Thesis for the degree of Master of Business Administration

A Study on long-term shipping contract in Korean Steel Industry

Supervised by Prof. Yong-Sik Oh, Ph.D.

By Hyungjun Kim

Department of Marine Finance

Graduate School of Marine Finance

Korea Maritime and Ocean University

February 2020

Approval Sheet

This thesis, which is an original work undertaken by Hyungjun Kim in partial fulfillment of the requirements for the degree of Master of Business Administration in Marine Finance, is in accordance with regulations governing the preparation and presentation of the thesis at the Graduate School of Marine Finance of Korea Maritime and Ocean University, Republic of Korea

Approved by the Committee Member of Master Thesis Review:

Prof. Jae-Bong Kim, Ph.D.
Chairman

Prof. Jaimin Lee, Ph.D.
Member

Prof. Yong-Sik Oh, Ph.D.
Member

Department of Marine Finance

Graduate School of Korea Maritime and Ocean University

February 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

<Abstract>

A Study on long-term shipping contract in Korean Steel Industry

Kim, Hyungjun

Department of Marine Finance
Graduate School of Marine Finance
Korea Maritime and Ocean University

Abstract

The long-term shipping contracts in steel industry represent the cooperative and coexisting relationships between the shipping and steel industries. The long-term shipping contract aims to minimize the risk from unpredictable changes in market conditions, which can result in unpredictable charter rates, freight, and unexpected limited vessel supply at the time of shipping. The contracts for iron ore and steel products share a common concept and purpose in long-term shipping contracts-namely, the longer duration. Yet, despite the long-term shipping contracts, differences between the contract forms for iron ore and steel products have emerged. Specifically, the proportion of consecutive voyage charters (CVC) is higher in iron ore shipping contracts than other contract types, and the contract of affreightment (COA) is proportionally higher for shipping steel products. Existing research on long-term shipping contracts is limited, and many studies discuss these contracts only partially, to assert their importance for securing competitiveness in tramp shipping companies. It is not therefore possible

to analyze why the iron ore trade has a larger CVC proportion and the steel industry a larger COA proportion.

This study aims first to determine the factors that contribute to the preferences for different contract types in the two markets studied, by analyzing each market's structure and shipping characteristics. Second, the study aims to determine why CVCs and COAs, which are both represented as long-term shipping contracts, are contracted with such large time frame gaps. Finally, this study seeks to find ways to extend the COA's duration for the benefit of the shipping company and the steel company, as some shipping companies find it difficult to maintain or expand their business due to short contract duration.

The literature review and in-depth interviews in this study identify through the research model, the characteristics of the market structure and shipping in both markets have significant effects on the form of shipping contract.

In the iron ore trade, the small number of suitable vessels in the market, the single fixed load/discharge ports, the long-distance voyages, and the potential risk for fatal accidents due to cargo liquefaction have a significant effect on types of long-term shipping contracts. Given these factors, the CVC contract is inevitable in the iron ore trade. Moreover, the market structure, which is a mutual oligopoly due to the small number of iron ore consignors and shipowners, affects the types of long-term shipping contracts. If the market structure were a consignor oligopoly, it would be more profitable for consignors to sign COA or spot contracts, as there would be more suitable vessels operated by experienced carriers in the market to secure on the spot. In a mutual oligopoly market, the consignors could secure a stable iron ore supply by signing a CVC contract to ensure that they could nominate the vessels at the time needed.

In the steel product trade, the COA contract is more appropriate because of its specific shipping characteristics—namely, the greater number of suitable vessels available in the market, the variation in ports, the cargo quantity per shipment,

the various load/discharge ports, and the need for experienced carriers for steel product loading. Furthermore, the market structure, which is a consignor oligopoly market, provides the consignors with superiority over shipowners, resulting in favorable contract types and conditions for the consignors.

In conclusion, due to each type's market structure and shipping characteristics, the CVC contract is more applicable for iron ore, whereas COA is more applicable for steel products. The interview results also indicate that the COA contract duration for the steel product trade should be at least two to three years to enable carriers to offer lower freight rates, as they could build up and expand new business sectors while maintaining a stable income from the COA. In markets that fluctuate frequently with a large gap, the longer duration of COA would provide advantages to consignors by hedging potential losses due to fluctuations in the market. Although the consignors may not benefit in the short term from doing so, shipowners would be able to strengthen their competitiveness by having a larger fleet to provide stable and satisfactory services over the long term.

KEY WORDS: Long-term shipping contracts; Contract of Affreightment (COA); Consecutive Voyage Charter (CVC); Iron ore transportation; Steel product transportation

CHAPTER 1. INTRODUCTION

1.1. Research Background

The steel industry has been a determinant of national industrial competitiveness and is recognized as a representative strategic industry. As the steel industry supplies intermediate goods to major industries in the nation, it is the basis of the material industry and thus has a more far-reaching effect on other industries. Therefore, growth and revival in the steel industry will benefit and provide infrastructure in the growth and revival of shipbuilding, automobile, shipping, and other major industries of the nation.

Iron ore is an essential raw material for producing steel products. POSCO, a steel company established in the 1970s that has been contributing to the growth and revival of the Korean steel industry, concluded that “continuous and stable supply of Iron ore is the core element and competitiveness of the steel company”.[1] However, the Korean steel industry must rely on imports of iron ore from foreign countries. When importing iron ore from a foreign country, the steel company signs a contract with a shipping company to transport the iron ore. Therefore, the shipbuilding, steel, and shipping industries share a systematic triangular connection.

The stable growth and development of the shipping industry is also a core factor affecting the steel industry. As the shipbuilding industry revives, it will experience an increased demand for steel materials, which will revive the steel industry, thereby increasing the demand on marine transportation, which will consequently

1) POSCO Newsroom, *Know-how of being Global Steelmaker that exports values from the country of no resources* (2019), Web

revive the shipping industry. As the demand for shipping increases, the demand for shipbuilding will further increase, continuing the cycle among the three industries. Therefore, it is essential that all players in the triangular connection maintain a long-term relationship for the development and benefit of each other's interests.

This study focuses on long-term shipping contracts, which represent the cooperative and coexisting relationships between the shipping and steel industries. The main purpose of the long-term shipping contract is to minimize the risk derived from unpredictable changes in market conditions, which can result in unpredictable charter rate, freight, and unexpected limited vessel supply at the time of shipping. Long-term shipping contracts are signed to protect and secure each interest, ensuring a stable supply of iron ore at a stable shipping cost regardless of changes in market conditions in the shipping industry and a stable income over time. Therefore, such contracts help the shipping company predict future income so that practical planning for future business is available.

The contracts for both iron ore and steel product share a common concept and purpose in long-term shipping contracts—namely, the longer period. Yet despite the long-term contract, differences between the form of contracts for iron ore and steel products have emerged. Specifically, the proportion of consecutive voyage charter (CVC) was higher in iron ore shipping contracts than other types of contract and the contract of affreightment (COA) showed a higher proportion for shipping steel products.[2] (Lee, 2009)

1.2. Literature Review

Thus far, existing research focusing on long-term shipping contracts is limited, and many such studies discuss these contracts only partially in order to assert how important it is to secure competitiveness in tramp shipping companies. For example,

2) Lee, In-Aae (2009), pp. 20-23.

You (2008) concluded that the freight fluctuations in the tramp shipping business are volatile because the business is completely free of competition and the freight range changes as a direct result of demand and supply. Therefore, stable freight income is the key element in risk management, and utilizing COA can strengthen the risk management.[3)]

Kang (2012) argued that long-term shipping contracts are critical for securing the competitiveness of bulk shipping companies. Therefore, companies must strengthen their ability to secure such contracts and manage them over the long term. Strengthening such abilities requires the close coordination of shipping companies, the government, and related organizations.[4)] Choi (2019) identified three types of long-term contracts and the differences among them, highlighting the legal conflicts between shipping companies and consignors.[5)]

The development of dedicated shipping businesses in the iron ore and coal markets for both shipping companies and consignors must be based on the competitiveness of the ship finance capacity in Korea while restricting large consignors from entering the shipping industry (Son, 2011). However, Son mentioned that finding related studies was difficult due to the lack of information and research related to long-term shipping contracts in both domestic and foreign markets. Indeed, given the lack of studies related to long-term shipping contracts, it is not possible to analyze why the iron ore trade has a larger CVC proportion whereas the steel industry has a larger COA proportion. Therefore, the current study examines three purposes based mainly on long-term shipping contracts and the cases of actual contracts (i.e., signed and performed) in the iron ore and steel product markets.[6)]

---

3) You, Sung Young (2008), pp. 24-26.
4) Kang, Byung-Joo (2012), pp. 73-74.
5) Choi, Gyung-Hoon (2019), pp. 44-47.
6) Son, Hyunho (2011), pp. 108-110.

1.3. Research Focus and Approach

This study focuses on three objectives. First, iron ore and steel products both utilize long-term contracts with shipping companies to minimize risks to their interests. However, each use different types of contracts. Therefore, the study aims to determine the factors that contribute to the preferences of different contract types in the two markets studied by analyzing each market structure and their shipping characteristics. Second, CVC and COA are both represented as long-term shipping contracts, but a large gap exists between the two time frames. A CVC is often signed with a relatively longer timeframe whereas a COA is often signed with a relatively shorter time frame.[7] Therefore, this study aims to determine why CVC and COA are contracted with such different timeframes. Finally, due to COA's short duration, some shipping companies find it difficult to maintain or expand their business. Thus, this study seeks to find ways to improve the plans, such as by extending the duration of the COA.

To meet these objectives, this study adopts the following approaches. The study conducts a literature study and in-depth interviews. It reviews Korean and foreign theses and dissertations, scientific treatises, research reports, specialty publications, and related articles to develop an understanding of long-term shipping contracts, the steel industry, and the status of shipping contracts in the Korean steel industry. In addition, the study includes in-depth interviews with a small group of experts in the steel and shipping industries to understand the preference-affecting elements, reasons for the different durations of the two long-term contracts, and the opinions of shipping companies and consignors on the duration of the COA. With the result of the interview, further literature review has been carried out to organize and strengthen the logic behind.

---

7) CVC is normally signed for 10 to 18 years whereas COA is normally signed for one (1) to four (4) years ; the time frame of COA is relatively short to be representing concept of long-term shipping contract.

The study is organized as follows. Chapter 1 introduces the research background, existing studies, objectives, and research focus and approach. Chapter 2 examines long-term shipping contracts to understand dedicated shipping contracts, consecutive voyage charter contracts, and contracts of affreightment and compares each contract. Chapter 3 explores marine transportation in the steel industry to understand the steelmaking process and the Korean steel industry's status; the marine transportation of each type of cargo (i.e., iron ore and steel products) is also explained, including the shipping characteristics, market structure, and form of shipping contracts. Chapter 4 discusses the process for conducting the in-depth interviews, including selecting interviewees and developing questions. The results are also presented and compared with the literature review to identify the factors that affect iron ore and steel product trade. Finally, Chapter 5 briefly concludes the study by summarizing the research findings, limitations of the study, and suggested directions for future research.

CHAPTER 2. LONG-TERM SHIPPING CONTRACT OVERVIEW

Marine transportation includes various types of modified contracts based on voyage charter and time charter. Voyage charter is normally applied for cargo/shipment contracts whereas time charter is normally applied for vessel charter contracts. Both types of modified contracts are actively in use in the current market. Focusing on long-term shipping contracts, this chapter further explains the characteristics of the CVC, COA, and dedicated shipping contracts. CVC and COA are based on cargo/shipment contracts whereas dedicated shipping contracts are based on a hybrid between cargo/shipment and vessel contracts.

In Korea, long-term shipping contracts were introduced to the industry with the help of the government's intention to foster and develop the shipbuilding industry. As a result, shipping companies, which have limited funding power, are able to secure funds at a low interest rate by signing long-term shipping contracts with steel companies (Choi, 2019).[8)]

2.1. Dedicated Shipping Contract

A dedicated shipping contract is the first type of long-term contract in the industry. This contract aims to build the most efficient ship specifically designed to carry a large volume of a homogeneous cargo. The consignor participates in the shipbuilding procedure itself. The contract begins upon delivery of the vessel and continues throughout its durable years. This contract was originally used in Japan and was introduced to Korea in 1972 to protect the Korean shipping industry's

8) Choi, Gyung-Hoon, op. cit, pp.6~7.

growth and secure the safety of a stable supply of iron ore and coal (Son, 2011).[9)]

For this contract, the consignor uses the freight to pay for the various expenses of building the new targeted vessel and the cost of operations for the durable years. The ownership of the vessel remains with the ship owner, but the consignor has the right to operate it at the consignor's intention until the durable years of the ship expires. The consignor is obliged to provide voyages with full cargoes for the targeted vessel. Therefore, this contract is efficient for the consignor in need of securing continuous or long-lasting imports of large volumes of homogeneous cargo as the consignor can secure the shipping service at a competitive freight rate.

From the shipowners' perspective, the dedicated shipping contract may limit their benefits during prosperous market conditions. However, securing freight rate that compensates for the shipbuilding and operational costs for a long period of time, regardless of the market condition, until the vessel's duration years expire means the shipowner can practically plan its future business routes and expand the firm. Therefore, the shipowner, without market condition interference, can redeem the cost of the vessel stably as well as secure financial aid at a low interest rate to expand its fleet.

From the consignor's perspective, this contract helps cut the primary costs as the vessel contracted is designed and built to carry a specific cargo, which means the vessel is designed to minimize the loading and discharging operations at specific ports, thereby reducing operation costs. Therefore, the consignor can save both costs and time when operating the vessel. In addition, when the shipping industry is enjoying a prosperous market, it is often difficult to secure the right vessel at the right time and right location. This can cause delays in the supply of core raw materials, which can ultimately result in the clients' loss of trust in the company. Therefore, a dedicated shipping contract can help the consignor secure stable

9) Son, Hyunho, op. cit, pp. 67~74.

transport service and the inventory management of raw materials.

2.2. Consecutive Voyage Charter (CVC)

The number of dedicated shipping contracts decreased in the 2000s. Due to the super cycle[10] period approaching the mid 2000s, shipping companies that built reliable experience and service through dedicated shipping became dissatisfied with the low profit from dedicated shipping contracts, even though they were stable. Therefore, there was a change in behavior in shipowners' profit making. The shipowners began to focus more on the chartering business, which brought them greater profits. They would charter in a vessel from the head owner and then charter out the same vessel as disponent owner. Through this structure of profit making, the shipowners were making greater profits than they would through dedicated shipping contracts.

As the 20 years of dedicated shipping contracts were ending, the consignors were in need of another type of long-term contract to safely supply the raw materials. Therefore, the consignors signed long-term shipping contracts with foreign shipowners, which commonly used CVC. A CVC contract is a new type of contract derived from a dedicated shipping contract (Son, 2011).[11]

CVC is based on voyage charter, where one voyage immediately follows upon another one for an agreed-upon number of voyages or for as many voyages as possible within the specific timeframe of the contract (Jung, 2013).[12]

The ship is designated for the contract, but unlike dedicated shipping contracts, the designated ship is not built for specific cargo or the consignor is not involved

10) Super Cycle : Since 2003, a five-year length of steady increase in shipping markets due to industrialization of China, which has shown growing rates of 10% a year for five years. In 2008, the global financial crisis terminated this cycle and rapidly collapsed the market.
11) Son, Hyunho, op. cit, p.82.
12) Jung, Bong-Min (2013), pp.11-12.

in the shipbuilding procedure. The designated ship is usually a secondhand ship previously used for other cargo. Although the ship was specifically designed and built to carry a specific cargo, it meets the minimum requirements for specific cargo carriage. Therefore, depending on the remainder of the durable years of the ship, the consignor and shipowner may negotiate and replace the vessel for the contract every two to three years upon mutual agreement.

The CVC is often applied when the intended cargo is homogeneous in a large volume; the timeframe of the contract is usually 5 to 20 years. It includes a designated ship, giving the charterer of the consignor the right to operate the vessel. The shipowner cannot deviate from the course or carry any other cargo without prior approval from the consignor and must immediately return to load port in ballast condition[13] to minimize the loss of time between voyages. As the CVC contract includes a longer timeframe, the shipowner and the consignor can share the benefit of securing a stable income and stable tonnage regardless of market changes.

Although the CVC contract is similar to a dedicated shipping contract, the consignor can reduce the burden of covering the shipbuilding and operation costs as the ship is not specifically built for the consignor. However, as previously mentioned, the vessel must immediately return to load port in ballast condition. The consignor is responsible for the compensation of ballast navigation. This compensation is often included in the ocean freight. In the long-term timeframe of the contract, the change in cost of the bunker is uncontrollable; hence, some consignors include a bunker adjustment factor clause in the contract to avoid excessive or inadequate compensation for the bunker in the ocean freight (Jung, 2013).[14] CVC is often utilized in the tanker market, gas market, and/or dry bulk

13) Ballast condition in this phrase means “no cargo onboard”, thus no income for the return voyage.
14) ibid, p.12.

market (Lee, 2013).[15]

The CVC is appropriate in a market of mutual oligopoly or supplier oligopoly. The means of the supplier in this study is the shipping company, and the means of demand in this study is the steel company. The CVC is used to sign a long-term transport service with the designated ship of a specific shipping company, thereby resulting in the shipping company's stabilized financial status as well as the guarantee of a designated vessel for the remainder of the durable years, meeting the consignor's requirements. This situation creates relatively higher entry barriers for shipping companies. In addition, the CVC is often signed with larger vessels (i.e., capesize[16] or above).

Although the size of vessels is increasing in the shipping industry, most ports in the world are constructed for smaller sizes (e.g., handysize to supramax[17]); hence, larger ships are often restricted from entering many ports. Therefore, many shipowners, unless they have already secured a dedicated shipping contract or CVC, prefer smaller vessels.[18] In Korea, not many shipowners have fleets with capesize or above,[19] which leads to an oligopoly from the supply point of view. Furthermore, only two steel mills exist in Korea, which leads to an oligopoly from the demand point of view. If more Korean shipowners had fleets with capesize and above for CVC with steel mills, the consignor would lower the proportion of CVC and increase the COA or spot contract proportion. Securing the minimum volume with CVC while utilizing the COA and spot contract depending on the shipping market for the remaining volume can maximize the profit from the margin of the ocean freight.

---

15) Lee, Na-Ree (2013), p.10.
16) Capesize Vessel : 170,000 Deadweight Tonnage
17) Vessels from 30,000 Deadweight Tonnage up to 58,000 Deadweight Tonnage. Most of the ports infrastructure are structured and fit for vessels not larger than 60,000 Deadweight Tonnage.
18) Handysize to Handymax ships.
19) Relative figure.

2.3. Contract of Affreightment (COA)

COA is a type of contract employed in contemporary trade[20] (Herring, 2019). This contract usually lasts from six months to three years, meaning the timeframe is relatively short. It is also known as a volume contract as it delivers a series of cargoes, in a contracted cargo quantity per shipment, for the contracted period[21] (Lee, 2014). The performing vessel is not designated for this contract and, hence, gives the right of vessel operation to the shipowner. The shipowner has the freedom to nominate the performing vessel, but this means the responsibility has been bequeathed to the shipowner. Even if the vessel is not designated, it does not mean that the shipowner can nominate any kind of vessel for each shipment. Depending on the consignor or the type of cargo, the minimum requirement of vessel specification is determined by the shipowner when nominating the performing vessel. The shipowner nominates the vessel accordingly, and the consignor may perform a hull survey or cargo hold survey upon arrival at the load port. The shipowner may nominate its own vessel or may charter a ship from another as long as the vessel meets the minimum vessel specification requirements given by the consignor. Thus, the shipowner can benefit from the flexibility of vessel operation and use this flexibility to maximize profits by loading other cargo, depending on market conditions[22] (Lee, 2013).

Unlike CVC, with COA, when cargo is discharged at the contracted discharge port, the vessel is not obliged to return to the contracted load port. Thus, if the shipowner nominates its own vessel, the shipowner has a right to secure a new voyage with another consignor to minimize the loss of the return; if a chartered vessel is nominated, the shipowner (or disponent owner in this case) has the right to redeliver the vessel to the head owner upon dropping the last outward sea pilot

20) Herring, Paul (2019), Web.
21) Lee, Jang-Gyun (2014), pp.4-7.
22) Lee, Na-Ree, op. cit, p.11.

at the discharge port.[23)]

As the contract does not obligate the return in a ballast condition, the ocean freight is relatively lower than that of the CVC. However, as the vessel is not designated, there might be a risk of temporarily limited tonnage for the shipment date the consignor requested. Although the shipowner is responsible for nominating the vessel, the consignor still runs the risk of losing clients' trust if the cargo delivery date is not met due to the limited tonnage.

It is the responsibility and obligation of the shipowner to load the contracted minimum quantity of cargo per shipment, and it is the responsibility and obligation of the consignor to have the minimum quantity of cargo ready by the ship's arrival at the load port. If the prepared cargo does not meet the minimum quantity of cargo contracted, the consignor should compensate for the missing quantity by providing ocean freight up to the minimum quantity, even if the actual loaded quantity is less. If the captain refuses to allow the loading of the minimum quantity of the vessel nominated by the shipowner for safety reasons or because of the limited space on the vessel, the shipowner will be held responsible for the disqualified vessel and may face a penalty[24)] in future contracts.

The COA is more widely applied in steel product shipping than raw materials such as coal, iron ore, and grain shipping. It is appropriate in an oligopoly, which means the market has a small number of steel companies and a large number of shipping companies. As the contract does not designate the specific vessel, this condition induces a free competition market for suppliers. A company that desires to sign a COA is not obliged to possess a vessel as long as the company can charter in suitable vessels in the market. Provided that it is a free competition

---

23) Disponent owner : When the charterer utilizes the concept of tonnage re-let to another charterer, the first charterer becomes disponent owner, not a registered owner.
Headowner : Registered owner of the vessel.
24) For example, restricted to participate in spot bidding for one (1) month, etc.

market, the freight rate is lower than other long-term contracts; hence, the consignor can benefit from the cost reduction effect.

2.4. Comparison of each contract

The Table 2-1 has briefly enumerated the characteristics of above three types of contracts and it can be referred that the dedicated shipping contract and consecutive voyage charter shares common characteristics, but contract of affreightment shows difference to the other two. The time frame of the COA is relatively shorter than the other two and the condition of COA are more suitable for the contract of various load and discharge ports and cargo with the demand of quantity that varies time to time. Whereas the CVC is more suitable for monotonous route with one or two load and discharge ports and the cargo with the demand of quantity does not vary much.

Although the detail condition of the contract is different, all three of them shares same purposes ; to provide stable transportation of cargo by securing tonnage on time and therefore the consignor is able to secure core raw materials stably and the shipowners can secure the stable income, which helps in structuring the future business plan or expansion regardless of changes in market condition.

Son (2011) has mentioned in his thesis that “Dedicated shipping contract allows to build a new ship with the guarantee of cargo carriage and the ocean freight is renewed every 2 years and therefore shows the strong characteristics of compensating prime cost. The COA is quarterly, semiannually or yearly contracted to transport contracted quantity of cargo and allows unspecified vessel to be nominated. Lastly the CVC allows shipowners to change the nominated vessel every 2~3 years and therefore the shipowners can create new opportunities as per condition of the market. And these are the main characteristics and the difference between three of the contracts”[25)]

Table 2-1 Characteristics of the long-term contract organized by types

Types of contract	Dedicated Shipping Contract	Consecutive Voyage Charter	Contract of Affreightment
Time frame of the contract	Long-term From the delivery of the new built vessel to the end of durable years of the vessel. (about 20 yrs)	Long-term 5 ~ 20 years	Medium Long-term 1 ~ 3 years
End point of the contract	At the end of the durable years of the vessel	At the end of contracted voyage	At the end of contracted period
Vessel Nomination	Designated Vessel	Designated Vessel	Non-designated Vessel (Minimum requirement provided)
Changeability of nominated vessel	Negative	Positive, upon negotiation	Positive
Ocean freight	Based on principle of prime cost compensation	Private or public bidding	Private or public bidding
Ability of combining/loading other cargoes	Negative	Negative	Positive
Obligation of return in a ballast condition	Obligated	Obligated	Not obligated, may secure new shipment or redeliver the chartered vessel.

25) Son, Hyunho, op. cit, p.82.

CHAPTER 3. MARINE TRANSPORTATION IN STEEL INDUSTRY

This chapter has narrated to assist in understanding of process of steelmaking, status of Korean steel industry and shipping status of Iron ore and steel products.

3.1. Steel Industry Overview

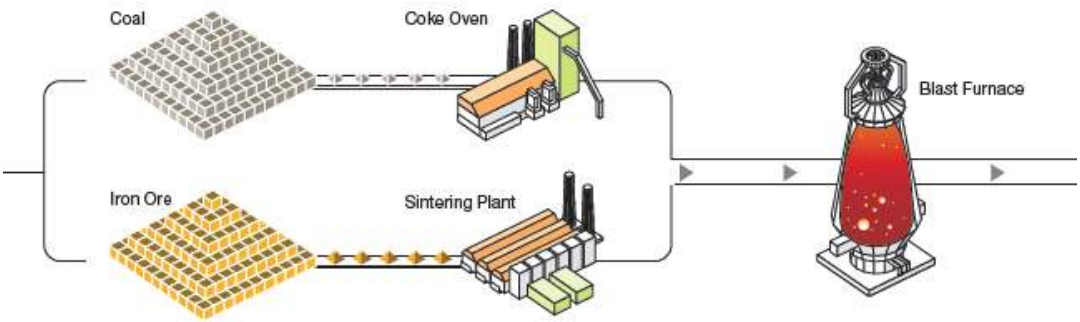
The Steel industry is one of the largest and most dynamic industry in the world. It participates heavy proportion on global economy and is the key economic indicator of the world.

3.1.1 Process of Steelmaking

There are four processes in steelmaking. It begins with Iron-making followed by steel-making, continuous casting and finally rolling procedure to manufacture steel products.

Iron-making :

In this process, the iron ore is turned into molten iron. The steelmaking raw materials, such as iron ore and coal are converted into sinter ore and raw coke by the sintering plant and coke oven before it is put into blast furnace. The sinter ore and raw coke are then put into the blast furnace and the heated air, of which the temperature gets up to 1,200 degrees, is blown from the bottom of furnace. This procedure oxidizes the coke and consequently reduces the sinter ore, which finally creates the molten iron.

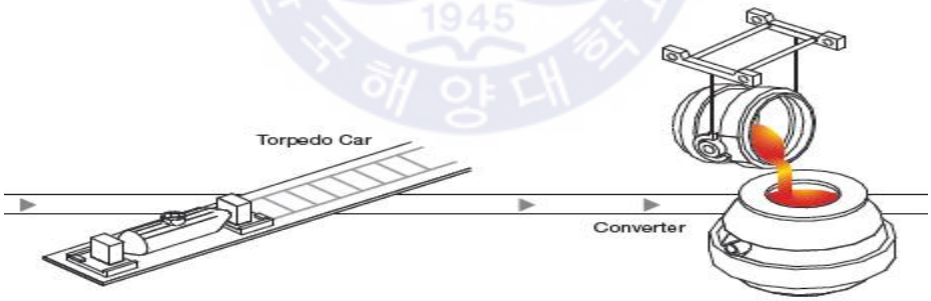


Source: POSCO, Company Digital Brochure, 2015

Fig. 3-1 Process of Iron-making

Steel-making :

In this process, the impurities of the molten iron are removed. The molten iron from the blast furnace is transferred into a torpedo car and sent to the steelmaking plant. At this point, the molten iron is poured into a converter, which the pure oxygen is blown into the converter. This step will burn off the impurities in the molten iron such as carbon, phosphorus and sulfur and therefore leaving only pure and clean molten steel in liquid state.



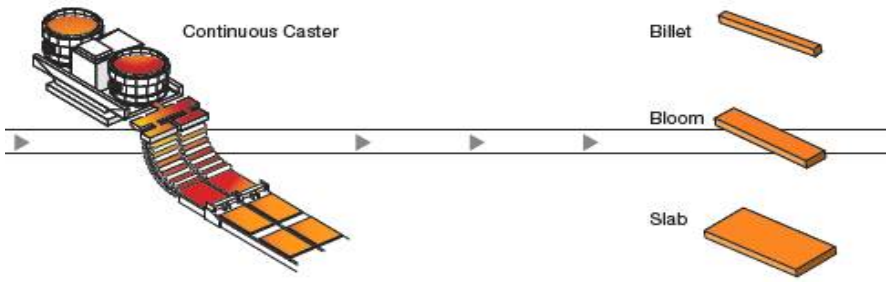
Source: POSCO, Company Digital Brochure, 2015

Fig. 3-2 Process of Steel-making

Continuous Casting :

The pure and cleaned molten steel in liquid state turns into a solid state in this process. The molten steel is poured into a mold and passes through a continuous

casting machine, where it is cooled and solidified into intermediate forms of steel products, such as Steel slab, steel bloom and steel billet.

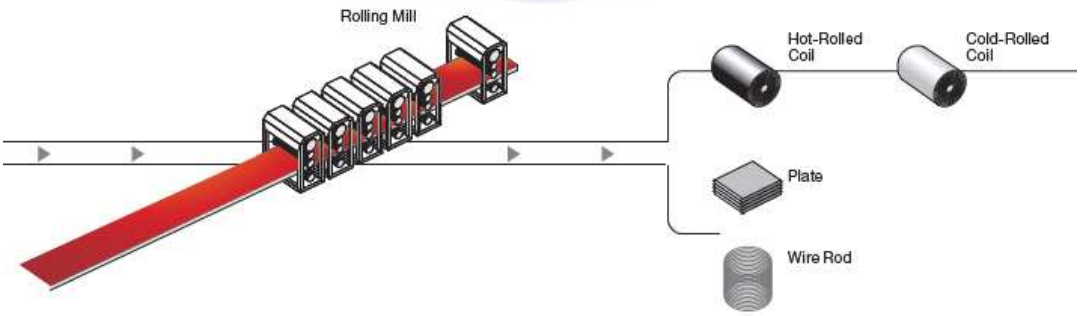


Source: POSCO, Company Digital Brochure, 2015

Fig. 3-3 Process of continuous casting

Rolling :

In this process, the intermediate forms of steel products made into demanded shapes, size, thicknesses are produced. For example, to transform steel slabs into Hot rolled coils, the slabs will be heated with 1,100 degrees or more and then sent through the large rolling machines. If this hot rolled coil is rolled at a room temperature, it becomes the cold-rolled coil, which can be fabricated to manufacture galvanized and electrical steel products.



Source: POSCO, Company Digital Brochure, 2015

Fig. 3-4 Process of rolling

3.1.2. Status of Korean Steel Industry

The steel industry of Korea has begun with the establishment of Pohang Steel[26] in 1970s. Since then, the industry showed dramatic growth and based on this growth, it has led the growth of automobile, shipbuilding and shipping industry, which were key industry of Korean economy.

As steel industry being representative strategic industry of Korea, the government provided active support of the policy, which helped to lead the economy of Korea since 1970s. The steel industry now has the proportion of 4.7% in total export quantity of Korea. Even though fast growth of the industry of information technology, and other new industry recently has led to a lower proportion of steel export in Korea, it is still recognized for its contribution in export.

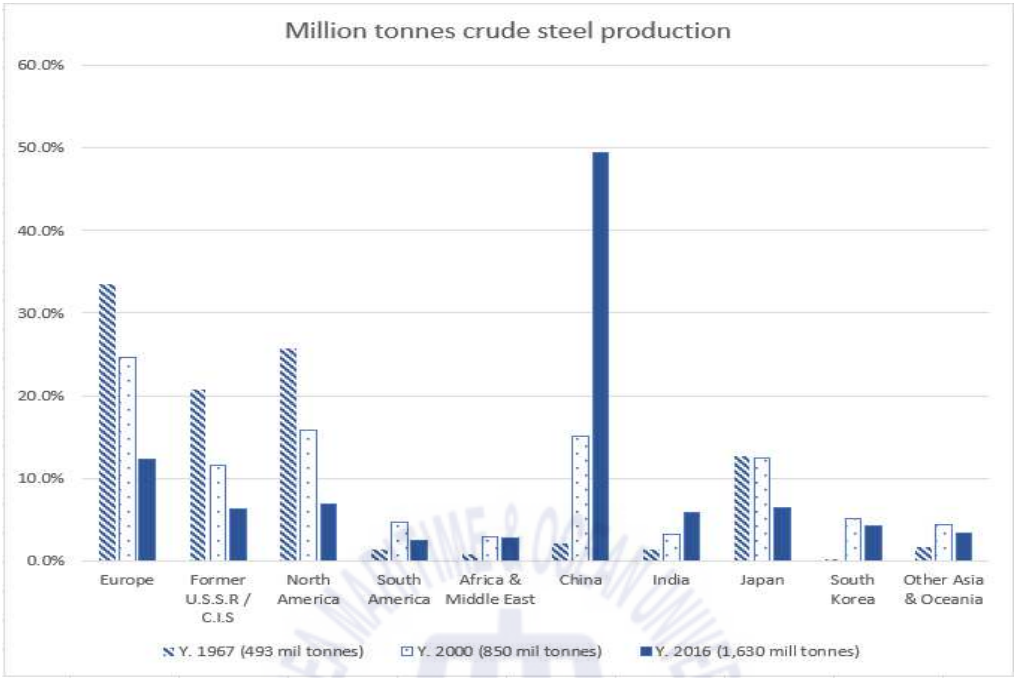
Figure 3-5 has been re-tabulated based on the information provided by the World Steel Association[27] in 2017. Being 50 years since establishment, the World Steel Association has published 50 years of steel production by the countries in million tonnes.

The graph shows that the steel production of Korea in 1970s was 0.1% of the world production, which is only 493,000 tonnes whereas Japan was producing 62,118,000 tonnes, which is 12.6% of the world production. However it shows gradual increase in production of Korea as it produced 6,846,000 tonnes, which is 4.2% of world production and reducing the gap with that of Japan, 6.4%.

---

26) Now POSCO. It was first established with the name of Pohang Iron and Steel Company in 1968, which began production in 1972.

27) World Steel Association : a non-profit organization to promote iron and steel industry to customers and general public. The members represent 85% of global steel production.



Source : World Steel Association, 2018

Fig. 3-5 World Steel in figures 2017

As of year 2019, Korea has ranked 5th based on steel production in accordance to table 3-1 and can be referred that Korea has been gradually increasing its production annually. In addition, even though it is only ranked 5th, the Korean steel company, POSCO has been named for 'World's most competitive steelmaker'(refer to table 3-2) for 9th consecutive year in 2018 by World Steel Dynamics.[28] (POSCO Newsroom, 2018) Not only POSCO was ranked in top 10, but also Hyundai Steel has named themselves in 9th and this shows the strength of the Korean steel industry amongst the influential steelmakers.

28) World Steel Dynamics is a strategic information service provider for steel industry developments, which regularly analyzes and publishes reports related to steel industry.

Table 3-1 World Rankings for crude steel production

Country	2018		2017	
	Rank	Tonnes	Rank	Tonnes
China	1	928.3	1	870.9
India	2	106.5	3	101.5
Japan	3	104.3	2	104.7
United States	4	86.6	4	81.6
South Korea	**5**	**72.5**	**6**	**71.0**
Russia / C.I.S	6	71.7	5	71.5

Source : World Steel Association, 2019

Table 3-2 World's most competitive steelmaker

	2018	2017	2016	2015	2014	2013	2012	2011	2010
1	**POSCO**	**POSCO**	**POSCO**	**POSCO**	**POSCO**	**POSCO**	**POSCO**	**POSCO**	**POSCO**
	8.37	8.31	8.02	7.91	7.91	7.73	7.48	8.12	7.53
2	**Nucor**	**Severstal**	**NSSMC**	**Nucor**	**Nucor**	**Severstal**	**NLMK**	**Nucor**	**JSW Steel**
	7.97	7.79	7.77	7.55	7.55	7.46	7.43	7.47	7.3
3	**Voest Alpine**	**Nucor**	**Nucor**	**NSSMC**	**NSSMC**	**Nucor**	**CSN**	**NLMK**	**Nucor**
	7.95	7.66	7.74	7.49	7.49	7.28	7.42	7.23	7.25
4	**Severstal**	**NLMK**	**SDI**	**Gerdau**	**Gerdau**	**NLMK**	**Severstal**	**Severstal**	**SAIL**
	7.7	7.63	7.57	7.34	7.34	7.21	7.3	7.15	7.23
5	**NSSMC**	**NSSMC**	**NLMK**	**Severstal**	**Severstal**	**JSW**	**Bao Steel**	**Arcelor Mittal**	**CSN**
	7.65	7.61	7.42	7.31	7.31	7.2	7.24	7.13	7.23
⋮									
9	**JFE**	**Arcelor Mittal**	**JFE**	**Hyundai**	**Hyundai**	**SAIL**	**Nucor**	**JFE**	**Severstal**
	7.42	7.31	7.24	7.05	7.05	6.99	7.09	7.08	7.05

Source : POSCO Newsroom, 2019

World Steel Dynamics evaluates the 'World's most competitive steelmaker' based on 23 criteria as listed in Table 3-3 and each criteria is based on 10-point scale. POSCO has won full scores in 8 different criteria in 2018 including Cost-cutting efforts, Harnessing Tech revolution, Downstream business, skilled and productive workers criteria and high scores on criteria of Pricing power in home market, profitability, size and expanding capacity, which led POSCO to be named as the 1st in rank.

Table 3-3 23 criteria for evaluation of Steelmaker

	Criteria	#	Criteria
1	Size	13	Location to procure raw materials
2	Expanding Capacity	14	Labor costs
3	Location in high-growth markets	15	Skilled and productive workers
4	Location close to customers	16	Liabilities for retired workers
5	Pricing power in home market	17	Profitability (EBITDA)
6	Value-added product mix	18	Balance sheet
7	Conversion costs : yields	19	Threat from nearby competitors
8	Energy costs	20	Environment and safety
9	Cost-cutting efforts	21	Downstream business
10	Harnessing tech revolution	22	M&A, Alliances and JV's
11	Iron ore mines	23	Country risk factor
12	Coking coal mines		

Source : POSCO Newsroom, 2018

As it is proved by the figure 3-5 and table 3-1, Korean steel industry shows high competency in the world steel industry and it provides high contribution in national competitiveness of Korea. As of year 2000, the cost of production was USD 40.2 billion, which was about 3.4% of the total and if steel-demand industry and related industry's figures are included, it is about 31.2% of the total.

Therefore, the importance of steel industry is magnified in aspects of national economy.

3.2. Marine Transportation for Iron Ore

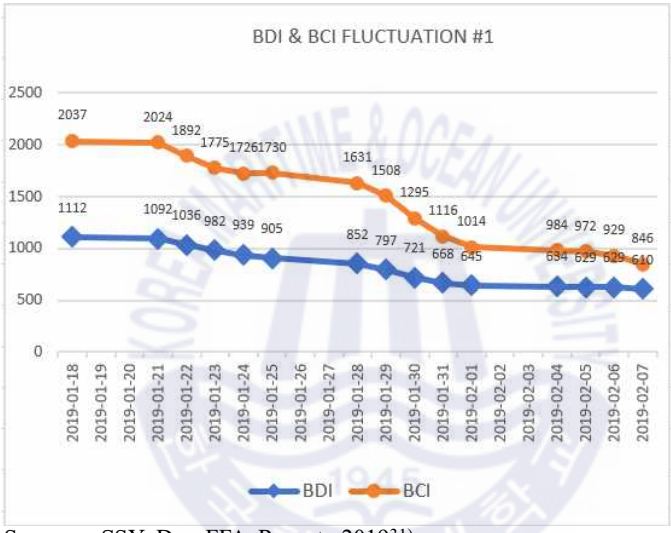
3.2.1 Characteristics of Shipping

Iron ore, the core element of raw material in making steel products, is also in intimate relations with the shipping industry. The quantity of iron ore transported has immense effect on maritime market, especially the dry-bulk sector. The five major dry-bulk cargo can be determined as Iron ore, Coal, Grain, Bauxite/Alumina and Phosphate and the minor dry-bulk is determined as Sugar, Fertilizer, Cement, Copper slag, etc. Among the dry-bulk cargoes, the iron ore and coal have proportion of 70% of total dry-bulk cargo trade. Therefore, analyzing the volume of iron ore transport is the key factor to analyze the dry-bulk market. There are indices to analyze the market status and the movement of dry-bulk index heavily depends on the iron ore market. The index referred in relations to the iron ore market is Baltic Dry Index (BDI) and Baltic Capesize Index, (BCI) which is announced by Baltic Exchange. Moreover, when the BDI and BCI is effected, the spot hire rate of Capesize also showed changes. If BDI and BCI increased, it can be understood that there are more volume of iron ore or other raw material cargo targeting Capesize to transport than the available Capesize vessels to transport. Thus, the spot hire rate of the Capesize increases.

The Figure 3-6 shows an example of the relationship. On 26th of January in 2019, the Dam of Vale[29] collapsed. Vale of Brazil produces 26% of world iron ore market and it is the major mine company in the world. Due to the Dam collapse, Vale assumed 11% of yearly production, which was about 30,000,000

29) Vale, BHPB, & Rio Tinto are the largest iron ore producers in the world covering 60% of world production.

tonnes.[30] (Mann, R, 2019) The unstable supply of Iron ore has increased the cost of iron ore and slow down in volume of transport. The Figure 3-6 shows the Baltic Dry Index and Baltic Capesize Index from 18th January to 07th February. This is to show the fluctuation of the indices 1 week prior to and after the date of the Dam collapse, 26th January. Although the indices were in declination prior to the Dam collapse, but it is noticeable that the indices showed stiff downward trend after the Dam collapse.



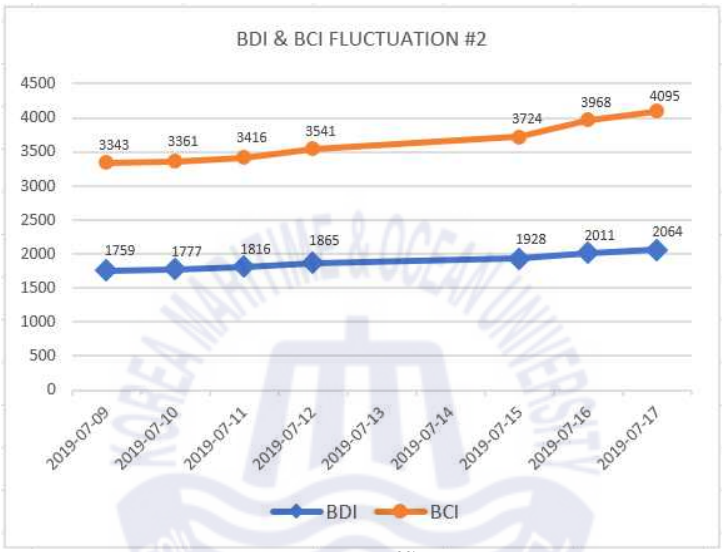
Source : SSY Dry FFA Report, 2019[31]

Fig. 3-6 BDI & BCI fluctuation in effect of Vale Dam collapse 01/26

The Figure 3-7 is to show the BDI and BCI fluctuation after Vale resumed operation of the Brucutu mine as of 22nd June in 2019. Brucutu mine was halt for its operation due to the safety of the nearby dam collapse in early February, which produces 10 million tonnes annually.[32] (McGeever, J & Plumb, C, 2019) When the court allowed Brucutu mine to resume operation, the Figure 3-7 shows the inclination of the indices in shipping. As Figure 3-6 showed 610 for BDI and 846

30) Mann, Richard (2019), Rio Times, Web.
31) Daily report gathered from 18th January, 2019 to 7th February, 2019.
32) McGeever, Jamie & Plumb, Christian (2019), Reuters, Web.

for BCI as the lowest point, the Figure 3-7 shows 2,064 for BDI and 4,095 for BCI, which is a dramatic change in numbers. In addition to the resumed operation of Brucutu mine, the shortage of iron ore compare to the demand in China has assisted in the increase. Likewise, the Spot hire rate of Capesize also showed dramatic changes during above two sections of time.



Source : SSY Dry FFA Report, 2019[33)]

Fig. 3-7 BDI & BCI fluctuation in effect of Vale Dam normalization

The Table 3-4 is to show the dramatic change of the spot hire rate of Capesize vessel. The hire rate declined to 8,230 due to the collapse of the dam in Brazil in January and inclined up to 31,073 with the help of the resumed operation and China's shortage of iron ore. Not to be specified with iron ore trade, but it is certainly provides immense effect to the maritime market.

33) Daily report gathered from 9th July, 2019 to 17th July, 2019.

Table 3-4 Change in Cape 180 5TC Rate[34)]

A – Effect of Vale dam collapse		B – Effect of Brucutu mine resume	
Cape 180 5TC (USD)		Cape 180 5TC (USD)	
2019-01-18	15,746	2019-07-09	26,367
2019-01-21	15,606	2019-07-10	26,403
2019-01-22	14,608	2019-07-11	26,705
2019-01-23	13,823	2019-07-12	27,389
2019-01-24	13,373	2019-07-15	28,579
2019-01-25	13,288	2019-07-16	30,157
2019-01-28	12,523	2019-07-17	31,073
2019-01-29	11,595		
2019-01-30	10,099		
2019-01-31	9,198		
2019-02-01	8,877		
2019-02-04	8,748		
2019-02-05	8,722		
2019-02-06	8,757		
2019-02-07	8,230		

Source : SSY Dry FFA Report, 2019

Iron ore has relatively limited trade routes and hence relatively few load ports. The main iron ore exporting countries are Australia and Brazil, which consist of 61% of world production. India was 3rd in iron ore export until the government ordered to reduce the export quantity in July, 2010. The reduction in export was to protect the domestic demand in the market as the demand is gradually increasing.[35)] (Son, H, 2011) As per the Table 3-5, Australia and Brazil has the highest production and export figures and China, Japan and Korea are the major importers in the market. India produced 201.8 million tonnes in year 2017, but exported only 28.1 million tonnes and rest were consumed by domestic. Therefore, there are very few load ports in iron ore trade as majority of exports are from Australia and Brazil.

34) 'Cape 180 5TC' is an average rate of 180,000DWT Capesize in five (5) time charter routes, of which are the routes of coal, iron ore and grain trade.
35) Son, Hyunho, op. cit, pp.11~12.

Table 3-5 Iron Ore trading countries and figures

Country	Production	Exports (-)	Imports (+)	Assumed Consumption (=)
Australia	883.4	872.8	0.3	10.9
Brazil	435.5	383.5	0.0	52.0
India	201.8	28.1	5.4	179.1
China	115.0	5.5	1,075.4	1,184.9
Japan	0.0	0.0	126.5	126.5
Korea	0.4	0.0	72.4	72.8
Others	531.0	348.8	298.0	480.2
World Total (Million Tonnes)	**2,167.1**	**1,638.7**	**1,578.0**	**2,106.4**

Source : World Steel Association, 2019

Iron ore is notorious for its characteristics in aspects of marine transportation. Due to its nature of liquefaction, there is potential risk during marine transportation. In 2007, nine vessels have sunken and took 29 lives away.[36] (Mohajerani, A, Dean, J and Munro, M, 2019) According to Susan Gourvenec, a professor of offshore geotechnical engineeing at the University of Southampton stated during the interview with 'Ship Technology Global'[37] that when there is cargo liquefaction during the navigation, it is assumed that the loss of the vessel and life is significant and no other types of vessel lost or incidents have such a high fatality rate. The cargo liquefaction has been a concern of seafarer for over a century.[38]

The general definition of liquefaction is the process of converting a substances

36) Mohajerani, Abbas, Joshua Dean, & Michael Munro (2019), pp.451-453.
37) Ship Technology Global : A maritime Magazine.
38) Ship Technology Global (2019) *Why are liquefied cargoes a persistent danger to ships?,* Web.

from its solid or gas state into its liquid state. The cargo in its solid state, particularly Iron ore fines and nickel ore, there is a friction between the particles of a concentrate that holds the particles together. The cargo may look dry during the loading operation, but its inherent certain moisture contents always exist. During the ocean navigation on board the vessel, the cargo is exposed to the agitation under vessel's navigating condition such as Vessel's rolling, pitching, and vessel's engine vibration. These external agitation assist the compaction of the cargo by increasing water pressure inherent within the cargo particles. Thus increase in water pressure along with the compaction of cargo, start to push particles apart. At this point, the transition of liquefy begins and the friction between particles are lost. Therefore, the cargo begins to behave like liquid causing free surface effect[39], which cause immense effect on vessel's stability. Further rolling will cause list to the vessel and the vessel will lose its stability as the liquefied cargo is completely shifted to one side.[40] (Tugsan, I and Tanzer, S, 2014)

To minimize the risk of the liquefaction, the shipper, shipowner, the captain and the crew of the vessel must abide by the International Maritime Solid Bulk Cargoes (IMSBC) Code regulated by the International Maritime Organization. All related parties must comply with the Transportable Moisture Limit (TPL) when it is loaded and the captain shall be able to halt the loading operation and request the Moisture Test if TPL is suspicious. Also, the liquefaction often occurs during the sea passage, thus the captain and the crew shall adjust to secure adequate metacentric height to protect the stability of the vessel. The bilge must be cleaned and empty prior to sailing and must test the workability of the bilge alarm and the bilge pump. When the bilge alarm sounds, the captain shall instruct to pump out

39) Free surface effect : The motion of liquid in the tank or cargo hold for iron ore case, that is partially full causes the ship's center of gravity to shift. Therefore when the vessel lists, the ship's center of gravity can shift to make parallel to waterline, which can be advised as loss of stability.
40) Tugsan, C & Satir, T (2014), pp.1-3.

the bilge regardless the loss of cargo weight.[41] (Gard AS, 2014) Although iron ore is not a complicated method-loading cargo or in needs of special care, but due to its nature of liquefy, the clear understanding of its behavior and experience by the shipper, shipowner, and the crew of the vessel are required.

3.2.2. Market Structure

The market of iron ore transport in Korea is structured as oligopoly on both parties. Assumed that consumer (demand) is the steel company and supplier (supply) is the shipping company, the both parties are consist of minority of market players. As of 2019, the steel companies that imports iron ore in Korea is POSCO and Hyundai Steel and hence it is assumed that there is only two consumer of the transport service. The transport service providers for iron ore in Korea are less than 10 companies. There are only four shipping companies that have signed a long-term shipping contract with POSCO and they are H-Line shipping, Panocean, Polaris shipping and Korea Line Corp. These are the stable and consistent shipowners that can provide stable transport service. Although there are middle-sized shipping companies that provides transport service for iron ore, it is difficult to enter the Capesize market without long-term shipping contract.

The iron ore is often transported by the Capesize vessel or above sizes to secure stable supply of core raw material of steelmaking and therefore intention of large volume in one shipment is inherent.[42] (Beresford, A, Pettit, S, Liu, Y, 2011) Table 3-6 shows the various sizes of the vessel and Capesize starts from 125,000DWT, but most of the Capesize vessel that is used to transport iron ore in Korea are from 170,000DWT to 200,000DWT. It is also notable that major transport cargo for Capesize and above is iron ore. Therefore, most of the Capesize and above vessels are used in iron ore trade.

---

41) Gard AS (2014), *Liquefaction of Solid Bulk Cargoes,* Web.
42) Beresford, Anthony, Stephen Petit, & Yukuan Liu (2011), pp.34-36.

Table 3-6 Types of dry-bulk vessels

Type of Vessel	Size of Vessel	Major goods transported
Handysize	20,000DWT ~ 40,000DWT	Minor Bulk
Handymax	40,000DWT ~ 50,000DWT	Minor Bulk
Supramax	50,000DWT ~ 60,000DWT	Minor Bulk
Ultramax	60,000DWT ~ 70,000DWT	Minor Bulk
Panamax	70,000DWT ~ 80,000DWT	Coal
Post-Panamax	80,000DWT ~ 125,000DWT	Coal
Capesize	125,000DWT ~ 220,000DWT	Iron Ore
VLOC	220,000DWT ~	Iron Ore

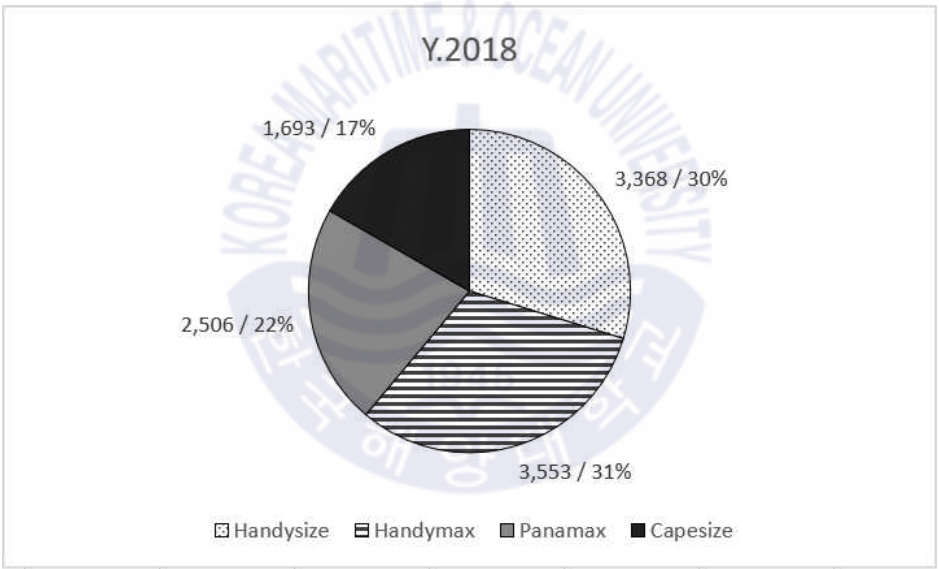
Source : Kiwoom Research, 2018

The entry barrier of iron ore market is too high for many shipping companies. First of all, operating/owning a fleet of Capesize or above is difficult for the middle/small-sized shipping companies because the cost of the vessel is higher than handysize vessels, and it is difficult to secure stable voyages if long-term shipping contract is not signed prior to owning. The Capesize vessels have lesser purposes of cargo to transport compare to that of smaller vessels, such as handysize and handymax. The handysize and handymax sized vessels have the most purposes in aspects of cargo transport due to its size. Most of the ports in the world are constructed to fit at least Handysize vessels and therefore the Handysize vessels do not have restriction of transporting any type of cargo. This means more opportunity of service and voyages for the vessel. Whereas, the Capesize can only call permitted, regulated ports, which are limited and also have limited choice of routes for trade due to its size. Therefore, the shipowners tend to expand their fleet with handysize and handymax size vessels as they provide more purposes.[43] (Park, S,

43) Park, Sun Ki (2019), p.8.

2019)

The Figure 3-8 shows the tonnages of each type of vessel in dry-bulk sector. The unit of the numeric is the number of the vessel in the world market. The Figure 3-8 shows that the sum of Handysize and Handymax is 6,721, which is about 60% of the total number of the vessel in the world. The Capesize is shown as 1,693, which is only 17% of the total number of the vessels. Although the world shipping market is in intended trend of delivering larger vessels, due to its limited purposes in dry-bulk, the larger vessels are less preferred by the shipowners.



Source : Clarkson Research Services, 2019

Fig. 3-8 Bulk Carrier Tonnage by types

Being the largest dry-bulk shipping company in Korea, Panocean also has larger handysize fleet than the capesize fleet both in owned and chartered fleet. Refer to Table 3-7, which shows the fleet list of Panocean as of 3rd quarter of year 2018. 100 Handysize and handymax vessels have been operated, which is 61% of the total fleet operation and the 17% of the capesize vessels have been operated by

Panocean in 2018. Likewise, due to the Capesize's limitation of the operation, it is only committed to carry and built to provide efficient operation for Iron ore, Coal and Grain. Therefore, the ocean freight and hire rate fluctuation are highly depended on the fluctuation of iron ore, coal and/or grain market, whereas there is smaller or timid effect on the fluctuation of handy-handymax market.[44] (Park, S, 2019)

Table 3-7 Fleet list of Panocean

Type of Vessel	Owned fleet	Chartered Fleet	Total
Handysize	9	26	35
Handymax	11	64	75
Panamax	13	26	39
Capesize	27	14	31

Source : Panocean IR Presentation Q3, 2018

In addition, the new building cost of Capesize vessel is exorbitant compare to that of the Handy and Panamax. As per Clarkson Research Services in March, 2019, the cost of new-built handysize vessel is USD 21.55 million, panamax is USD 27.5 million and capesize is USD 51.0 million. Therefore, it is financially uncomfortable for middle-sized shipping companies to invest on large vessels without any long-term contract. Even if a shipping company does not own a Capesize vessel, it may deploy a chartered Capesize vessel to commit to spot (one voyage) contract for iron ore. However, as mentioned above, the fluctuation of the Capesize hire rate is relatively frequent and wider, that the financially unstable shipping company prefer not to invest on the inherent risk. These are the reason that the entry barrier of iron ore transport market is relatively higher and structures oligopoly of transport service provider in iron ore transport market.

44) ibid, pp.9~10.

3.2.3. Shipping Contract

Big portion of Iron ore shipping contract are performed with the CVC in Korea. The steel companies that import iron ore for their steelmaking are POSCO, Hyundai Steel and Dongbu Steel, but as mentioned previously, Dongbu Steel no longer imports iron ore as they stopped operation of their steel mills and in progress of sale and since POSCO has relatively high proportion of steel production and practically in lead of Korean steel industry, POSCO's case has been analyzed in this study along with the largest steelmakers of Japan and China.

POSCO imports iron ore via CVC, COA and spot contract and 75% of its annual imports are by CVC. 15% of COA and 10% of Spot contracts are signed and performed for the rest. As per POSCO's Audit Report of 3Q-2018, 38 vessels are in long-term contract (both CVC & COA) for raw materials (Iron Ore, Nickel Ore, Coal) and average remaining contract years are 10 years. For iron ore transport, H-Line shipping, Panocean, Korea Line Corp, and Polaris have signed CVC with POSCO. The number of CVC for each companies has been listed in Table 3-8. H Line Shipping is operating 13, Korea Line Corp is operating 8, Panocen is operating 2, and Polaris is operating 4 CVC vessels with POSCO for iron ore import.[45] These contracts also have average of 10 years of remaining contract period. (Panocean IR Presentation 3Q-2018)

Table 3-8 POSCO CVC Vessels for Iron ore

POSCO CVC Vessels - 2018				
H Line Shipping	Korea Line Corp	Panocean	Polaris	Total
13	8	2	4	27

Source : Korea Shipowners Association, 2019

45) *Note, the figure shown in table 3-8 is a best estimate figure by Korea Shipowners Association

The largest steelmaker in Japan, the Nippon Steel & Sumitomo Metal Corp (NSSMC) imports their iron ore by dedicated shipping contract. As mentioned above, the dedicated shipping contract was started by Japan in the government's intention of mutual development of shipping and steel industry. The Japanese are in continuous effort of the maintaining the dedicated shipping contract by building a stronger bonds between shipowners and consignors. NSSMC imports 70 million tons of iron ore annually and all are transported by dedicated shipping contract with companies such as Mitsui O.S.K. Lines (MOL), K-Lines, NS United and Nippon Yusen Kaisha (NYK). (Corbett, A, 2015) In 2015, NSSMC has signed more dedicated shipping contracts with above four shipping companies. NSSMC added nine more VLOCs of 24-250,000DWT to their fleet. Three vessels from MOL and two vessels of each from K-Lines, NS United and NYK has been signed. Maximizing dedicated shipping contract, Japanese steel and shipping industry smoothly blocks foreign shipping companies from entering the Japanese transport market, which was intended by the Japanese. Japanese steel and shipping industry have strong bond in between and shares common interest of long and steady relationship. The steel industry has strong trust in Japanese shipping companies of their outstanding services and strength in freight rate. The 70% of Japanese vessels have been already secured with at least five (5) years long shipping contract and 41% of Japanese vessels have been known to be secured with at least ten (10) years long shipping contract. Looking at the percentage figures of the vessels in long-term shipping contract, it is advised that how actively the COA, CVC and dedicated shipping contract is used in Japan.

The largest steelmaker in China, Baosteel imported iron ore through CVC of 20 years with China Ocean Shipping Company (COSCO), signed in 2007.[46] (Fastmarkets, 2007) Baosteel has secured about 80% of annual volume with

46) Fastmarkets (2007), *Baosteel and COSCO ink long-term coal, iron ore charter contracts.,* Web.

long-term contract (CVC & COA) and about 20% with spot contract, which is similar to that of POSCO. However in 2008, after financial crisis had hit globally, under the principle of "joint efforts of the strong ones to complement the advantages, cooperate for win-win and grow together", Baosteel, China Shipping and China state shipbuilding corporation has decided to make one-team to enhance strength of the mutual interest. Baosteel and China shipping launched a joined venture company called Hong Kong Haibao Shipping Company. This company is to support Baosteel's iron ore import and steel product export and the vessels in need so was newly built by the another joint venture of Baosteel, China shipping and China state shipbuilding corporation called Longxue Shipbuilding Co., Ltd. The Hong Kong Haibao Shipping Company initiated its operation with six VLOCs, which were engaged in iron ore imports from Brazil and Australia.[47] (Baosteel news centre, 2008) As of January, 2016, China Shipping an COSCO were merged into China COSCO Shipping Corporation Limited and as the two giants are merged into one, the iron ore import for Baosteel is highly relied on China COSCO Shipping Corporation Limited.

In the view of three major Asian countries' iron ore imports, it is advised that long-term shipping contract in concept of CVC has been utilized although the understanding of interest is different by nations.

In cases of Vale, the one the largest iron ore producers in the world, utilizes both COA and CVC in their iron ore transportation. Most of the long-term shipping contract before 2016 were signed with CVC contract, but recently the change has been shown in types of long-term contract for Vale. Most of the new long-term shipping contract has been signed as COA instead of CVC, but unlike ordinary COA, the time frame of the contract was rather as long as CVC, 27 years. Also, as a COA contract, they officially do not designate the specific vessel

47) Baosteel News Centre (2008), *Baosteel sets up Haibao Shipping Company with China Shipping.,* Web.

to perform, but it is to be understood between the two parties that a specific vessel will perform the contract. Basically, the contract is to be performed as it is used to through CVC, but Vale is free from the compulsory cargo readiness to fulfill fully laden shipment and IFRS 16[48] effect. Before IFRS 16 was in effect, Leases, where operating leases were to be recognized as off balance sheet of the company and therefore, the CVC caused minimal affect for consignors for their balance sheet. However, the IFRS 16 regulates and requires lessees to capitalize all leases, except for short-term leases and leases of low-value assets, which means all CVC contracts can be recognized as a leases from the consignor to the shipowners as in CVC contract, the vessel is operated as per consignor's instruction regardless of the ownership. Due to IFRS 16, many consignors and shipping companies are finding alternative solutions as the CVC contract is inevitable in terms of IFRS 16 regulation and it is believed that changing CVC to COA, but maintain the nature of the contract, is one of the idea to the solution.

Korean Financial Services Commission has announced that all CVC contracts that is signed after year 2019 will be recognized as leases as per IFRS 16, but all the remaining CVC contracts that were signed prior to year 2019 will not be included in the recognition. Thus, Korean steel industry and shipping industry believe that there will be lesser CVC contracts and will be changed into COA once the current CVC contracts expire.

3.3. Marine Transportation for Steel Product

3.3.1 Characteristics of Shipping

The steel products can be grouped by six categories of products and they are Cold rolled coil (CRC), Hot rolled coil (HRC), Stainless Steel coil (STS), Steel

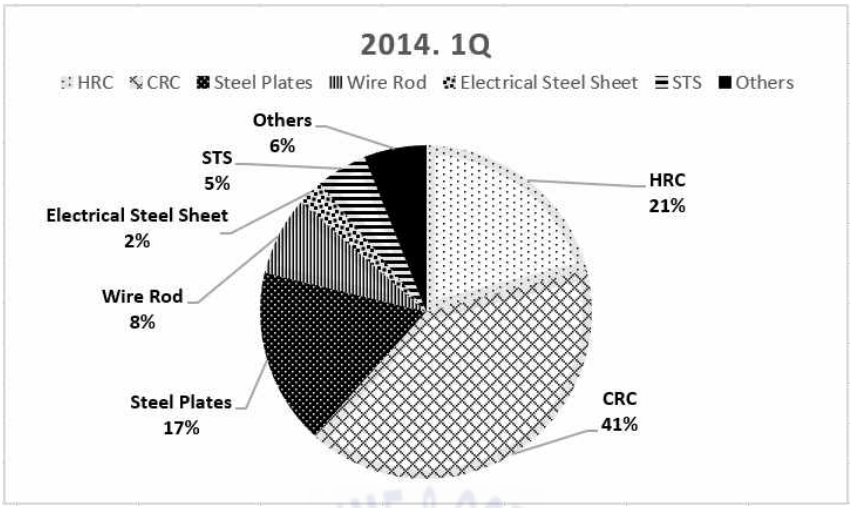
48) IFRS 16 : International Financing Reporting Standard issued in January, 2016 and to be in effect as of January, 2019.

plate, Wire rod and Electrical Steel sheet. As of 2014, sales proportion of each category of POSCO was as listed in below graph. The sum of CRC and HRC exceeds 60% of the total sales. Although this figure is based on 1st quarter of the year, the average annual sales are in similar figure. Each type of product has loading/lashing regulation to follow as they have different exterior. For example, HRC is not the final product and this cargo will be processed into final product at the customers' processing center. Therefore, the cargo, when it is loaded, will be unpackaged and is permitted to load up to four (4) tiers[49] if the tanktop strength of the vessel can bear. Whereas, CRC is already processed and in fully packaged and sensitive of bent, or crush due to heavy weight on top. Therefore, CRC is usually permitted to load up to two tiers, but sometimes three tiers with light weighted CRC on top. In addition, HRC are permitted to load/discharge during the rain, but CRC is strictly prohibited to do so due to wet damage claim. Therefore, when loading, the supercargo of the shipping company shall be present at scene to make sure cargoes are loaded in safe condition.

These products are exported to Fareast Asia, Southeast Asia, West India, Middle East Asia, East/West Europe, and USA/Mexico mainly. These are regional category of POSCO's steel product export and each region is divided into countries and each country has multiple ports of product demand. Unlike iron ore, the steel product export has various cargo demanding area. The volume of export for each port varies depending on the demand. Some ports may not have any demand for particular time and some ports may have more demand than usual. Due to the existing variables in terms of demand, the nature of marine transportation is not as simple as iron ore. The routes of the voyage changes every shipment and volume of each port varies every shipment. The figure 3-10 is to help easy comprehension of one shipment procedure for Southeast Asia region.

---

49) Tiers : when loading steel product, number of vertical row. For example, if one row of coil is loaded on top of a lower row of coil = 2 tiers.



Source : Steel Daily News, 2014

Fig. 3-9 POSCO product sales figure by category

The figure 3-10 is based on shipping company's perspective. The steel company will assign a shipping company and provide cargo and port details such as, request arrival date of vessel, intended load and discharge ports, and cargo quantity of each ports. With the given information, the carrier will decide either to nominate its own vessel or chartered vessel from the spot market. At this process, the carrier's strategy in account of the market condition will help in profit making. Once the decision is made, the carrier shall nominate intended vessel one week prior to the request date and the nominated vessel must be suitable to load assigned quantity of cargo and must arrive 1st load port no later than the request date. After cargo is loaded and discharged, it is carrier's strategy choice to either redeliver the vessel to the head owner, if chartered, or secure nearby shipment that has popular discharging ports so that it can secure another shipment following the new shipment. The assigned discharge port is not consistent. It changes every shipment and the figure 3-10 is one of the cases to help comprehension of the readers.

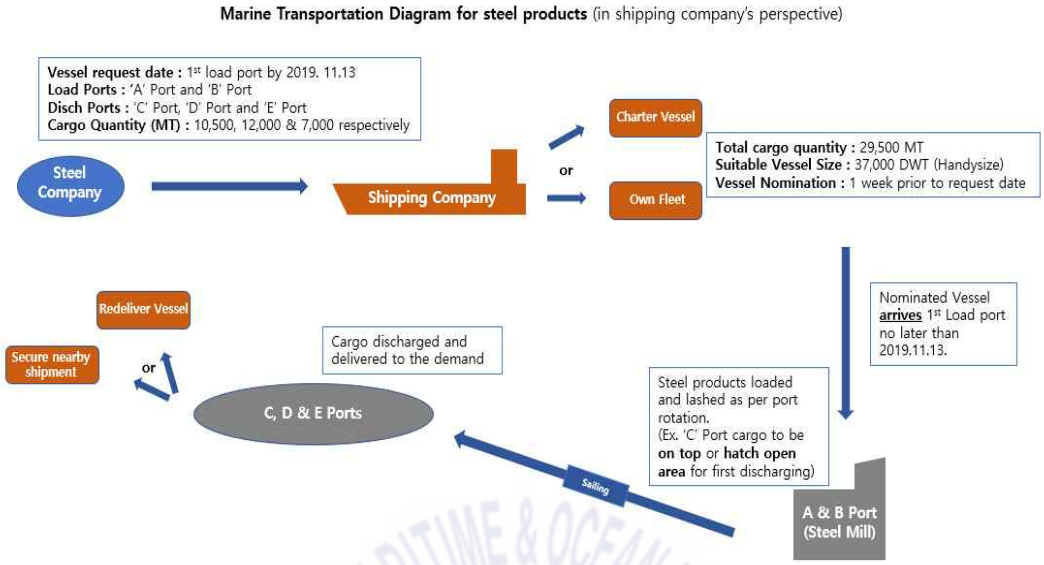
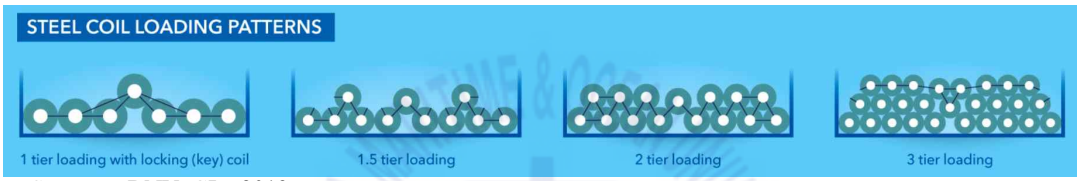


Fig. 3-10 Typical Marine Transportation Procedure Diagram for Steel Product

The steel products require strategic loading procedure as it can not be dropped like other dry-bulk cargo. Since it is a product to be sent to the customer, the quality of the cargo at the delivery is important. Therefore, the supercargo of the shipping company is usually present at the scene of loading to protect the interest of shipping company in terms of the quality of the cargo. Steel product does not have chemical reaction that severely affects the safety of the vessel, such as liquefaction or free surface effect. The heavy weight of steel product (one coil can weight up to 30MT), however, occasionally causes serious damage to the vessel's tanktop strength. Tanktop strength is the safe working loadable weight that the vessel's cargo hold bottom can bear. If the product is loaded beyond its limit, the vessel can have severe safety issue. However, with the limitation of the tiers in loading product, it is often prevented to go beyond the tanktop strength. For example, in figure 3-10, the suitable vessel to load 29,500 MT of steel product is assumed as 37,000DWT vessel. The maximum weight the vessel can transport at once is not important in terms of loading steel product as the tier is limited, but the bottom space of the cargo hold is essential. Wider and longer cargo hold can

load more steel product and therefore, regardless of the maximum weight the vessel can carry, the size of the cargo hold is more essential when searching for suitable vessel. Doing so will prevent such fatal accident from hold bottom damage. The steel products are to be loaded strictly as per loading manual provided by vessel's classification society such as Korean Register, Lloyd's Register, American Bureau of Shipping, etc. Every vessel has its own steel loading manual made in account of vessel's tanktop strength. The figure 3-11 is the general steel coil loading pattern provided by DNV GL, one of the largest classification society in the world.



Source : DNV GL, 2019

Fig. 3-11 Steel Coil Loading Patterns

Every region and port has its own method of discharging and therefore shall be aware of the steel cargo operation. The steel products, if not lashed properly, can get damaged as the lashing gets loosen during the sea passage due to heavy rolling and pitching. Also, when the cargo is loaded during winter, kin attention to the cargo during sea passage of the crew is essential. If the steel product is loaded during the cold weather and discharged during the warm weather such as Southeast Asia, it is most likely to have condensation issue, which causes damage to the cargo. Thus, sufficient ventilation of the cargo hold is necessary depending on the routes or install fan heater[50] in the cargo hold as a countermeasure. The crew shall be attentive to check the cargo visually and shall check the temperature and moisture of the cargo hold daily.

50) POSCO has been installing in its Southeast Asia bound vessels to prevent cargo damages due to condensation and it has proven to be effective.

3.3.2 Market Structure

The market structure of steel product is consignor-oligopoly. Assumed that consumer (demand) is the steel company and supplier (supply) is the shipping company, there are small number of consumers in Korea compare to that of supplier, the shipping companies. Although there more steel companies that manufactures steel product than iron ore import companies, many of them does not have large and consistent enough volume of cargo to export. However, it is free competition market for the supplier, in which allows many shipping companies to provide service. As the marine transportation of steel products are performed mostly by the COA and spot contract, the vessel is not specifically nominated to commit in particular contract. In addition, the requirement of shipping company to provide transport service in steel product sector is more flexible than it is for iron ore. The shipping company can enter the market with only one owned small vessel and the satisfactory credit rating is not too high that most of middle sized companies can provide. However, the shipping company must have experience of shipment of the region that is applying for. For example, if a shipping company intends to apply for bidding of USA/Mexico region, the company shall have already experienced the shipment bound to USA/Mexico with steel products. These experiences are often covered with spot shipment with foreign steel companies as there is no such requirement for spot contracts. Once secured the cargo, the shipping company is not obliged to nominate its own vessel. It is permitted to charter vessel in the spot market and nominate to the steel company. Therefore, not only large firms have opportunity serve, but also small-middle sized firms have many opportunity to compete in providing service.

Unlike iron ore, the vessels performed in steel product transport are normally from Handysize to Ultramax. (Refer to table 3-6 for vessel size description) As per table 3-8, the proportion of handysize and handymax in the global shipping market

is over 60%. Therefore, it is to be advised that it is relatively easier to find and charter smaller vessel in the market. Also, due to the large proportion and various cargo loading purposes, the fluctuation of small vessel market is relatively lesser than large vessels as the large vessels are limited in loading purposes of cargo. Additionally, the routes for iron ore is known to be fixed and stable as it loads mostly from Brazil and Australia and discharges at China, Japan and Korea as these are the most iron ore consuming countries. Thus, the suitable vessels for iron ore will mostly be free to fix near above three Asian countries. However, the cargo shall be loaded in Brazil and Australia and the ocean freight will be too expensive and far to fix a vessel from China to go to Brazil for loading cargo. Therefore it is far from practicability. The steel products, however, vessels are relatively small and those handysize to ultramax vessels tend to and prefer to be open free to fix in near fareast as the high demand of the vessel is provided in fareast. Thus, there are always handysize to ultramax vessels in fareast, which allows relatively easier reservation of the vessel as in need and hence provides lower entry barrier to the market.

3.3.3. Shipping Contract

Big portion of shipping contract in steel product is the contract of affreightment and spot. Dongkuk Steel and POSCO has minimum 50% of COA and rest as spot contract for their annual steel product volume. This is because of the unstable demand by the region. Depending on the demand, the ports of demand may increase and this is the cause of ascent in ocean freight as the sailing routes and port fees of each varies. Simultaneously, it is insecure to rely solely on long-term contract such as COA because in terms of COA, the consignor shall confirm and provide the best estimated total volume of transport during the contract period. Therefore, 50% of annual estimated volume is fair enough to be certain to provide to the shipping companies. Doing so, the consignor can secure minimum stable

transport of steel product exports and save unnecessary extra cost from increase in number of discharging ports. In COA, the ocean freight per metric ton of cargo is fixed per port and the ocean freight does not increase for calling more ports in COA. Whereas, in spot contract, the shipping company will calculate in account of actual cost causing factors as per actual discharging ports given.

For general bulk cargoes, the spot bidding is open to public and any company that can provide service may participate in the bidding as it does not require strategic loading and lashing procedure. The steel products, however, usually allows qualified shipping companies to participate in the bidding. The qualified means that the participating company must have had experience of steel product carriage in that relevant routes.

In cases of Japanese steel product market, the COA is actively applied with time frame of one (1) year as well. However, it is more like renewing the contract every year with minimal adjust in contract terms or freight rate. Japanese steel companies such as JFE or NSSMC prefers and gives priority to Japanese shipping companies such as NYK Lines, MOL and other major companies in Japan. Usually the spot shipment are opened and given to foreign companies to participate, but it is also limited to below 10% of the spot shipment. Likewise, Japanese steel industry and shipping industry have strong bond and share the same interest of long relationship with rational rate of the freight instead of short and aggressive freight rate. Long and steady is their strength of maintaining strong bonds.

CHAPTER 4. INTERVIEW AND ANALYSIS OF SHIPPING CONTRACT

To identify the factors affecting the preference for shipping contract types in the Korean steel industry, this study included interviews with Korean experts in the industry. The results of the interviews provide further clarification to the findings from the literature review to determine the factors related to iron ore and steel products.

4.1. Outline of the Interview

In-depth interviews were conducted to identify the factors contributing to the selection of different types of long-term shipping contracts and the opinion of each party in regard to the future modification of shipping contract terms (e.g., contract period). The interview questions were used to gather profound opinions of the field experts. The interviewee pool included 13 individuals: four from the steel industry and nine from the shipping industry. Few individuals requested a guarantee of anonymity, but confidentiality was maintained as the selected interviewees play substantial roles in the shipping contract sections of their companies.

4.1.1 Research Model

The research model is shown in Figure 4-1. The research model is to help comprehend this study's major findings of the first objective.

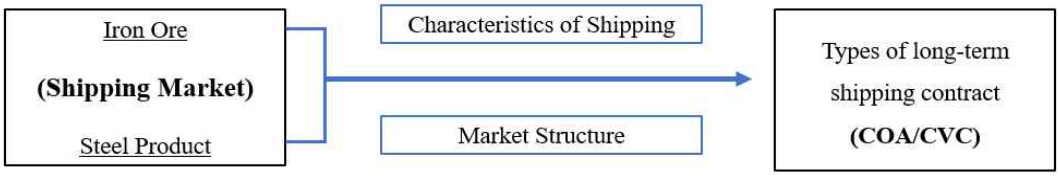


Fig. 4-1 Research Model

The purpose of the model is to show that, by analyzing the market structure and characteristics of shipping iron ore and steel products, we can draw conclusions about which type of long-term shipping contract is preferred and necessary. The in-depth interviews helped analyze the identified factors' influence on the type of contract. The blank boxes shown in Figure 4-1 were to be filled with the analyzed factors from the in-depth interviews.

4.1.2 Selection of Interviewees

The interviewees were specifically narrowed down to individuals who had worked in the related section of the field and could represent their knowledge on behalf of their companies. As the shipping contract section is not familiar to the public, even to personnel working in related fields, it was more valuable to interview a few substantial influencers of contracts instead of having many interviewees with insufficient or misleading information. The pool of interviewees was carefully selected to ensure reliability; most interviewees were professional representatives or decision makers in the steel and shipping industry.

The pool of selected interviewees is listed in Table 4-1, which includes the title of the interviewee, participation, date of the interview, and interview approach. The company names have been anonymized to ensure the confidentiality of interviewees. The four steel industry interviewees were restricted in their answers, but participated to provide as much information as possible. The nine steel industry interviewees were from the major shipping companies in Korea that account for the

significant proportion of the marine transportation for the major steelmaking companies in Korea.

Table 4-1 Interviewee Pool List

#	Company Name	Consignor (C)/ Shipowner (S)	Title	Participation (Y/N)	Date of the Interview (YY/MM/DD)	Interview Approach
1	'A' Steel Mill	C	Team Leader	Y	19/11/22	Phone Call
2	'A' Steel Mill	C	Managing Director	Y	19/11/22	Phone Call
3	'B' Steel Mill	C	Team Leader	N	N/A	N/A
4	'C' Steel Mill	C	Team Leader	Y	19/11/18	E-Mail
5	'D' Shipping	S	Manager	Y	19/11/27	Mobile Messenger
6	'E' Line	S	Managing Director	N	N/A	N/A
7	'F' Merchant Marine	S	Department Head	Y	19/11/25	E-Mail
8	'G' Line	S	Manager	N	N/A	N/A
9	'H' Ocean	S	Managing Director	N	N/A	N/A
10	'I' Shipping	S	Team Leader	Y	19/11/23	E-Mail
11	'J' Shipping	S	Executive Director	Y	19/11/23	Meeting & E-Mail
12	'K' Shipping	S	Team Leader	Y	19/11/18	E-Mail
13	'L' Shipping	S	Team Leader	Y	19/11/25	Phone Call & Mobile Messenger

The participating companies are major steel companies in Korea, and interviewees were individuals who were working or had worked as at least a team leader of the contract team and logistics team of the respective companies. They have played a substantial role in decision-making related to contracts. Furthermore, the individuals from the selected shipping industry were at least team leaders of a business team and actively participated in business decision-making, including contracts with major consignors; therefore, their interviews provided elevated reliability on behalf of the shipping industry.

4.1.3 Implementation of the Interview

Many interviewees found the questions rather difficult to answer as the topics required greater depth than they would ordinarily provide. Thus, securing answers from the interviewees was challenging. Interview questions were produced into two different forms (see Appendix A and Appendix B). One form was for steel companies while the other was for shipping companies, although they ultimately produced identical information. The questions asked about iron ore transport contracts and steel product transport contracts. Due to the two completely different markets, only one shipping company participated in both markets; therefore, many interviewees from the shipping companies responded only to the questions related to the contracts with which they were involved. Meanwhile, steel industry participants responded to both types of questions except for one participant that did not import iron ore.

The questions were produced to receive open and varied answers from individuals with different interests. The questions may seem vague, but the goal was not to narrow down any answer in the direction of the research. As the interviewees were Koreans, the questions were asked in Korean to ensure a better understanding of the research intention and lead to dedicated answers. The questions were selected to determine the most commonly used types of shipping contracts in iron ore and whether the nature of the shipping and market structure affected the preference of contract type by the consignors as well as shipowners' perspective of the effect.

Interviews were conducted between November 14 and November 27, 2019. As Table 4-1 indicates, 13 interviewees were included but only nine participated as some interviewees believed the questions asked about confidential information and were not comfortable sharing such information. Thus, the data analysis includes the answers of only these nine interviewees, whose offices were located in different states; therefore, most interviews were performed via e-mail, phone calls, and

mobile messenger. A few interviewees did not want to participate using any written or recorded method even though they were informed that their confidentiality would be secured.

The answers and information from each participant appeared to be identical in terms of the doctrinal aspects of this study. However, the in-depth interviews indicated that the consignors and shipowners had some conflicting perceptions regarding the contract period and the entry allowance of inexperienced carriers for lower freight rates for the steel products in the COA pool (see Section 4.4. for further discussion).

4.2. Case of Iron Ore Shipping Contract

This section discusses the interview results related to iron ore shipping contracts. The interview data indicated that the characteristics of iron ore shipping and the market structure of the iron ore have significant effects on the type of shipping contract applied. This section discusses the reason behind the high proportion of a particular type of contract for iron ore trade based on an analysis of two factors.

4.2.1 Influence of Characteristics of Shipping

The nature of shipping iron ore appears to affect the form of the shipping contract. The key factors of shipping in the iron ore market include the regularly maintained volume of cargo based on the importance of a consistent supply of cargo for individual businesses, the business itself, the ability to secure large vessels when needed is relatively less important than for of other sizes, and the characteristics of the cargo. These key factors induce the consignor to prefer CVC contracts.

Iron ore is essential for steelmaking procedure, and the steel industry requires a certain amount, about 50%, of the annual iron ore volume to be secured for a

stable supply. If not secured and the steel company faces a shortage of iron ore, furnace operations cannot be continued; when furnaces close, subsequent processes in the steel product are suspended. As a result, the steel company will lose its competency, leading to a high cost of resumption. Therefore, a large volume of iron ore trade is regularly maintained, which is why the industry targets large vessels.

In addition, when large vessels are committed to transporting iron ore, they generally require a long voyage as the trade routes for iron ore are fixed and considered long distance. The normal trade routes for iron ore traverse from Brazil to the Far East, such as China, Japan, Korea, and Australia. Therefore, when a company needs to secure a spot vessel for iron ore, it is hard to charter a spot vessel for the voyage as the corresponding vessel is already engaged with an iron ore shipment. The loading regions are usually Brazil and Australia, but most vessels for iron ore will be freely open in the Far East. Securing a vessel from the Far East to load iron ore in Brazil and discharge in the Far East will cause a high increase in the ocean freight due to the cost of ballast sailing. In addition, as the charter rate of capesize or above fluctuates, primarily with the iron ore and coal market, and the range of the fluctuation is high due to the relatively small number of vessels in the market, it is a risky strategy to secure a vessel in the spot market.

Finally, the characteristics of iron ore—although not a complicated cargo to load—affect the form of shipping contract for the consignors. Iron ore has one of the simplest cargo loading and discharging procedures. However, its liquefying characteristic can cause serious damage and accidents. The liquefaction has always been a concern for seafarers as it frequently occurs during sea passage and the occasional accidents result in a high fatality rate. To minimize the risk of accidents during sea passages, a knowledgeable and experienced crew is essential. The crew should know to check the transportable moisture limit of the cargo before it is

loaded and the vessel departs and to test the bilge pump and bilge alarm before departure. During the sea passage, the crew should pay keen attention to the bilge alarm and be able to pump out the bilge as necessary regardless of weight loss to the cargo. Consequently, consignors prefer shipping companies experienced with this cargo to prevent any such accidents. Although shipping accidents during sea passage are the responsibility of the shipping company, both the shipper and consignor will be affected by the accidents given the large volume of cargo being transported and likely catastrophe affecting the raw material supply plan.

The CVC timeframe is about 20 years, and the CVC designates a vessel and allows for a change in the committed vessel if the shipping company requests such a change for its business strategy. The committed vessel cannot carry any other cargo unless a substitute vessel is provided. However, in COA, the timeframe is one to three years, and no specific vessel is designated, meaning any suitable vessel—either owned or chartered—can be used. The committed vessel also has no return obligations, which allows it to carry other shipments upon discharging the iron ore. Therefore, the COA is not as convenient for the consignor transporting iron ore.

To secure the stable supply of iron ore at large volumes while overcoming challenges such as high ocean freight due to market changes and less available tonnage in the market, it seems that the nature of iron ore transportation induces and affects the preference for CVC over COA.

4.2.2 Influence of Market Structure

The small number of steel companies and potential shipping companies constructs a mutual oligopoly market in iron ore transportation in Korea. Only two steel companies import iron ore in Korea. Although the dry-bulk sector of the maritime industry is a free competition market that any shipping companies can enter, a similar context is unlikely in the marine transportation of iron ore. To be a

potential shipping company to transport iron ore, the company must have a suitable vessel (i.e., capesize or larger vessel). However, the cost of building a new capesize vessel, as of 2019, is USD 51.0 million, which is twice the cost for handysize or panamax vessels. Therefore, shipping companies must have sufficient financial power to enter the market. Such costs could be covered if a long-term contract is secured prior to ordering a new built ship, but it is unlikely to happen without a pre-secured vessel due to inconsistency. Therefore, to provide marine transportation service in the iron ore trade, a shipping company should have sufficient funds as well as experience in the iron ore trade. These factors increase the barriers to entry for other shipping companies; hence, only a small number of shipping companies have long-term contracts with steel companies, such as POSCO and Hyundai Steel.

This market structure induces and increases the preference for CVC. As it is also an oligopoly among shipping companies, the number of suitable vessels available is limited. Consignors can reach out to foreign shipping companies, but the mutual understanding of interest and communication can be limited, and there is also a possibility of strategy leaks to foreign countries, which can lead to a loss of national competitiveness. Therefore, it is essential for consignors to get a hold of national carriers in consistent terms for longer periods to stabilize the cost of steel products by maintaining low and stable ocean freight over the long term.

4.3. Case of Steel Product Shipping Contract

This section discusses the interview results related to steel product shipping contracts. Based on the interview data, two factors—iron ore shipping and the market structure of the iron ore—have a significant effect on the type of shipping contract applied. This section examines the reasons for the high proportion of a particular type of contract for steel products based on these factors.

4.3.1 Influence of Characteristics of Shipping

Having more tonnages available for steel product transport reduces consignors' burden in securing the immediate fixture of vessels, which suppresses freight increases due to the supply and demand of the vessel. This does not induce the consignor to prefer CVC in this case. Rather, to lower the transportation cost for steel products, COA is preferred because steel products have various regions of demand and each region has many ports. Not every port is called on in one shipment, and the ports of call are determine not long before the shipment is carried out. Therefore, if the consignors utilize a spot contract, the cost of transportation may increase depending on the number of ports called on as it would require an extra bunker and time consumption due to deviation. If the shipment is carried out through COA, the ocean freight per metric ton is fixed by each port. Thus, regardless of the number of ports, the cost of transportation remains the same and the extra cost of the bunker and time consumption due to deviation is on the shipowners' account.

In addition, steel products are a complex cargo to load and discharge compared to other types of bulk cargo. It requires the shipping companies' know-how, especially in terms of loading. Thus, it is essential for the supercargo of each company to be on the scene during loading and provide direction in terms of strategical loading to load as much as possible in a safe manner. Otherwise, many claims can be received stemming from cargo damage as it is a product of demand. Therefore, consignors prefer COA as they can immediately access a group of experienced and skilled shipping companies employed in steel product transport.

4.3.2 Influence of Market Structure

The market structure of steel products is indicated as a consignor oligopoly. Although the consignors require experienced carriers in transporting steel products,

the increased barriers to entry into the market are minimal. For iron ore, it is a burden for shipowners to possess a vessel, but possessing a handysize or ultramax vessel is not a burden for small shipping companies even with unstable funding power. Vessels of this size can be used to transport various cargoes and are not limited to steel products. Therefore, there is greater opportunity to experience steel products from foreign spot cargoes and gain the required know-how. As a result, there are up to 12 shipping companies in one region of a COA pool. With this background, there is no reason for consignors to sign a CVC contract as they will have to select a specific company to provide service for a long period of time with the committed vessel. As there are many qualified candidates in the pool, it is more profit securing to sign a COA contract.

If they sign a CVC, the consignors are responsible for the ballast voyage of the returning vessel and fully laden cargo volume of the committed vessel on every voyage. However, if they sign a COA, the consignors do not have such burdens as the vessel nomination is the shipowners' responsibility and the consignors do not have to deal with the pressure of preparing full cargo for the vessels as long as consignors meet the contracted quantity during the time frame.

4.4. Findings from the Interview

The interviews with individuals in both the steel and shipping industries provided data that could be used to develop the research model by incorporate the factors that have a significant influence on the types of contract. Among the various answers provided by interviewees, the major findings of the interviews are summarized in this section.

4.4.1 Major Findings

The relatively lower proportion of vessels suitable for iron ore trade in the market, loading and discharging ports being fixed and regular to specific ports, the

long distance of the trade routes, and cargo liquefaction are characteristics of iron ore shipping. These shipping characteristics were analyzed via the in-depth interviews and were shown to have a significant influence on the application of contract types. Furthermore, the market structure of the iron ore trade is a mutual oligopoly that induces the contract to be CVC. From consignors' perspective, COAs generate greater cost savings, but due to the mutual oligopoly, the consignors bear the higher prime cost of shipping to secure stable transportation. Therefore, for the iron ore trade, the characteristics and contract terms of the CVC contract are preferred and more applicable than COA or spot contracts.

The shipping characteristics of the steel product trade is that there is a larger proportion of suitable vessels in the market and greater variation in the ports, more cargo quantity per shipment, and the need for experienced carriers for steel product loading. Furthermore, the market structure of the steel product trade is maintained as a consignor oligopoly, providing the consignors with superiority over shipowners. Thus, for the steel product trade, the characteristics and contract terms of COA are preferred and more applicable than the CVC contract.

Figure 4-2 and 4-3 depict the research model with the major findings from the interviews.

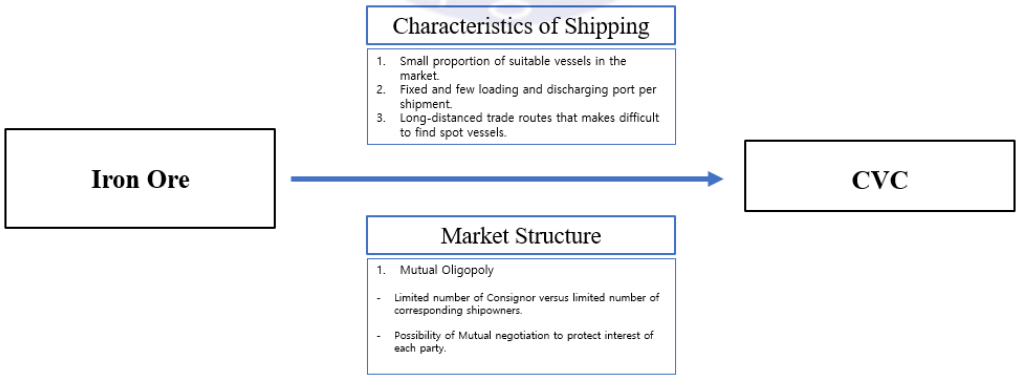


Fig. 4-2 Research Model with Findings for Iron Ore

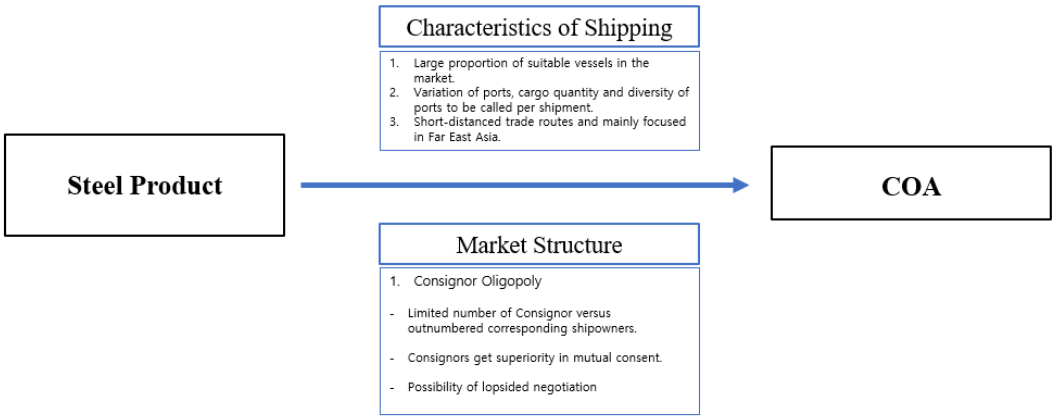


Fig. 4-3 Research Model with Findings for Steel Product

4.4.2 Issues of Contrasting Perspectives

The main contrasting points identified in the analysis of the interview data were the contract period for COA of the steel product trade and the entry allowance of inexperienced carriers for lower freight rates for the steel product COA pool. This section discusses each perspective and identifies the main contrasting issues between the two parties in the contract period.

4.4.2.1 Consignors' Perspective

The consignors indicated that CVC contracts are used for 70% of the annual iron ore import volume, compared to 15% for COA and 15% for spot contracts. They mentioned that CVC contracts are indispensable for supplying iron ore because iron ore is one of the main raw materials for manufacturing steel products; if this supply is not consistent, the impact on the company is significant. If the supply is disconnected due to the shipping market structure or no immediate available tonnage to transport, the furnace may have to close temporarily, which will bring the steel product-making procedures to a complete stop. Therefore, maintaining the operation of the furnace is important. To prevent stoppage, the industry must supply a minimum of 50% of a safe stock level of iron ore. CVC is utilized to maintain this safe stock level even though the consignors can make higher profits

by utilizing spot contracts depending on the market level. In addition, due to the long voyage routes for transporting iron ore, finding immediately available vessels is difficult, resulting in challenges to secure vessels in spot markets.

Regarding the risk of transportation due to cargo characteristics, the consignors indicated that they preferred shipping companies with ample experience with cargo, although they did not worry about entry barriers to the iron market transport, which are already high. As a result, carriers are proven to be able to perform with such cargo. The shipping companies that have large vessels and are available for iron ore trade have already demonstrated that they have high financial power to maintain those vessels, and most large vessel owners have experience with iron ore.

The consignors said short-term contracts do not exist, although they suggested these could be spot contracts. Consignors offer one iron ore shipment to qualified shipping companies, providing details on the cargo quantity, load and discharge ports, contract term (e.g., free in and out or free in liner out), and CQD[51] or load/discharging rate so shipping companies can calculate the competitive ocean freight for the shipment. The bidding is open to all qualified shipping companies, and the lowest ocean freight is selected. Therefore, no preference for shipping contract type exists for short-term contracts while the other factors affecting types of contracts remain identical for short-term contracts.

Regarding possible future changes in form of contracts for iron ore, the consignors mentioned that Korea's adoption of IFRS 16 will not affect the type of contract much. IFRS 16 went into effect in 2019 and will apply to all newly established CVC contracts. However, the industry is continuously appealing the senselessness of IFRS 16 as it embraces all CVC contracts as consignors' debt ratio. The consignors mentioned that is unlikely to happen and, hence, the type of

51) Customary Quick Despatch : a condition where the charterer must load and/or discharge as quickly as possible in the circumstances prevailing at the time of loading and/or discharging.

contract will not change due to IFRS 16. However, the global trend for long-term contracts is changing to a shorter timeframe. The major suppliers of iron ore (i.e., Vale, BHBP, and Rio Tinto) are reducing the timeframe for their long-term contracts from 18–20 years to 5–10 years because of the uncertainty and unpredictable market conditions of shipping. Due to the safe supply of iron ore, the portion of CVC contracts cannot be reduced; therefore, by reducing the timeframe, the consignors can enjoy the flexibility of either extending the end of the timeframe or using a spot contract depending on the market conditions.

For steel products, the consignors indicated that they use COA contracts 50% to 80% of the time whereas spot contracts account for 50% or less of the annual trade volume. Steel products have fixed consumers, so the fluctuation in annual volume due to demand is small. However, depending on the demand, every shipment has a different cargo quantity and ports of call, as many ports are stationed in each region of trade. Therefore, if the steel company is not one of the major steel companies that have a large volume of stationary demand, it could be difficult to have a larger portion of COA as the volume will be unstable and COA is basically a cargo volume contract over a long timeframe throughout which the consignors guarantee the contract volume. As the ports of call are not consistent, the consignors believe that this market characteristic affects the spot contract. If a vessel performs based on a COA, the ocean freight by port is already fixed upon the signing the COA; thus, consignors can save extra costs associated with calling on more ports, such as time and bunker due to deviations in routes. However, if a vessel performs based on a spot contract, the ocean freight offered will account for these extra costs; hence, the consignors will have to cover the extra costs through the ocean freight.

The consignors also agreed that the vessels for steel products are relatively easy to access because the targeted vessel size is handysize to ultramax, which make up the largest fleets in the world. Moreover, their main routes are heavily concentrated

in the Far East and Southeast Asia. The short duration of each voyage allows for easier immediate fixes, so consignors are less concerned about securing vessels for steel products.

The consignors believed that the timeframe for the steel product COA, which is currently one year for all major steel companies in Korea, is sufficient. This is because the consignors provide such a large volume annually, more than 400 to 500 million tons, that they provide substantial shipments each year. The consignors determine the timeframe-to-annual volume ratio to calculate the lowest possible ocean freight per annual volume. When the annual volume is 400 to 500 million tons, the ratio for one year of COA can bring the best balance between the lowest freight and safest transport. If the annual volume is less, the timeframe will be longer to match the ratio and secure the balance.

4.4.2.2 Shipowners' Perspective

Although most of shipowners' answers were similar to those of the consignors, a few mentioned that the risk of cargo liquefaction of iron ore is not a key factor that affects the preference of contract types. This is because the number of liquefaction accidents is limited, especially among carriers with ample experience. However, the CVC contract plays a substantial role in maintaining factory operations and strengthening prime cost competitiveness because of the shipping characteristics of iron ore. Iron ore shipments usually involve one loading port and one discharging port with a long-distance route and ton-mile. Deducting the prime cost is the basic strategy for maximizing the cargo quantity in one shipment. Maintaining a certain quantity of stabilized iron ore supply is also necessary to run the furnace continuously.

Some shipowners stated that, if the number of large vessels significantly increases, the proportion of both COA and spot contracts will increase, and the charterers or consignors would be in a better position to sign COA or spot

contracts depending on market conditions rather than CVC. This is because the carriers will be able to provide a lower freight rate as the ballast voyage would be eliminated, resulting in more options for securing vessels in the market. Therefore, the carriers can construct a competitive business portfolio with such COA and spot contracts that will help expand their business and enable them to provide even lower freight rate. However, the shipowners were pessimistic of increases in the number of larger vessels as no shipowners would take the risk of owning capesize or VLOC vessels without signed CVC or COA contracts with consistent charterers.

Regarding steel products, the shipowners indicated that the key reasons for the higher portion of COA for steel products are consignors' cargo readiness, the acceptance of the lopsided shipment condition change regardless of contract term, the flexibility of vessel nomination, and the cargo transporting quality risk.

As COA is not signed for a fixed quantity per shipment,[52] it is more suitable for steel product transport because the quantity per shipment varies according to its cargo production and readiness at the time of loading. As they are products, there are many cases of faulty production, which are eliminated from transportation. Moreover, there are many cases where the consignors request lopsided shipment condition changes, such as port rotation or extra near-port calling as well as other requests that do not cost enough to request compensation. In such cases, as the consignors are small in number and in a better position in business, the shipowners have no choice but to agree to the request.

The shipowners were not satisfied with the timeframe of the current COA, which contrasts with the consignors' perspective. The shipowners believe that one-year contracts limit the shipping companies' ability to strengthen their business portfolio because it is too short to prove that the company has stable enough contracts to expand its business sector or fleet. This limits the company's ship financing power

52) COA is signed for yearly quantity of cargo.

and, hence, slows the growth of the company.

Finally, shipowners complained that, because of the disproportionate number of suitable vessels for steel products in the market, the consignors are abusing the superiority of the market structure to reduce the prime cost. They explained that consignors have recently started lowering the entry barrier conditions for the COA carrier pool, allowing carriers with limited expertise in the steel product trade in order to lower the freight rate of COA. The carriers cast doubt on the possibility of potential hindrances in stable and safe transport due to the alleviation of entry barriers. Allowing amateur carriers into the industry may cause severe cargo damage due to accidents or cases of abandonment when securing the requested vessel during poor market conditions to protect their own interests. Abandonment occurred in the past for one of the major steel companies in Korea, resulting in a loss of brand image to Japanese customers, who needed the steel product in a timely manner for construction.

Several key contrasting points emerged between the two parties. The consignors believed that the current contract period of COA is enough for both consignors and shipowners to evenly share the profits; however, the shipowners considered this system to limit their efforts to grow and expand their business in the future. In addition, the shipowners believed that maintaining high entry barriers for the COA pool is essential for both parties to protect and secure the stable and safe transport of steel products, yet the consignors did not agree that the entry barriers are so low as to allow inexperienced carriers to participate.

CHAPTER 5. CONCLUSION

5.1. Summary

The literature review and in-depth interviews in this study identified the characteristics of shipping and market structure in both fields, showing that the iron ore and steel product trades, have significant effects on the form of shipping contract.

For the iron ore trade, several shipping characteristics proved to have a significant effect in applying types of long-term shipping contracts—namely, the small number of suitable vessels in the market, the single fixed load/discharge port, the long-distance voyages, and the potential risk for fatal accidents due to cargo liquefaction. Given such factors, the CVC contract is inevitable in the iron ore trade. Moreover, the market structure, which is a mutual oligopoly due to the small number of consignors and shipowners in iron ore, affects the types of long-term shipping contracts. If the market structure were a consignor oligopoly, it would be more profit securing for consignors to sign COA or spot contracts as there are more suitable vessels operated by experienced carriers in the market to secure on the spot. Due to the mutual oligopoly market, the consignors can secure a stable supply of iron ore by signing the CVC contract to ensure that they can nominate the vessels at the time of their needs.

For the steel product trade, the COA contract is more appropriate because of its specific shipping characteristics—namely, the greater number of suitable vessels available in the market, the variation in ports, cargo quantity per shipment, various load/discharge ports, and the need for experienced carriers for steel product loading.

Furthermore, the market structure, which is a consignor oligopoly market, provides the consignors with superiority over shipowners. As a result, the consignors enjoy favorable contract types and conditions.

Thus, due to the influence of the market structure and shipping characteristics of each type of cargo, the CVC contract is more applicable for iron ore whereas COA is more applicable for steel products.

Finally, the study results indicated that the contract duration of COA for steel product trade should be longer than one year. The shipowners suggested that a COA contract period of at least two to three years would enable carriers to offer lower freight rates as they could build up and expand new business sectors while maintaining a stable income from the COA. In markets that fluctuate frequently with a large gap, the COA also provides advantages to consignors in terms of hedging potential losses due to stiff fluctuations in the market. Although the consignors may not find short-term benefits from doing so, shipowners are able to strengthen their competitiveness by having a larger fleet to provide stable and satisfactory services over the long term.

5.2. Implications and Further Studies

Many shipowners made similar complaints in terms of contract period, but they are afraid to raise their voices to the consignors, who have superiority in the market. The interviews demonstrated that most consignors are open to the voice of the customer (VOC) and some consignors encourage shipowners to provide VOC. The consistent request to extend the duration of COA via VOC may encourage consignors to consider and review the possible scenarios. However, the VOC must be submitted with a sound basis as well as realistic and probable suggestions for a win–win strategy.

Moreover, to reduce the possibility of potential hindrance in stable and safe

transport, the alleviation of the entry barriers to the COA pool for the steel product trade should be kept to a minimum. Expertise related to specific cargo loading should be maintained at a high level so that the consignors can also maintain or strengthen their brand image globally. In doing so, the consignors can comply with customers' requested delivery date and provide satisfaction. In addition, consignors will be less involved in fatal accidents from cargo damage due to inexperienced loading procedures.

Finally, one of the major steel companies indicated during the interview that the contract type for iron ore will most likely not change due to IFRS 16 adoption, but there is a possibility of reducing the CVC contract period based on global trends. Regardless of the contract duration, this interviewee suggested that the contract will be renewed upon expiration with changes in the freight rate depending on market conditions. This is good news for shipowners as they can correspond according to the market conditions to prevent potential losses.

Existing research provided limited relevant information for the public; hence, the information provided in this study is either old or possibly inaccurate. To secure accurate information, many individuals in the industry were approached, but were refrained from participating in the study as they did not wish to provide contract-related information, which they deemed to be sensitive information. Providing more information to the public can offer opportunities to students in related fields to understand how long-term contracts are actually carried out in the Korean market.

As no previous study has focused exclusively on long-term shipping contracts, it is hoped that this study can initiate and foster further study of long-term shipping contracts. By initiating this area of the study, this research will provide the basis for future individuals to provide updated and more accurate information to expand on this study. Doing so will disclose more information of the conservative industry and will secure a bit of transparency in terms of contracts.

REFERENCE

Axelsson, B., Gorton, L. and Avtalsrätt, K. (n.d.). *Some Questions on Contracts of Affreightment*. [online] *Lunds University*. JURIDISKA FAKULTETEN vid Lunds universitet. Available at: http://lup.lub.lu.se/student-papers/record/3126230/file/3463358.pdf [Accessed 29 Nov. 2019].

Baosteel News Centre. (2008). *Baosteel sets up Haibao Shipping Company with China Shipping*. [online] Available at: http://www.baosteel.com/group_en/contents/2863/39265.html [Accessed 23 Nov. 2019].

Basic Facts About Nippon Steel & Sumitomo Metal. (2018). [online] NSSMC. Available at: https://www.nipponsteel.com/en/ir/library/pdf/factbook2018_all.pdf [Accessed 23 Nov. 2019].

Beresford, A., Pettit, S. and Liu, Y. (2011). Multimodal supply chains: iron ore from Australia to China. *Supply Chain Management: An International Journal*, [online] 16(1), pp.32–42. Available at: http://orca.cf.ac.uk/19611/ [Accessed 7 Jan. 2020].

Choi, D. (2007). *Analysis of consequence effect of steel industry*. [online] Seoul: POSCO Research Institute. Available at: https://www.posri.re.kr/files/file_pdf/70/300/2649/70_300_2649_file_pdf_07_1-2_%EC%B2%A0%EA%B0%95%EC%82%B0%EC%97%85-%EC%B5%9C%EB%8F%99%EC%9A%A9.pdf [Accessed 14 Nov. 2019].
[In Korean : 최동용 (2007). *철강산업의 산업연관효과 분석*. 포스코경영연구원]

Choi, K. (2019). *Research on the legal issues related to the marine transportation contract of the owner of large volume cargo*. MA Thesis. Seoul: Korea

University.
[In Korean : 최경훈 (2019). *대량화주의 운송계약과 관련한 법률문제에 관한 연구*. 석사학위논문. 서울:고려대학교]

Fastmarkets. (2007). *Baosteel and COSCO ink long-term coal, iron ore charter contracts*. [online] Available at: https://www.fastmarkets.com/ [Accessed 23 Nov. 2019].

Gard AS, January (2014). *Liquefaction of solid bulk cargoes*. [online] Available at: http://www.gard.no/Content/20651223/Cargo%20liquefaction%20January%202014.pdf [Accessed 7 Dec. 2019].

Gorton, L. (2016). Contracts of affreightment: some features and principles. *Scandinavian Studies in Law*, [online] 46, pp.61–91. Available at: https://lup.lub.lu.se/search/publication/7d2a2c72-657d-4fb7-9175-cf6a22729c68 [Accessed 7 Jan. 2020].

Herring, P. (2017). Contracts of affreightment. *Charterparties*, [online] pp.299–304. Available at: https://www.taylorfrancis.com/books/e/9780203730416/chapters/10.4324/9780203730416-15 [Accessed 7 Jan. 2020].

Jeong, Y. (2013). *Marine Transportation*. Paju: Textbooks.
[In Korean : 정영석 (2013). *해상운송론*. 파주:텍스트북스]

Jo, Y. (2015). *A study of shipper's decision factors of industrial carriers - Focusing on dedicated bulk carrier*. MA Thesis. Seoul: Chungang University.
[In Korean : 조영곤 (2015). *화주기업의 해상운송 인소싱 선택요인에 관한 연구-원료 전용선 중심으로*. 석사학위논문. 서울:중앙대학교]

Jung, B. (2013). *Four (4) parts of Shipping Market*. [online] Korea Open Course Ware. Available at: http://contents.kocw.or.kr/contents4/document/lec/2013/Chungang/Jungbongmin/4.pdf

[Accessed 12 Nov. 2019].
[In Korean : 정봉민 (2013). *해운시장 4개 부문*. 해운경제학 강의자료. 서울:중앙대학교]

Kim, D. (2013). *A study on a plan for Reinforcing International Competitiveness in the Korean Bulk Shipping Industry*. MA Thesis. Seoul: Chungang University.
[In Korean : 김동명 (2013). *한국 벌크 해운산업의 경쟁력 강화방안에 대한 연구*. 석사학위논문. 서울:중앙대학교]

Ko, M. (2016). *The understanding of Iron ore market and study on investment cases*. MA Thesis. Ansan: Hanyang University.
[In Korean : 고문석 (2016). *철광석 시장 이해 및 투자사례 연구*. 석사학위논문. 안산:한양대학교]

Lee, I. (2009). Current state of cooperation between Korean shipowners and consignors. *Haeyang Hankuk*.
[In Korean : 이인애 (2009). *국내 선화주 협력의 현주소*. 서울:해양한국]

Lee, J. (2014). *Know-how of Japanese shipping industry's stable growth - "Stabilization and growth" by Long-term contract transport business of large volume cargo*. Seoul: Hyundai Research Institute.
[In Korean : 이장균 (2014). *일본 해운업체의 안정적 성장 비결 – 대량화물 대상의 장기계약운송업으로 '안정과 성장' 실현*. 서울:현대경제연구원]

Lee, N. (2013). *Tramper Shipper's perception on Carrier Selection Criteria by Carrier Contract Type*. MA Thesis. Seoul: Chungang University.
[In Korean : 이나리 (2013). *부정기화주의 운송계약방식에 따른 선사 선정기준에 관한 연구*. 석사학위논문. 서울:중앙대학교]

Liu, J. (2011). *Chartering policies in the dry bulk market*. [online] Available at: http://commons.wmu.se/cgi/viewcontent.cgi?article=1201&context=all_dissertations [Accessed 13 Nov. 2019].

Mann, R. (2019). *Brumadinho Dam Collapse Cost Vale US$4.9 Billion in Q1*. [online] The Rio Times. Available at: https://riotimesonline.com/brazil-news/rio-business/mining-business/brumadinho-dam-collapse-costs-vale-us4-9-billion-in-q1/ [Accessed 19 Nov. 2019].

Mohajerani, A., Dean, J. and Munro, M.C. (2019). An overview of the behaviour of iron ore fines cargoes, and some recommended solutions for the reduction of shifting incidents during marine transportation. *Ocean Engineering*, [online] 182, pp.451–474. Available at: https://www.sciencedirect.com/science/article/pii/S002980181930201X [Accessed 7 Jan. 2020].

Munro, M; Mohajerani, A (2016). A review of the newly developed method used to prevent liquefaction of iron ore fines on bulk carriers. *Australian Geomechanics*, [online] 51(1), pp.43–52. Available at: http://researchbank.rmit.edu.au/view/rmit:36349 [Accessed 7 Jan. 2020].

NAI (2017). *Liquefaction*. [online] Nautinst.org. Available at: https://www.nautinst.org/resource-library/technical-library/bulk-carrier-safety/liquefaction.html [Accessed 21 Nov. 2019].

Park, S. (2019). *A study on factors affecting hire of handysize vessel in tramp shipping market*. MA Thesis. Seoul: Chungang University.
[In Korean : 박선기 (2019). *부정기 해운시장에서의 핸디사이즈 용선료에 영향을 미치는 요인 연구*. 석사학위논문. 서울:중앙대학교]

POSCO Newsroom. (2018). *POSCO Named World's Most Competitive Steelmaker for 9th Consecutive Year*. [online] Available at: https://newsroom.posco.com/en/worlds-most-competitive-nine-years/ [Accessed 20 Nov. 2019].

POSCO Newsroom. (2019). *Know-how of being Global Steelmaker that exports values from the country of no resources*. [online] Available at:

https://newsroom.posco.com/kr/%ec%9e%90%ec%9b%90-%ec%97%86%eb%8a%94-%eb%82%98%eb%9d%bc-%ec%84%b8%ea%b3%84%eb%a1%9c-%ea%b0%80%ec%b9%98%eb%a5%bc-%ec%88%98%ec%b6%9c/ [Accessed 20 Nov. 2019].

Reuters Editorial (2019). *Brazil's Vale to restore full Brucutu mine output after court ruling*. [online] Reuters. Available at: https://www.reuters.com/article/us-brazil-vale-mine-idUSKCN1TK1LN [Accessed 19 Nov. 2019].

Rude, J. (2019). *Supporting safe steel coil transport*. [online] DNV-GL. Available at: https://www.dnvgl.com/expert-story/maritime-impact/Supporting-safe-steel-coil-transport.html [Accessed 21 Nov. 2019].

Ship Technology Global. (2019). *Why are liquefied cargoes a persistent danger to ships? - Ship Technology Global | Issue 62 | January 2019*. [online] Available at: https://ship.nridigital.com/ship_jan19/why_are_liquefied_cargoes_a_persistent_danger_to_ships [Accessed 21 Nov. 2019].

Son, H. (2011). *A Study on iron ore, coal market and dedicated shipping business*. MA Thesis. Seoul: Sungkyunkwan University.
[In Korean : 손현호 (2011). *철광석, 석탄 시장과 전용선 해운업에 관한 연구*. 석사학위논문. 서울:성균관대학교]

Song, S. (2017). *An analysis on the efficiency of Shipping Pool for Tramper in the Iron ore and Coal Industry*. PhD Diss. Incheon: Inha University.

TradeWinds. (2015). *Nippon Steel agrees voyage deal to employ Valemaxes*. [online] Available at: https://www.tradewindsnews.com/weekly/nippon-steel-agrees-voyage-deal-to-employ-valemaxes/1-1-362745 [Accessed 18 Nov. 2019].

Tugsan, C. and Satir, T. (2014). *CARGO LIQUEFACTION AND DANGERS TO*

SHIPS. [online] Available at: https://www.ifsma.org/resources/Cargo-Liquefaction.pdf [Accessed 13 Nov. 2019].

Wilford, M., Coghlin, T. and Kimball, J.D. (2003). *Time charters*. 5th ed. London: Lloyd's Shipping Law Library.

World Maritime News. (2015). *NSSMC In for Nine Capesizes*. [online] Available at: https://worldmaritimenews.com/archives/170953/nssmc-in-for-nine-capesizes/ [Accessed 22 Nov. 2019].

Yang, D. (2013). *A study on the Development Plan of Domestic Steel Logistics*. MA Thesis. Busan: Korea Maritime and Ocean University.
[In Korean : 양도관 (2013). *국내 철강물류 발전 방안에 관한 연구*. 석사학위논문. 부산:한국해양대학교]

Yeom, J. (2010). *Law of Time Charters*. Paju: Bobmun Sa.
[In Korean : 염정호 (2010). *정기용선계약법*. 파주:법문사]

<Websites>

Baosteel homepage http://www.baosteel.com

China COSCO Shipping Corporation Limited http://en.coscocs.com

EB News http://www.ebn.co.kr/

Government Index http://www.index.go.kr

Gard P and I https://www.gard.no

Korea Iron & Steel Association http://www.kosa.or.kr

Korea Shipowners Association http://www.shipowners.or.kr

Korea Shipping Gazette http://www.ksg.co.kr

NSSMC homepage https://www.nipponsteel.com

POSCO Research Institute https://posri.re.kr

POSCO Newsroom https://newsroom.posco.com/kr

The Nautical Institute https://www.nautinst.org

QUESTIONNAIRE A

<Subject : Steel Industry>

인터뷰 질문지 (화주대상)

한국 철강산업에서의 장기운송계약에 관한 연구 - 한국 해양대학교 해양금융대학원

안녕하십니까, 한국해양대학교 해양금융대학원에서 석사학위논문을 작성하고 있는 김형준입니다.

저는 오용식 교수님의 지도 하에 "한국 철강산업에서의 장기운송계약에 관한 연구"를 하고 있습니다.

바쁜 업무에 번거로우시겠지만, 약간의 시간을 내주시어 우리나라 철강산업에서의 장기운송계약의 실태를 알려주시면 대단히 감사하겠습니다.

1) 철광석 운송계약에 관하여

1. 귀사에서 철광석을 들여올 때 장기운송계약의 비중은 어느정도입니까? 장기계약의 기간은 어느정도입니까?
2. 장기운송계약시 계약형태로는 어떤 계약을 선호하십니까?(예, CVC, TC, COA) 그 비중은 어느정도입니까?
3. 장기계약에서 특정계약형태(CVC 또는 TC, COA)를 선호한다면 그 이유는 무엇입니까?
4. 철광석 운송의 특성(대량운송, 소수의 기항지 등)이 장기계약의 형태에 어느 정도 영향을 주는지요?
5. 철광석 운송의 RISK(화물 액상화로 인한 침몰사고 등)는 장기계약에 어떤 영향을 주는지요?
6. 철광석 운송시장의 특성(상대적으로 적은 수의 대형선박; Capesize 이상 급)은 장기계약에 어떤 영향을 주는지요?
7. 단기운송계약시 계약형태로는 어떤 계약을 선호하십니까?(예, VC, TC, COA) 그 비중은 어느정도입니까?
8. 단기계약에서 특정계약형태(VC 또는 TC, COA)를 선호한다면 그 이유는 무엇입니까?
9. 철광석 운송의 특성(대량운송, 소수의 기항지 등)이 단기계약의 형태에 어느 정도 영향을 주는지요?

10. 철광석 운송의 RISK (화물 액상화로 인한 침몰사고, 등)는 단기계약에 어떤 영향을 주는지요?

11. 철광석 운송시장의 특성(상대적으로 적은 수의 대형선박; Capesize 이상 급)은 장기계약에 어떤 영향을 주는지요?

12. 향후 철광석 운송에서 장단기 계약의 형태에 변화의 가능성이 있습니까? 있다면 어떤 변화이겠습니까? 예) COA 또는 Spot 계약이 확산 될 가능성이 있습니까 (IFRS 16 도입, 등)? 있다면 (없다면) 왜 그렇습니까?

2) 철강제품 운송계약에 관하여

1. 귀사에서 철강제품을 내보낼 때 장기운송계약의 비중은 어느정도입니까? 기간은 어느정도입니까?

2. 장기운송계약시 계약형태로는 어떤 계약을 선호하십니까?(예, CVC, TC, COA) 그 비중은 어느정도입니까?

3. 장기계약에서 특정계약형태(CVC 또는 TC, COA)를 선호한다면 그 이유는 무엇입니까?

4. 철강제품 운송의 특성(상대적 소량운송, 다수의 기항지, 수요에 따른 물량 변동, 등)이 장기계약의 형태에 어느 정도 영향을 주는지요?

5. 철강제품 운송의 RISK(화물 Damage claim, Lashing, 결로, 등)는 장기계약에 어떤 영향을 주는지요?

6. 철강제품 운송시장의 특성(상대적으로 많은 수의 소형선박 ; Handysize~Ultramax)은 장기계약에 어떤 영향을 주는지요?

7. 단기운송계약시 계약형태로는 어떤 계약을 선호하십니까?(예, VC, TC, COA) 그 비중은 어느정도입니까?

8. 단기계약에서 특정계약형태(VC 또는 TC, COA)를 선호한다면 그 이유는 무엇입니까?

9. 철강제품 운송의 특성(소량운송, 다수의 기항지, 수요에 따른 물량 변동, 등)이 단기계약의 형태에 어느 정도 영향을 주는지요?

10. 철강제품 운송의 RISK(화물 Damage claim, Lashing, 결로, 등)는 단기계약에 어떤 영향을 주는지요?

11. 철강제품 운송시장의 특성(상대적으로 많은 수의 소형선박 ; Handysize~Ultramax)은 단기계약에 어떤 영향을 주는지요?

12. 향후 철강제품 운송에서 장단기 계약의 형태에 변화의 가능성이 있습니까? 있다면 어떤 변화이겠습니까? 예) CVC, 또는 Spot 계약이 확산 될 가능성이 있습니까? 있다면(없다면) 왜 그렇습니까?

13. 국내에서 철강제품 COA 계약은 기간이 매우 짧다고 생각합니다. 왜 그렇습니까?

14. 향후 철강제품 COA 계약 시 기간이 늘어날 가능성이 있습니까? 있다면(없다면) 왜 그렇습니까?

바쁘신 와중에도 인터뷰에 응해 주셔서 대단히 감사드립니다.

QUESTIONNAIRE B

<Subject : Shipping Industry>

인터뷰 질문지 (선주대상)

한국 철강산업에서의 장기운송계약에 관한 연구 - 한국 해양대학교 해양금융대학원

안녕하십니까, 한국해양대학교 해양금융대학원에서 석사학위논문을 작성하고 있는 김형준입니다.

저는 오용식 교수님의 지도 하에 "한국 철강산업에서의 장기운송계약에 관한 연구"를 하고 있습니다.

바쁜 업무에 번거로우시겠지만, 약간의 시간을 내주시어 우리나라 철강산업에서의 장기운송계약의 실태를 알려주시면 대단히 감사하겠습니다.

1) 철광석 운송계약에 관하여

1. 철광석 장기운송계약에서는 COA 보다 CVC 형태의 계약이 큰 비중을 차지하고 있습니다. 이는 어떠한 이유에서라고 생각하십니까?
2. 선사 입장에서 선호하는 철광석 운송계약은 무엇입니까? (예, CVC, COA, Spot) 그 이유는 무엇입니까?
3. 철광석 운송의 특성 (대량운송, 소수의 기항지, 등)이 **장기계약 (CVC, COA)**의 형태에 어떤 영향을 준다고 생각하십니까?
4. 철광석 운송의 특성 (대량운송, 소수의 기항지, 등)이 **단기계약 (Spot ; TC, VC)**의 형태에 어떤 영향을 준다고 생각하십니까?
5. 철광석 운송시장의 특성 (상대적으로 적은 수의 대형선박 ; Capesize 이상 급)이 **장기계약**의 형태에 어떤 영향을 준다고 생각하십니까?
6. 철광석 운송시장의 특성 (상대적으로 적은 수의 대형선박 ; Capesize 이상 급)이 **단기계약**의 형태에 어떤 영향을 준다고 생각하십니까?
7. 철광석 운송의 Risk (화물 액상화로 인한 침몰사고, 등)가 **장기계약**의 형태에 어떤 영향을 준다고 생각하십니까? 이 Risk를 최소화하기 위해 선사들은 어떤 노력을 하고 있습니까?

8. 철광석 운송의 Risk (화물 액상화로 인한 침몰사고, 등)가 **단기계약**의 형태에 어떤 영향을 준다고 생각하십니까?

9. 국내에는 철광석 운반 대상선인 Capesize 이상 급 선박 보유 선사는 상대적으로 적습니다. Capesize를 보유한 국적선사들이 많아진다면, COA 계약 또는 Spot 계약의 비중이 높아질 것이라 생각하십니까? 그렇다면 (그렇지 않다면) 왜 그렇습니까?

10. 철광석 운송에 COA 또는 Spot 비중을 높인다면 국적선사에게는 어떠한 장점과 단점이 존재한다고 생각하십니까?

2) 철강제품 운송계약에 관하여

1. 철강제품 장기운송계약에서는 CVC 보다 COA와 Spot 형태의 계약이 큰 비중을 차지하고 있습니다. 이는 어떠한 이유에서라고 생각하십니까?

2. 선사 입장에서 선호하는 철강제품 운송계약은 무엇입니까? (예, CVC, COA, Spot) 그 이유는 무엇입니까?

3. 철강제품 운송의 특성 (상대적 소량운송, 다수의 기항지, 수요에 따른 물량 변동, 등)이 **장기계약 (CVC, COA)**의 형태에 어떤 영향을 준다고 생각하십니까?

4. 철강제품 운송의 특성 (상대적 소량운송, 다수의 기항지, 수요에 따른 물량 변동, 등)이 **단기계약 (Spot ; TC, VC)**의 형태에 어떤 영향을 준다고 생각하십니까?

5. 철강제품 운송의 Risk (화물 Damage, Lashing, 결로, 등)는 **장기계약**의 형태에 어떤 영향을 준다고 생각하십니까? 이 Risk를 최소화 하기위해 선사는 어떠한 노력을 하고 있습니까?

6. 철강제품 운송의 Risk (화물 Damage, Lashing, 결로, 등)는 **단기계약**의 형태에 어떤 영향을 준다고 생각하십니까?

7. 철강제품 운송시장의 특성 (상대적으로 많은 수의 소형선박 ; Handysize~Ultramax)은 **장기계약** 형태에 어떤 영향을 준다고 생각하십니까?

8. 철강제품 운송시장의 특성 (상대적으로 많은 수의 소형선박 ; Handysize~Ultramax)은 **단기계약** 형태에 어떤 영향을 준다고 생각하십니까?

9. 철강제품 운송은 특정선박을 지정하여 운송하는 것보다 배선의 융통성이 필요하다고 생각하십니까? 그렇다면 (그렇지 않다면) 왜 그렇습니까?

10. 한국 철강제품 운송은 많은 중소형 선사들이 참여할 수 있는 자유경쟁시장이라 생각됩니다. 이러한 시장구조가 COA 또는 Spot 계약 비중도에 영향을 끼친다고 생각하십니까?

11. 철강제품 COA 계약의 계약기간이 짧다고 생각됩니다. 짧은 이유는 무엇이라고 생각하십니까? COA 계약기간을 더 길게 체결하면 선주에게 어떠한 장/단점이 있습니까?

바쁘신 와중에도 인터뷰에 응해 주셔서 대단히 감사드립니다.