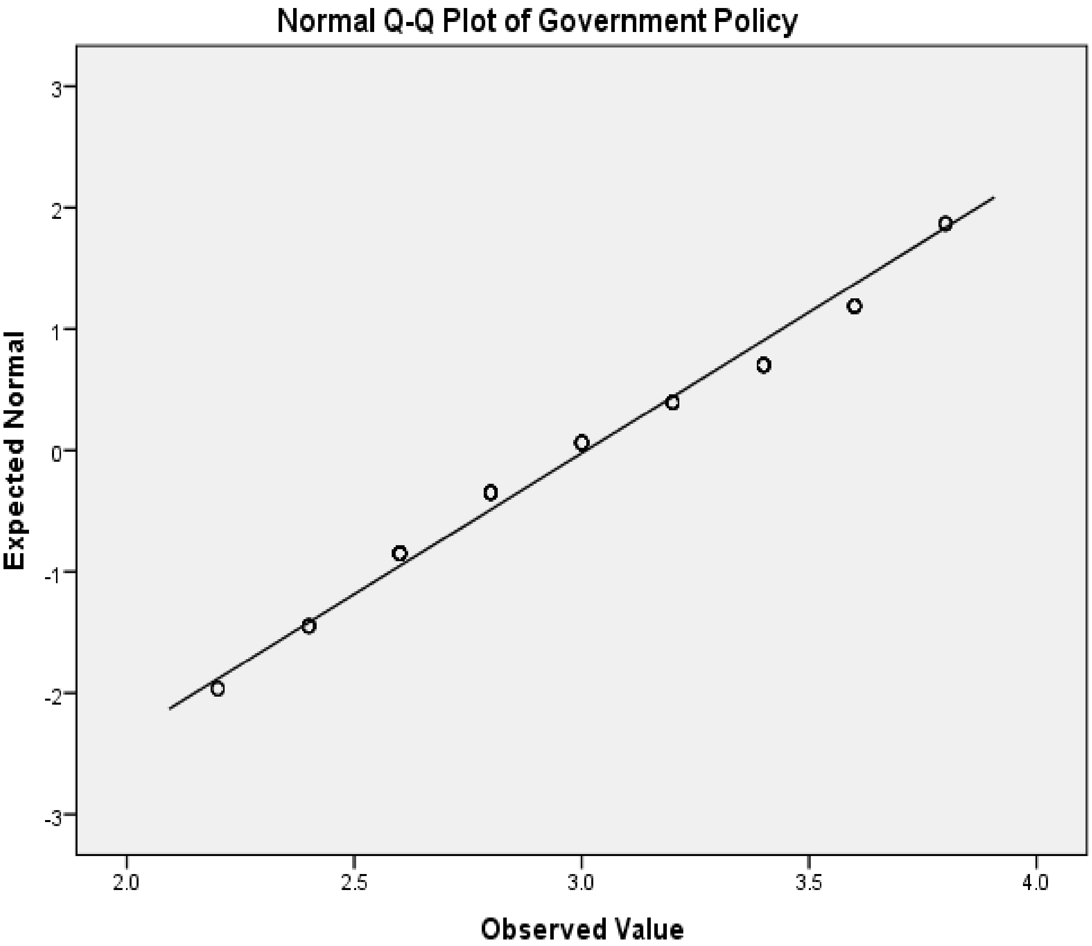



Normal Q-Q Plot of Bargaining Power of Buyers
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
1.5
2.0
2.5
3.0
3.5
4.0
4.5


Normal Q-Q Plot of Threat of new Entrants
Expected Normal
3
2
1
0
-1
-2
-3
3.0
3.5
4.0
4.5
Observed Value


Normal Q-Q Plot of Threat of Substitutes
Expected Normal
Observed Value
2
1
0
-1
-2
-3
2.5
3.0
3.5
4.0
4.5
5.0
5.5


Normal Q-Q Plot of Competitive Rivalry
Expected Normal
2
0
-2
-4
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Observed Value


Normal Q-Q Plot of Government Policy
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
2.0
2.5
3.0
3.5
4.0

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