

TOPIC: Sustaining competitive advantage in the global economy

TITLE: Competition in the shipbuilding industry

SUB TITLE: Can the Korean Shipbuilding Giants Sustain their Competitive Advantage?

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ABSTRACT

For many decades, Korean shipbuilders have been the leader of the global market. They offer cost effective and high quality vessels based on their advanced production technologies, good management and process control which helps them utilize their economies of scale and learning effect. Korean shipbuilders top the industry with highest market share.

However, China is a powerful rival with the low labor cost and huge amount of domestic demand. Chinese shipyards are rapidly closing the gap with Korean companies.

This research is conducted to explore how the Korean shipbuilding industry can maintain its competitive advantage in the long-run. The methodology used was the use of classical strategy analysis framework which involved analyzing the industry structure and conducting macro-environmental analysis, SWOT analysis and value creation frontier analysis. The paper attempts to provide a detailed analysis of the Korean shipbuilding industry stressing the competitive advantage strategy of Korean shipbuilding firms.

1.0 INTRODUCTION

The world shipbuilding industry holds the largest portion of the global transportation sector and is continuously growing. The industry's main driving force is economic growth because sea is the main source of exportation and importation of goods and services across countries and continents. The shipbuilding industry constitutes the building and modification of ships for commercial and military use. The shipbuilding market is divided into the tanker sector and the dry bulk sector. The tanker sector consists of ships that carry oil while the bulk sector constitutes ships that carry dry bulk cargo. Another type of ship called the combo or combination carrier can carry both dry and wet cargo. Most ships are created to function in one of these markets. The industry requires huge investments in capital, labor and technology. Creating ships is a very long process and orders in the shipping industry are placed long before they are needed to allow time for building of the ship. Shown below is a feedback loop that depicts how economic conditions influence demand for ships. As can be seen from the loop, if the world economy improves, then the desired shipping capacity increases as there is more economic activity across the global such as exportation and importation leading to the desire for more ships for transportation purposes. When the desired shipping capacity increases, the gap between the current shipping capacity and the desired shipping capacity also increases which in turn leads to an increased order rate for building ships. Once the order rate goes up, shipbuilding increases which in turn reduces the order rate as more and more orders are completed. Completed orders also increase the current shipping capacity which in turn decreases the gap between desired and current shipping capacity.

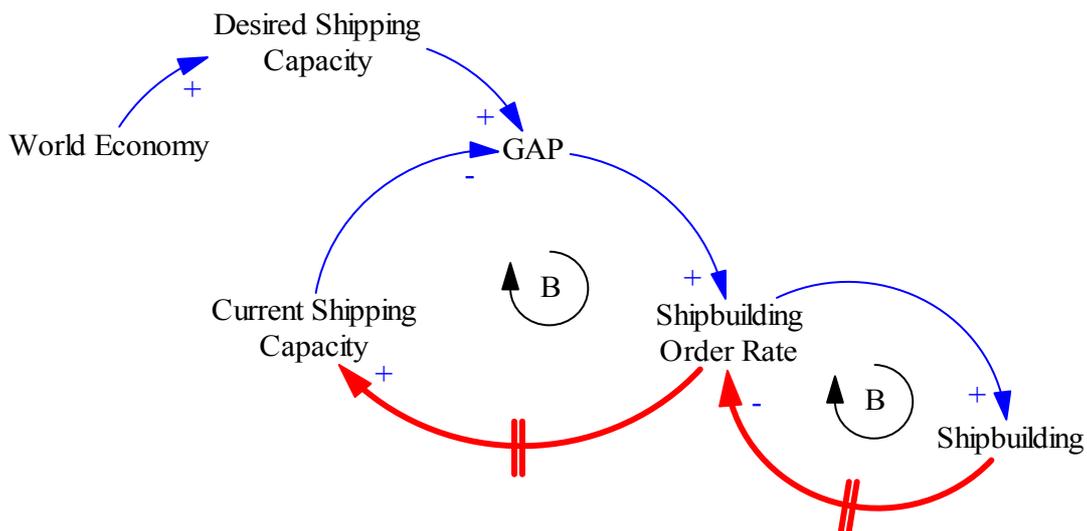


Fig 1.0 Economic conditions and its influence on the shipbuilding industry

Shipbuilding earlier on was dominated by Western nations and more recently by Japan¹. Currently however, Korea tops the industry with other Asian competitors like China and Japan following close behind. The major firms in the Korean industry are Hyundai Heavy Industries, Daewoo Shipbuilding and Marine Engineering, Samsung Heavy Industries, and STX Shipbuilding². The market share held by geographic regions in the global shipbuilding industry are shown below:

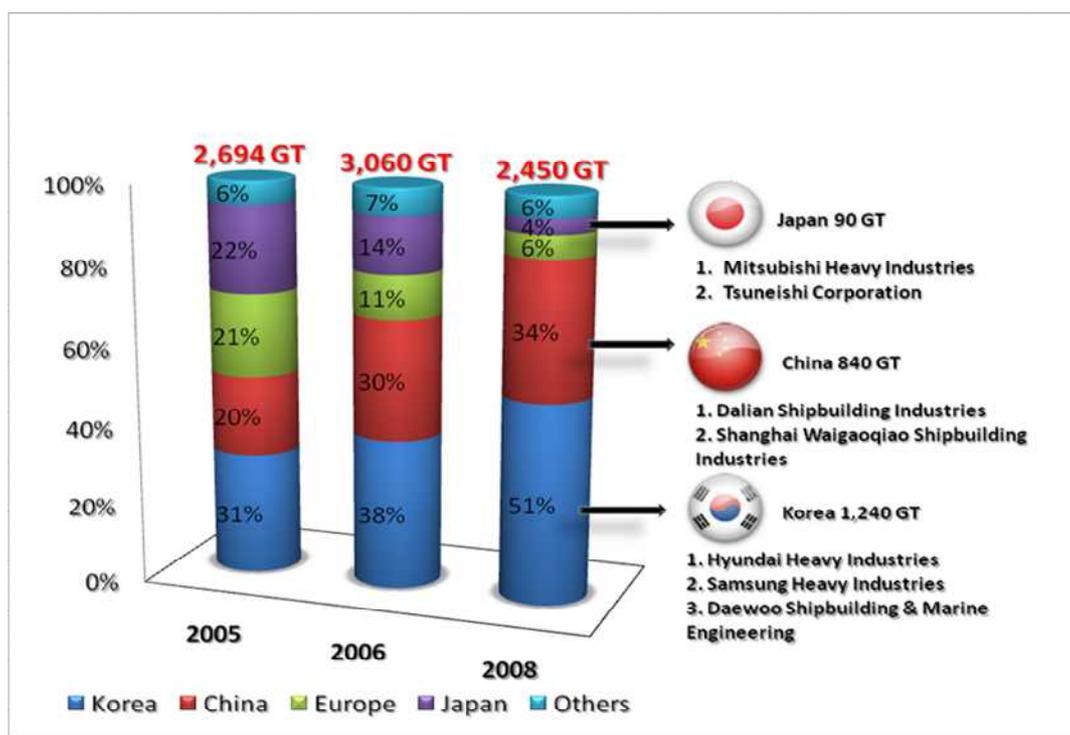


Fig 2.0 Global Shipbuilding Industry Market Shares [Source: www.clarksons.com]

An important fact to note in the graph is that the total market size has decreased from 2005 to 2008 due to the economic recession. Despite this decrease in the total market size, Korea has been able to increase its market share from 31% to a striking 51%. This can be attributed to the competitive advantage strategy employed by Korean shipbuilders (Refer to section 5.3 of the report for details).

¹ <http://www.krs.co.kr/kor/file/Evolution%20of%20Korean%20Shipbuilding%20Industries-Technology%20Development%20and%20Innovation.PDF>

² http://www.researchandmarkets.com/research/f8f562/the_shipbuilding_i

2.0 INDUSTRY STRUCTURE

An analysis of the shipbuilding industry was done using Michael Porter's five force model³ to understand its nature. The following characteristics of the industry were identified:

- There are high entry barriers in the shipbuilding industry. The major barriers include huge capital investments, acquisition of highly specialized equipment, establishing strong distribution networks to compete with existing firms, high taxes and tariff by government, requirement of high-skilled labor, and flexibility in operations⁴. Due to these factors, most potential entrants are reluctant to enter the industry.
- The bargaining power of buyers in the industry is quite high. This is so because there are few buyers. These buyers base their decision on price, quality, delivery and government policy. Buyers are knowledgeable and are sensitive to price. They purchase in large volumes and switching cost of buyers is low particularly during exchange rate fluctuations. Key buyers are commercial clients who place very large orders giving them a high bargaining power³.
- The threat of substitutes in the shipbuilding industry is very low. The only available substitutes are airplanes, but these substitutes are not a threat because they have very high costs³.
- The bargaining power of suppliers is low in the shipbuilding industry. The main reason for this is that there is a fairly low concentration of suppliers. Suppliers to the shipbuilding industry are mostly steel manufacturers or parts manufacturers and these suppliers do not have high influence because the switching cost of suppliers is quite low. There is also very low threat of forward integration in the industry currently. Suppliers like POSCO have attempted to forward integrate with Daewoo⁵. Nevertheless, the bargaining power of the suppliers remains low. In addition, the Korean shipbuilders are also vertically integrating to reduce costs and increase productivity. Recently, companies like Hyundai and STX created and acquired steel manufacturing companies respectively to ensure that there is a constant supply of raw materials such as steel, at stable prices and on time⁶.

3

http://books.google.co.uk/books?id=X7FrWUBanZYC&pg=PA541&lpg=PA541&dq=rivalry+in+shipbuilding+industry&source=bl&ots=pccBwxwm0_&sig=htvt6FOyaxW78hYXBn2GiqAHqyc&hl=en&ei=Dz_bSv_jOILesgOHlqGxCQ&sa=X&oi=book_result&ct=result&resnum=1&ved=0CA4Q6AEwAA#v=onepage&q=rivalry%20in%20shipbuilding%20industry&f=false

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http://books.google.co.uk/books?id=X7FrWUBanZYC&pg=PA541&lpg=PA541&dq=rivalry+in+shipbuilding+industry&source=bl&ots=pccBwxwm0_&sig=htvt6FOyaxW78hYXBn2GiqAHqyc&hl=en&ei=Dz_bSv_jOILesgOHlqGxCQ&sa=X&oi=book_result&ct=result&resnum=1&ved=0CA4Q6AEwAA#v=onepage&q=rivalry%20in%20shipbuilding%20industry&f=false

⁵ http://www.koreatimes.co.kr/www/news/biz/2009/07/123_29355.html

⁶ http://www.alacrastore.com/company-snapshot/Hyundai_Steel_Co-1022872

- The global shipbuilding industry is geographically divided among the major competitors. Competitors are therefore identified by geographic locations rather than as firms. The industry is geographically highly concentrated because market shares held by the major rivals Korea, Japan, and China are much larger than shares held by less dominant players (refer to Fig 2.0). There has been a high degree of competition in the shipbuilding industry as seen from the history of the industry resulting in a less disciplined environment. Nevertheless, the rivalry among firms in the shipbuilding industry is quite intense and is mostly based on price competition. In addition, firms are diverse and can accept lower profits than competitors due to differences in geographical locations and economic conditions. Also, there is low product differentiation which results in higher competition for securing orders from buyers. There are high exit barriers in the industry due to high investments in facilities and infrastructure making most firms reluctant to leave the market⁷.

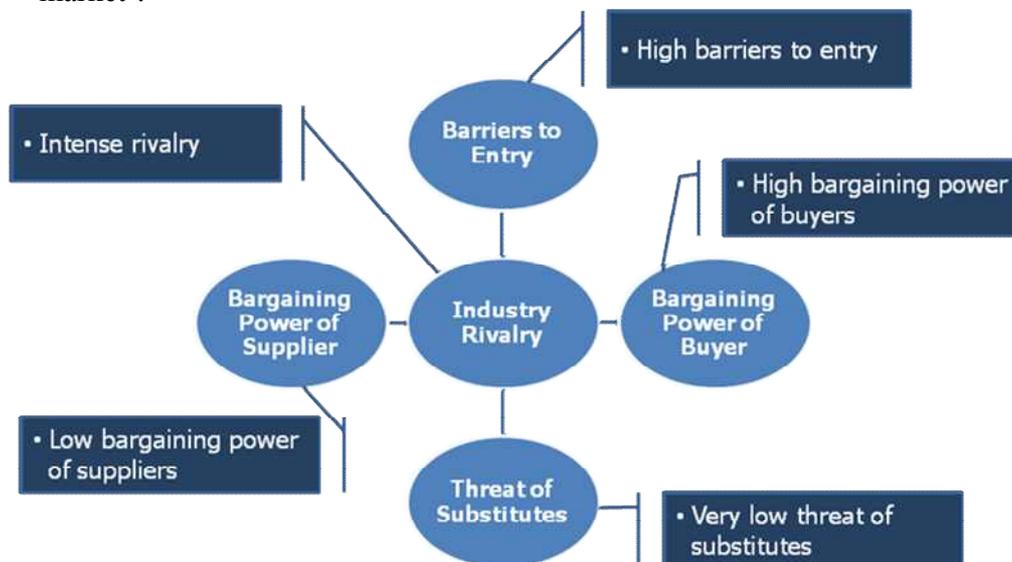


Fig 3.0 Shipbuilding Industry Structure

3.0 MACROENVIRONMENTAL ANALYSIS

The macro-environmental analysis for the shipbuilding industry was done using the PEST model. The four aspects of the environment and their impact on the shipbuilding industry are discussed below:

3.1 POLITICAL/REGULATORY FACTORS

As stated earlier, government imposes high taxes and tariffs in the shipbuilding industry. Government also supports firms through subsidies in certain countries like India⁸. In addition, governments also invest in capacity such as green-field investment and new facilities in low cost regions like China Vietnam, Philippines and India. The Korean shipbuilding industry is also supported by the Korean government⁹. In the past, there have been few formal rules for governing the shipbuilding industry and firms are state-supported. However, currently the International Maritime Organization (IMO) is responsible for setting up rules and regulations governing the shipbuilding industry¹⁰.

3.2 ECONOMIC FACTORS

Due to the high level of economic activity in recent years, trade has also increased leading to greater demand for shipbuilding. In addition, the increase in demand for oil has also led to a rise in demand for ships to transport the oil. In the current economic conditions, the movement of business to low-cost areas where economic growth is increasing has also created greater demand for shipbuilding. Also, the fluctuations in the exchange rate in recent years led to higher profits for shipbuilders like Korea where the currency exchange rate went up. However, due to the present economic recession the demand for ships is lower than before.

3.3 SOCIO-CULTURAL FACTORS

Shipbuilding industry brings huge revenues to countries and directly influences the welfare of the people by affecting the GDP. However, there are some negative effects the industry has on the environment. An example is oil-spillage caused by many carriers in the ocean that results in water pollution and death of sea creatures. Recently IMO set up anti-fuel-pollution rules for shipbuilders to protect the environment¹¹. In addition, shipbuilders are

⁸ <http://www.globalsecurity.org/military/world/india/shipbuilding.htm>

⁹ <http://www.researchandmarkets.com/reports/679538/>

¹⁰ http://www.imo.org/newsroom/contents.asp?topic_id=82&doc_id=369

¹¹

http://74.125.155.132/search?q=cache:tP6B1K_qFCkJ:www.kccworld.co.kr/HeavyDuty/Data/Newsletter/2009/Newsletter2009_Spring.PDF+IMO+sets+up+rules+for+anti+pollution+for+shipbuilders&cd=9&hl=ko&ct=clnk&gl=kr&client=firefox-a

focusing on building environmentally friendly ships using green technology in an effort to protect the environment.

3.4 TECHNOLOGICAL FACTORS

Most shipbuilding companies are making use of technology to attain higher production levels and greater efficiency. Korea shipbuilders for instance, make use of technology to produce a larger number of ships (compared to their rivals) despite high labor costs. The largest shipyard in the world is located in Ulsan and managed by Hyundai Heavy Industries. This shipyard is able to produce \$80 million vessels every four working days due to the use of sophisticated production technology¹². The impact of technology and innovation is also evident from creations such as the Japanese NYVE which is powered by solar energy. Korea particularly, is making extensive use of technology in both process improvement and manufacturing (Please refer to section 5.3 for details).

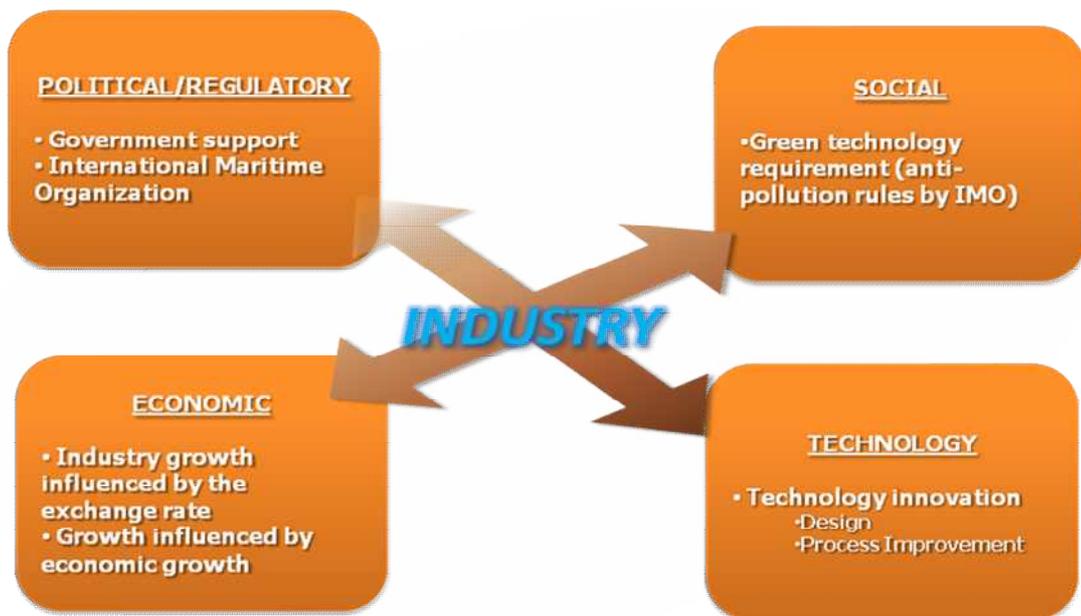


Fig 4.0 Macro-Environmental Analysis

4.0 CHINESE SHIPBUILDING INDUSTRY

The Chinese shipbuilding industry is the major competitor of the Korean shipbuilding industry. In order to understand how Korea can maintain its competitive advantage, it is important to analyze its major rival, China. The Chinese accomplished shipbuilding

¹² http://www.worldportsource.com/ports/KOR_Port_of_Ulsan_1488.php

output was 28.81 million deadweight tonnages, rising by 52.2% of last year According to the Clarksons, the market shares of Chinese accomplished shipbuilding output, newly undertook ship orders and ship orders in hand accounted for 29.5%, 37.7% and 35.5% respectively in the world. Chinese accomplished shipbuilding output and ship orders in hand kept a fast growth for six consecutive years giving China second place in the world. Presently, the major shipyards in China are Shanghai Waigaoqiao Shipbuilding Co. Ltd (SWS), Dalian Shipbuilding Industry Co., Ltd. (DSIC), and Changing shipyard¹³.

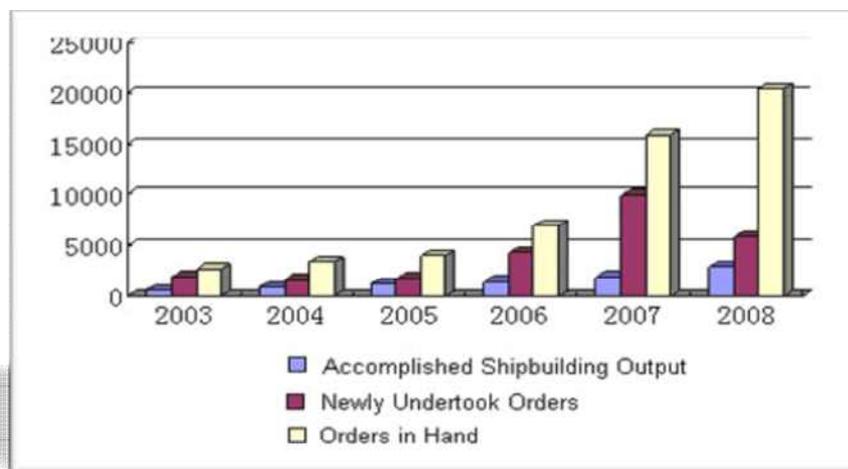


Fig 5.0 Chinese Shipbuilding Orders [Source: www.clarksons.com]

Major strengths of the Chinese shipbuilding industry are low labor costs, adequate supply of steel for ships, and strong government support. In addition, China's strong economic growth has promoted the demand of sea and river transportation for iron ore, coal, grain, construction materials and other bulk, in recent years. Below is a graph that shows the labor costs for the three major rivals China, Japan and Korea in the shipbuilding industry:

¹³ <http://www.bharatbook.com/detail.asp?id=83445&rt=China-Shipbuilding-Industry-Report.html>

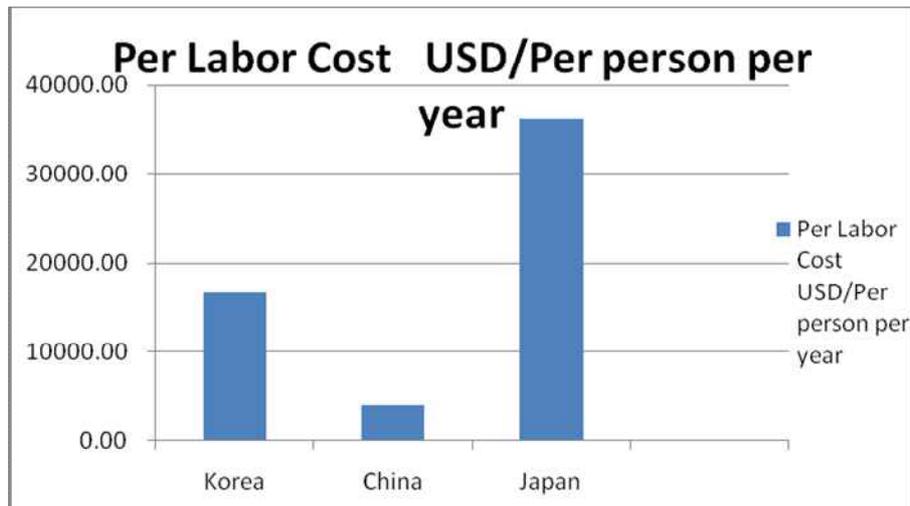


Fig 6.0 Labor Cost Comparison for the Shipbuilding Industry Leaders

4.1 MAJOR CHALLENGES

Although China has many advantages, it also has some weakness. China still lags far behind the top shipbuilding countries in many ship functions, especially in structural design and technology. It is far behind the other countries in many key technologies, with no domestic brands to provide support products for exported ocean ship. And a lot of key components simply cannot be manufactured in china at the present time. The country's capacity to provide the products with high added-value ship is woefully insufficient. However, the international ship prices have declined since 2005, so the competition becomes more and more fierce. Raw materials like steel, iron, RMB appreciation and exchange rate fluctuation are all key factors for manufactures to take into consideration. In addition, issues of lack of professionals in shipbuilding industry and brain drain are also very prominent. There is also increased risk of excess capacity in the industry which is seen as a major threat¹⁴. The graph below shows the productivity per person in the Korean, Chinese and Japanese shipbuilding industries:

¹⁴ <http://www.newsgd.com/news/picstories/200609250005.htm>

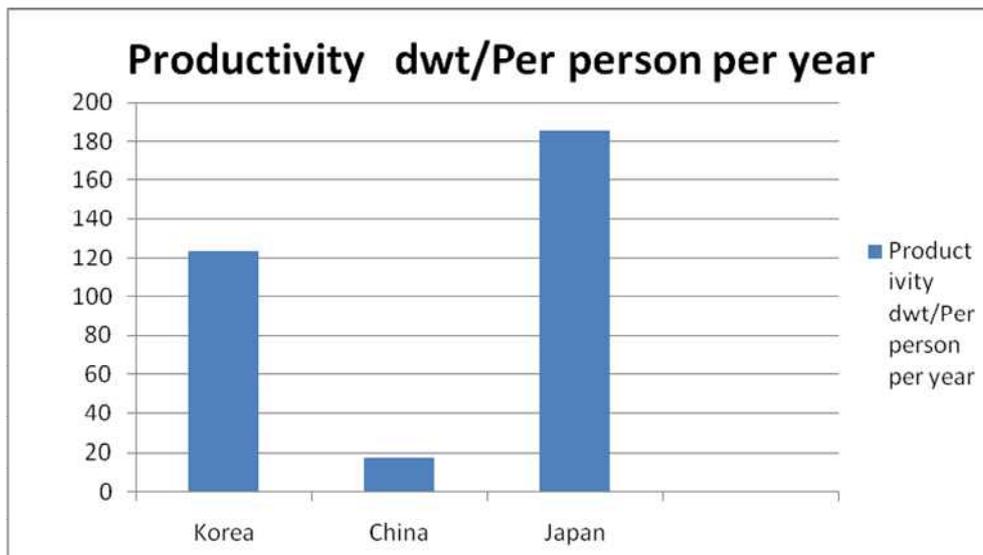


Fig 7.0 Worker Productivity Comparisons for Shipbuilding Industry Leaders

From this chart we can know that China's productivity is only about 1/6 that of the productivity of Korea and Japan, making it unable to compete with them on high-value added products such as gas and container carriers.

Even though China is a major competitor of Korea right now, in the long run China may not be able to maintain its low cost advantage. Nowadays, China's currency is appreciating and the Chinese government has tried to keep low factor costs such as fuel, electricity, environment and social security costs in order to encourage exportation but China shipbuilders still lack high skilled workers. Compared to Korea, China needs to spend more man-hours to build vessels. This delays completion and delivery of the end product and also prevents the production of high-value added vessels that could otherwise have resulted in higher profits.

Also, despite the increase in orders received, China has a major weakness in terms of long term production costs. Currently, the variable cost for example, for steel plate price (which is the main components of shipbuilding) is increasing continuously. The costs for other equipments and local wage inflation is also on the rise. This will affect Chinese shipbuilders who use the advantage of low cost labor and material to gain profit directly because they need to maintain low capital in order to sell at a lower price than their Korean counterparts. Especially in 2008, China's shipbuilding variable costs rose higher than its revenue. Furthermore, the costs of shipbuilding are underestimated in China and the variable cost for building the ship are higher than the price of the ship which means that as they build more ships, they experience losses. These factors make it hard for the Chinese shipbuilders to improve their productivity and survive in the long run¹⁵.

¹⁵ <http://download.hellenicshippingnews.com/pdf/worldyards/Profitability%20of%20Shipbuilders.pdf>

5.0 KOREAN SHIPBUILDING INDUSTRY

According to Korean times 2005, Korea has been the home of seven top 10 global shipbuilders¹⁶. The seven shipbuilding giants include Hyundai, Daewoo, Samsung, Hanjin, STX, Daesun and Shina Shipbuilding. Among them, five key groups are Hyundai, Daewoo, Samsung, Hanjin, and STX. These companies can achieve success by constantly developing their production with innovative processes, keeping customer satisfied with best quality and offering on-time delivery at competitive prices.

5.1 SWOT ANALYSIS

The strengths, weaknesses, threats, and opportunities of the Korean shipbuilding industry are shown below:

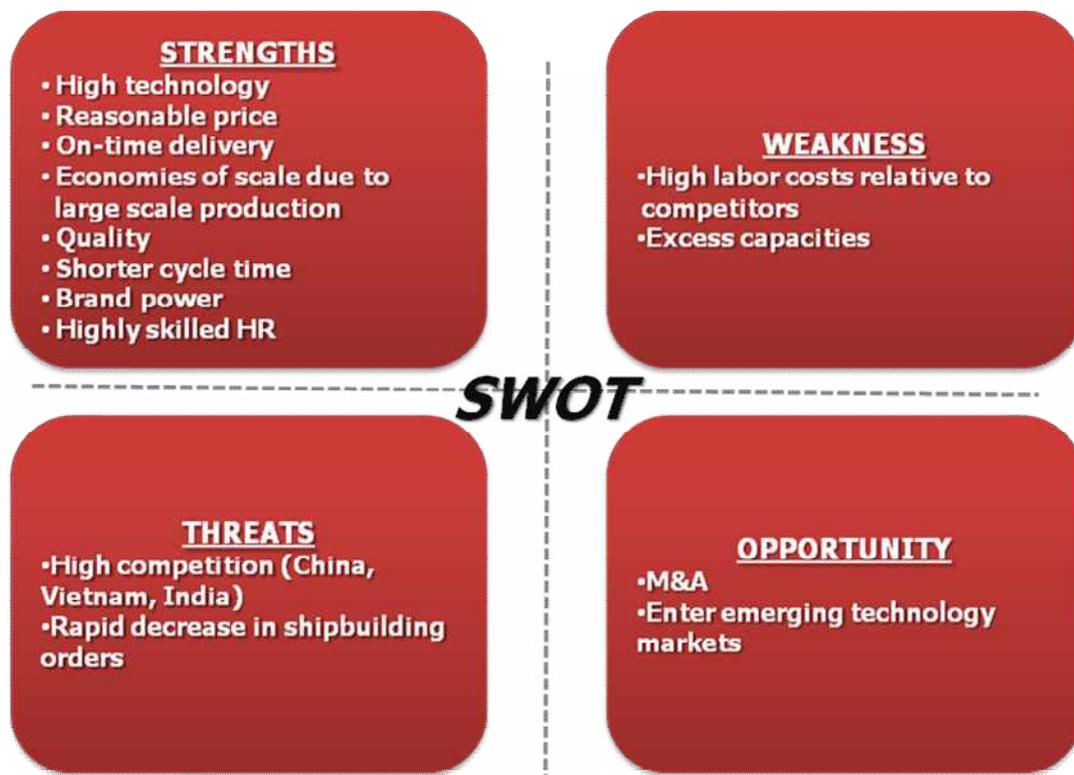


Fig 8.0 Korean Shipbuilding Industry SWOT Analysis

¹⁶ <http://www.marinetalk.com/articles-marine-companies/art/7-Korean-Shipbuilders-Rank-in-Top-10-xxx000123742OT.html>

The major strength of the Korean industry is its highly sophisticated technology. In addition, the price of products, on-time delivery, economies of scale, quality, brand power and highly skilled labor are also the strong points of the Korean industry. The weakness of the industry is basically its high labor costs as compared with China. Also, the firms also have excess capacity due to the economic recession in the country. The sources of threat to the Korean industry are mainly China, India, and Vietnam who compete with Korea on price. Another major threat is decrease in shipbuilding orders in recent years due to the economic recession. The opportunities afforded to the Korean industry are investment in Research & Development and entry into emerging markets. Higher profits will increase if the Korean shipbuilders focus on investment in one of these.

5.2 VALUE CREATION FRONTIER ANALYSIS

Korean shipbuilding business is analyzed through the concept of Value Creation Frontier. According to the graph below (refer to Fig 9.0), Korean shipbuilders position themselves in the middle between cost leadership and product differentiation meaning that they offer competitive price with value-added vessels. Compared to Korea, European shipbuilders who are known as major cruise ship providers, offer more sophisticated vessels with higher price than Korean shipbuilders. Nordic Industries Development Asia Pacific said that European shipbuilders are more fragmented than Korean shipbuilders. They have smaller yards which are not suitable for producing high volume. Therefore, they focus on producing more luxurious vessels with one-off designs such as cruise-ships¹⁷.

China and Japan build similar vessel types. Their business models fall on the cost leadership with less product differentiation. Comparing to Japan, Korean shipbuilders have been emphasizing more product differentiation. As in mid 80's, Korea aimed to produce different types of ships. Eventually, this strategy has proven successful. Nowadays, Korea has become a specialized and a global leader in VLCC, LNG and large container ships. Nonetheless, Japanese shipbuilders have continued the strategy of producing low resolution and less value-added bulk carriers and middle-sized containers¹⁶.

Similar to Japan, China offers competitive price to the market. Definitely, China can take advantage from the low labor cost and produce in high volume at low price. From this fact, Chinese shipyards are speedily closing the gap with Korean shipbuilders in the world market.

Korean shipbuilders can create value by offering reasonable price with high value-added vessels on the frontier. Yet, Korea stays on the same curve as China, meaning that Korea cannot achieve competitive advantages over its major rival. Therefore, Korea aims to move to another frontier to create higher value and maintain the competitive advantage. This reflects from the direction of the Korea Shipbuilding Association that “ultimately, the

¹⁷ <http://www.nordic-industries.com/nid/Downloads/NID-KOREA%20SUMMARY-2004.pdf>

shipbuilders are required to convert the concept of the shipbuilding industry dramatically to a new business mode by switching from ‘Shipbuilders’ to ‘Ocean Developers’”. By adopting this new concept, Korean shipbuilders are trying to diversify their business models by changing their way of thinking. Consequently, they do not see themselves as carrier builders but ocean developers which could dramatically change their business approach to marine development, marine plant construction and ship finance, for example¹⁸.

In order to gain competitive advantages over the whole industry, these Korean giants are working on creating another frontier and are aiming to move towards the product differentiation side by developing technological innovations, entering into other markets and achieving more efficiency¹⁹.

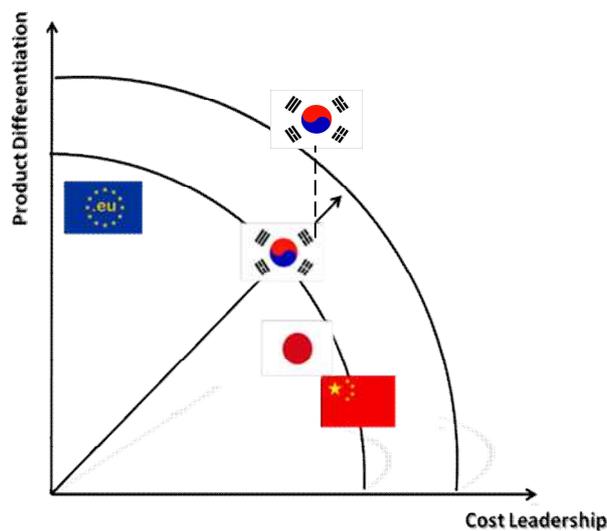


Fig 9.0 Shipbuilding Value Creation Frontier

5.3 KOREA’S COMPETITIVE ADVANTAGE

Korean shipbuilding companies are focusing on three aspects of the business to gain a competitive advantage in the shipbuilding industry: technology innovation, efficiency, and entry into emerging markets. Each of these aspects is discussed below.

¹⁸ <http://www.nordic-industries.com/nid/Downloads/NID-KOREA%20SUMMARY-2004.pdf>

¹⁹ http://article.joins.com/article/article.asp?Total_ID=3485441

5.3.1 TECHNOLOGY INNOVATION

Korean shipbuilders have been developing their technology for many decades. Their current strategy is to offer the new concept of digital ship. Examples of three major Korean Shipbuilders' technological development are the follows:

- Hyundai Heavy Industries (HHI) – makes use of production technologies such as offline welding robots, indoor production of 40m long blocks, and a two-component proportioning system in painting²⁰.
- Samsung Heavy Industries (SHI) – is using multidirectional oil tanker that can change in all directions (180 degrees) in order to find new ways to break ice when the ship is trapped by icebergs. Also, first Eco-Friendly LNG-powered passenger boat that reduces emissions of nitrogen oxide, sulfur oxides and CO₂ emission is being used²¹.
- Daewoo Shipbuilding & Marine Engineering – uses hydrodynamics design which helps to decrease the loss of propulsion power caused by waves and slamming²².

5.3.2 EFFICIENCY

One way that Korean Shipbuilders achieve their competitive advantage is to improve their efficiency by improving production process and human resources. This s done as follows:

- **Decreased ship construction time and raised production efficiency**
Technological innovation also plays a crucial role, as technology simplifies the complex production process, it reduces ship construction time and cost. The examples of their current supportive technology are the following:
 - T-shaped dry-dock: utilize a tandem shipbuilding process in which two ships can be simultaneously constructed at one dock²³.
 - MegaBlog: The blocks completed through the processing, assembling and fitting of iron plates, which are then moved to docks to be taken into ships²⁴.
 - On-land construction: Building ships on land, then loaded out on a semi-submersible barge by using air pad and skid. Then, float ships by submersing the barge²⁵.

²⁰ <http://english.hhi.co.kr/business/shipbuilding.asp>

²¹ http://www.energykorea.or.kr/pdf/2008_0102/080418-Shipbuilding_Korea_nl.pdf

²² <http://www.dsme.co.kr/>

²³ <http://www.koshipa.or.kr/eng/koshipa/koshipa3/initiatives.htm>

²⁴ http://www.shi.samsung.co.kr/Eng/product/tech_prd01.aspx

²⁵ <http://www.krs.co.kr/kor/file/Evolution%20of%20Korean%20Shipbuilding%20Industries-Technology%20Development%20and%20Innovation.PDF>

- Skid Launching System: Two blocks of ship are loaded out by using hydraulic transporter. The blocks are assembled on the barge and floated off²⁴.
- DAM Method: Ships can be built larger than dock size. Then it allows under-water welding process to be applied²⁴.

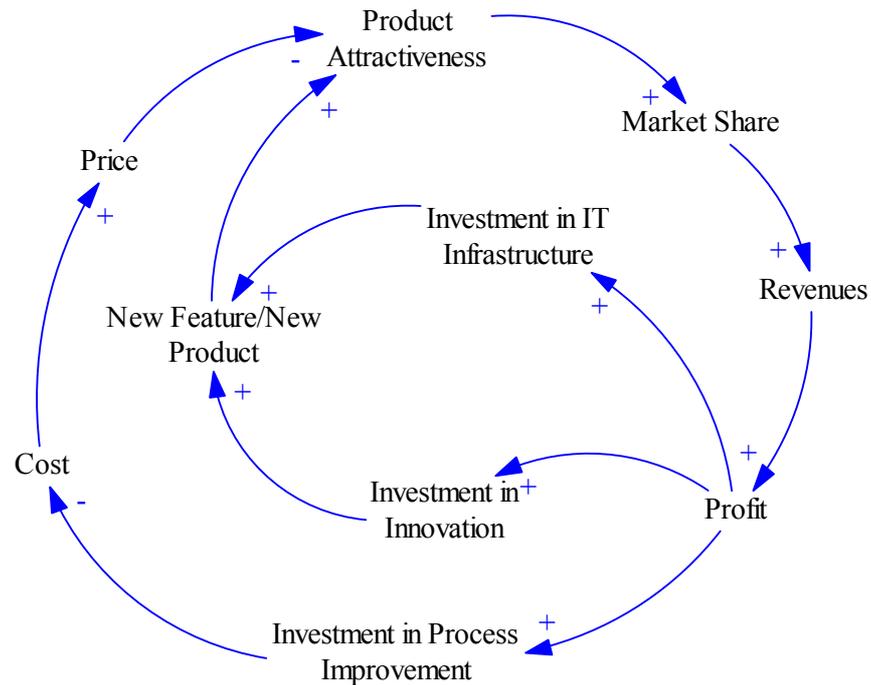


Fig 10.0 Production Efficiency and Product Attractiveness Feedback Loop

Based on the casual loop diagram above, investment in process innovation and technology not only reduce the cost of production, but also increase the product attractiveness. Also, by investing in IT infrastructure, the Korean giants can offer new features and new products to the market. This leads to the increasing of product attractiveness. Consequently, technological innovation becomes the source of competitive advantage and helps them gain higher market share, revenue and profit.

- **Off-shoring of activities to increase productivity**

Korea is outsourcing some of its production operations to lower cost regions such as India, China, and Vietnam. Korean shipbuilders believe that by outsourcing the design engineering capability they will be able to achieve a lower costs as opposed to high costs incurred when design engineering is done in regions like the US. The carrying costs of developing new technologies like LNG vessel design will also be

reduced²⁶. Below are some examples of Korean Shipbuilders' off-shoring activities:

- 3 biggest Korean shipbuilding companies are building global networks with a variety of methods, including local investment and Merger & Acquisitions (M&A).
- Samsung Heavy Industries for example, has block production plant in Shandong Province, China.
- Shown below are some of the Korean shipbuilders overseas investment:

Company	O'seas Projects	Site Acreage (m ²)
Samsung Heavy Industries	Ningbo Block Factory In Jiangsu Province, China	660,000
	Rongchen Block Factory In Shandong Province, China	792,000 1,188,000
Daewoo Shipbuilding & Marine Engineering	Mangalia Shipyard (repair) In Romania	990,000
	Yantai Block Factory In Shandong Province, China	990,000
Hanjin Heavy Industries & Construction	Subic Shipyard In Subic Bay, the Philippines	2,310,000
Hyundai Mipo Dockyard	Vinashin Shipyard In Vietnam	990,000
STX Offshore & Shipbuilding	Dalian Shipyard In Liaoning Province, China	561,000
	Dalian Block Factory In Liaoning Province, China	1,518,000

Fig 11.0 Korean Shipbuilders Overseas Investment [Source: **KOSHIPA.OR.KR**]

- **Human Resources development**

Korea has more than 110,000 skilled shipbuilding workers which is 4 times greater than the number of skilled workers in Japan²⁷. Korea can recruit this huge number of skilled laborers because the companies collaborate with academic institutes and implement custom-tailored education programs. Moreover, the ministries of knowledge economy and justices support shipbuilding companies that want to seek ways of recruiting experts from abroad by providing Gold Card Worker Visa System which is a service designed to facilitate employment of foreign high-tech professionals in Korea by alleviating the difficulties that foreigners face at immigration offices²⁸.

²⁶ <http://www.koshipa.or.kr/eng/koshipa/koshipa3/introduction05.htm>

²⁷ http://steelguru.com/news/index/2009/02/16/ODI3MTA%3D/Update_on_South_Korean_shipbuilding_industry.html

²⁸ http://www.goldcard.or.kr/eng/01_gold_intro/introduce.asp

Nevertheless, KOSHIPA forecasts that in 2010, there will be a shortage of workers for the industry. According to the forecast, the demand for skilled workers will be 15,130 while the supply is only 12,179. Therefore, the disparity is -2,951²⁹.

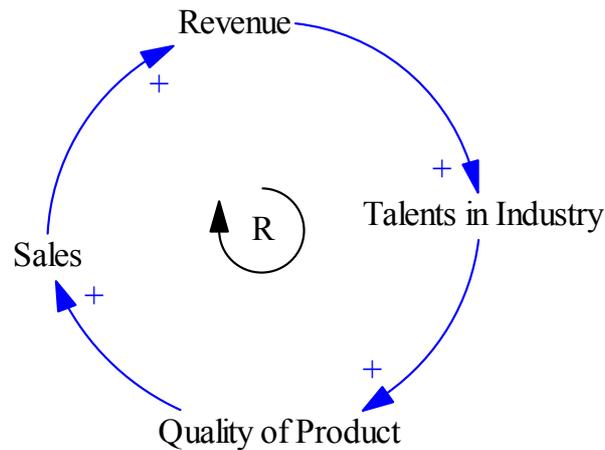


Fig 12.0 *Competitive Advantage from HR Development*

Additionally, the casual loop diagram above shows that quality of employees and new product in Korean industry are the main causes to outperform competitors including China, while maintaining high efficiency. Therefore, Human resource development system needs to be upgraded in order to improve the efficiency and become a source of Korean competitive advantage.

5.3.3 ENTRY INTO EMERGING TECHNOLOGY MARKETS

Apart from focusing on technology innovation and efficiency to gain competitive advantage in the shipbuilding business, Korean companies are also working towards entering new markets so as to make up for the losses experienced as a result of low demand for ships in the current economic recession. Many Korean companies have chosen to invest in the wind power industry which is a renewable energy source. The major firms that invested in the business are Hyundai Heavy Industries Co., Samsung Heavy Industries Co., STX Shipbuilding, and Daewoo Shipbuilding and Marine Engineering Co.. These firms have already begun operations in this business. For example, Hyundai has already secured a deal with U.S.-based wind-facility to provide 1.65MW wind turbines and is also investing in solar energy³⁰. SHI is heading into green energy while STX is investing in offshore plants and alternative energy, and Daewoo has acquired the US-based DeWind

²⁹ <http://www.krs.co.kr/kor/file/Evolution%20of%20Korean%20Shipbuilding%20Industries-Technology%20Development%20and%20Innovation.PDF>

³⁰ <http://maritimeneews.info/freight-news/beleaguered-yards-turn-to-wind-power/>

Turbine wind power company. The advantage for shipbuilders in penetrating this market is that the equipment used in production of wind turbines is very similar to that used in shipbuilding. So investors do not have to incur more costs to purchase equipment and instead are able to utilize their existing facilities more which can reduce the capital investment cost³¹.

5.4 DYNAMICS OF THE KOREAN SHIPBUILDING INDUSTRY

The discussions so far in the article can be summarized in the feedback loop below (refer to Fig 13.0) which represents the dynamics of the Korean shipbuilding industry. The important feature to note in this figure is the profit, which is what Korea aims to increase. Since Profit = Revenue – Cost, profit can be increased by either increasing the revenue or by reducing costs. To increase revenue shipbuilders can either raise prices or increase sales. Korean shipbuilders are increasing their profits through investments in emerging technologies, Research and Development (R&D), and process improvement. The green balancing feedback loop in the diagram shows the technology innovation technique that Korean shipbuilders use to gain a competitive advantage while the yellow reinforcing feedback loop shows the efficiency strategy implemented by the shipbuilders. The red reinforcing feedback loop shows the new strategy that Korean shipbuilders have recently adopted of investing in emerging technologies such as the wind turbine industry.

As can be seen from the graph, investment in R&D results in a two-fold effect on revenue by providing more attractive products leading to increased sales and reducing the Time to Market (TTM) resulting in increased price. In terms of cost, Korean shipbuilders invest in process improvement and achieve higher productivity, lower costs and higher efficiency through improved process design, shorter cycle times, etc. Also, by increasing the market share through investment in R&D, the company also experiences higher economies of scale which also reduces costs. It is important to note that although Korean has achieved a competitive advantage by implementing the afore mentioned two strategies, competitive advantage is temporary and may not last forever unless the shipbuilders work towards staying one step ahead of their competitors. This can be done by investment in the emerging technology which will in the long-run yield greater revenues for the firms. By investing in emerging technology, Korean ship builders will ensure that their competitive advantage is sustained.

³¹ http://www.koreaherald.co.kr/NEWKHSITE/data/html_dir/2009/11/26/200911260061.asp

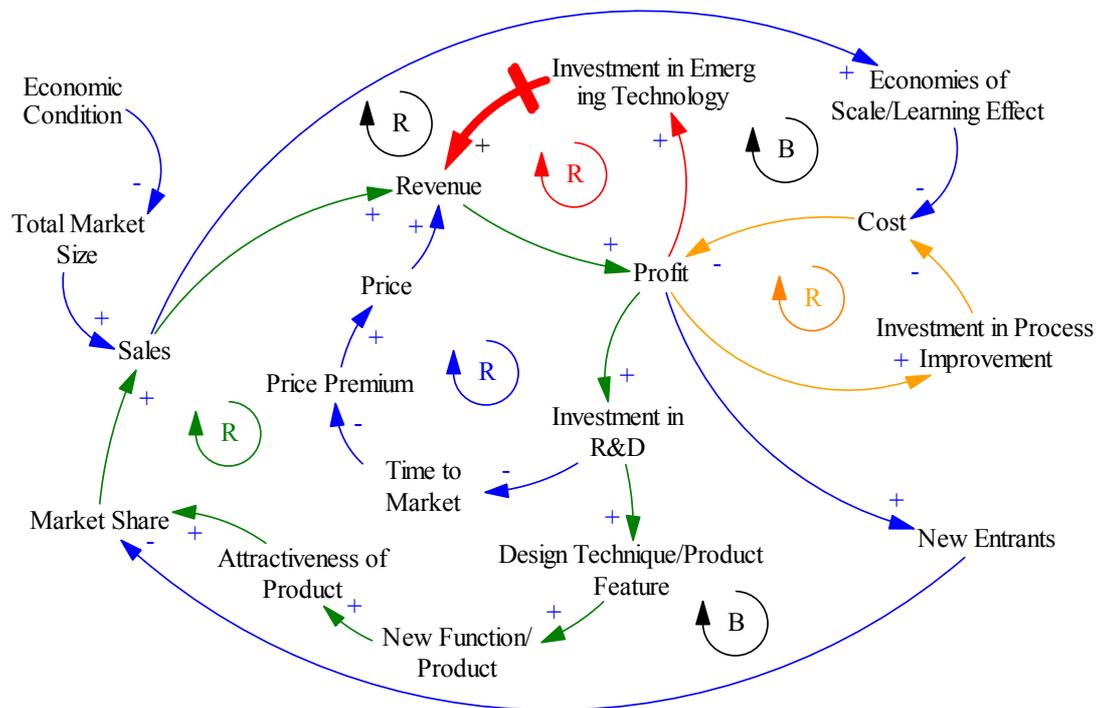


Fig 13.0 Causal-Loop Diagram for Korean Shipbuilding Industry

Therefore, the way forward for Korean shipbuilders is to continue investing in technology innovation, process improvement, and emerging technology markets. In addition, Korean companies should also work towards product diversification and price reduction techniques to increase their revenue. It is also recommended that Korean companies focus on the development of their human resources by making the industry more attractive for highly skilled workers such as graduates. This can be done through collaboration with educational institutions to attract students by holding seminars, conferences, providing on-site visits, and giving financial assistance to those who wish to pursue a career in the shipbuilding industry.

6.0 CONCLUSION

This paper has analyzed the Korean shipbuilding industry by using a combination of the traditional strategic framework and systems thinking methodology to understand the structure of the industry better. It also attempts to show how Korea can sustain its competitive advantage in the long run. Competitive advantage is temporary as the history of shipbuilding industry has shown ; there are always changes of the leader of the industry over the period of time. Therefore, the Korean Shipbuilders are trying to find ways to sustain their competitive advantage. Changing their business concept from "Shipbuilders" to "Ocean developers" has become one of their major strategies. Also, the analysis has

shown that the interrelated improvement of technological innovations and efficiency will help these giants compete with competitors by lowering their cost of production and offering high product differentiation. Furthermore, expanding its business into emerging market will help them sustain the core competence and competitive advantage in the long run.

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