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Strategies for improving the competitiveness of the Korean shipbuilding industry : Case study of Hyundai Heavy Industries

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WORLD MARITIME UNIVERSITY
Malmö, Sweden

**STRATEGIES FOR IMPROVING THE
COMPETITIVENESS OF THE KOREAN
SHIPBUILDING INDUSTRY**

Case study of Hyundai Heavy Industries

By

HYUN LEE
Republic of Korea

A dissertation submitted to the World Maritime University in partial
fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE
In
MARITIME AFFAIRS
(SHIPPING MANAGEMENT AND LOGISTICS)

2015

DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

Title of Dissertation: **Strategies for improving the competitiveness of the Korean Shipbuilding Industry: Case study of Hyundai Heavy Industries**

Degree: **MSc**

Although external factors affect companies, companies need solutions to survive and sustain growth. However, the financial crisis of 2008 affected the Korean shipbuilding industry and companies recorded poor financial results. To solve this problem and increase the competitiveness of the Korean shipbuilding industry, it is necessary to find stabilizing suggestions and promising markets to diversify into.

Therefore, this research is aimed at proposing suggestions for problem solving and new market development. To deeply look into this situation, a case study of a particular company will be undertaken. The target company is Hyundai Heavy Industries and its competitors are Samsung Heavy Industries and Daewoo Shipbuilding & Marine Engineering.

The process involved four stages. The first stage where an external analysis were done for global, national and international regulation trends and the overall trends were extracted. The sectors where the trends were analyzed are green business, smart business and entertainment business. The second stage is an internal analysis which was achieved by examining the general background using a capability analyzing tool. In this stages seventeen resources with eight problems were found. Based on previous stages, in the third step, five problem-solving suggestions and nine take-off suggestions were proposed. The fourth step is suggestions adaptation for prioritization. To do this, all suggestions were listed and similar suggestions combined. The nine combined suggestions were assessed according to internal resources, external competition and needed time. Through this, high, medium and low level recommendations were given. High level recommendations are energy efficient vessel, advanced connected smart ship, B2C business, production costs and emotional approach. This will be followed by the ripple effect, where if the ideas are accepted, the company can solve encountered problems and create a new market. In addition, other Korean shipbuilding companies can also adopt the ideas or methodologies to increase competitiveness.

KEY WORDS: Korean Shipbuilding Industry, Global trend, Korean Government approach, IMO regulation trend, Korean shipbuilding company, Innovation of Shipbuilding Industry, Smart Ship, Eco- Ship, Cruise business, Hyundai Heavy Industries, Samsung Heavy Industries, Daewoo Shipbuilding & Marine Engineering

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LIST OF ABBREVIATIONS

APRG	Advance Payment Refund Guarantee
BDI	Baltic Dry Index
BOR	Boil-Off Rate
B2C	Business to Customer
B2B	Business to Business
BNEF	Bloomberg New Energy Finance
CCS	Carbon Capture & Storage
CCS	Cargo Containment System
DSME	Daewoo Shipbuilding & Marine Engineering
EC	European Community
GHG	Greenhouse Gas
HHI	Hyundai Heavy Industries
HTEI	Hyundai Technical Education Institute
ICT	Information and Communications Technology
IMO	International Maritime Organization
TDM	Temporary Defense Mechanism for Shipbuilding
MBA	Master of Business Administration
MECE	Mutually exclusive and completely exhaustive
MEPC	Marine Environment Protection Committee
MOU	Memorandum of Understanding
PSL	Pre-Shipment Loan
R&D	Research and Development
SHI	Samsung Heavy Industries
SOC	Social Overhead Capital
TGIF	Twitter, Google, I phone and Facebook
UKHO	United Kingdom Hydrographic Office

1. Introduction

1.1. Background

In the period of changing paradigms in the market, reading the market needs and taking rapid action in accordance with the current movement are important. Samsung Electronics and Sony cases are good examples. From the 70s to the 90s, Sony was a trend leader and an innovative company with representative goods such as the Walkman. At that moment, it seemed hard to expect the collapse of Sony. However, Sony did not take appropriate action to change according to market and customer needs. This approach drove Sony to record net losses and decreased the value of the company. On the other hand, Samsung Electronics continuously monitored the market needs and trends, and changed in accordance with market movements. Therefore, this strategy made Samsung Electronics to become one of the biggest trend leaders. Continuous innovation and keeping up with the trends are crucial in the fast changing society.

The Korean Shipbuilding industry is also likely to experience change. As Table 1 shows, the net profits¹ of the three major shipbuilding companies, which were Hyundai Heavy Industries (HHI), Samsung Heavy Industries (SHI) and Daewoo Shipbuilding & Marine Engineering (DSME), had experienced problems. Except for the DSME in 2013, all the three companies' net profits continuously declined. The principal cause of those results was the financial crisis of 2008 which affected the

¹ Net profit is the actual profit and formula is 'gross profit – expenses'.

entire maritime industry. However, if an external factor threatens the sustainability of a company, it is necessary to find a hedging solution which can create a different way to generate profit.

Table 1 *Net profit of Korean major three companies*

(KRW million)

	2010	2011	2012	2013	2014
HHI net profit	4,576,490	2,753,350	1,029,643	146,303	-1,769,215
SHI net profit	888,418	863,934	741,218	652,446	149,225
DSME net profit	776,036	648,255	175,853	241,893	112,087

Source: organized by author based on (Hyundai Heavy Industries, 2013, 2015a); (Samsung Heavy Industries, 2013, 2015a); (Daewoo Ship building & Marine Engineering, 2013, 2015a)

However, the level of decrease in the rate indicates it was not solely due to external factors. There existed internal problems which contributed to unacceptable financial performance. Therefore, this research will focus on identifying problems in the Korean shipbuilding industry and finding promising markets to enter. To achieve this goal, a deep analysis of one company will be an effective method. This is because by case study, this dissertation can show a tailored way to conduct the whole process of problem solving and methodology.

Among three major shipbuilding companies, HHI is appropriate to choose for the case study. As Table 1 presents, HHI has recorded dramatic changes in its financial status. Its decreasing rate of net profits is the highest and it has even recorded a net loss of KRW 1,768,215 million in 2014, which is around USD 1.5 billion. Therefore, HHI has been chosen for the case study, and this case study can be tailored and adopted to other Korean shipbuilding companies. In addition, two other companies are also analyzed together as competitors.

Moreover, the whole process of this research is not only applicable to Korean major shipbuilding companies, but also to other shipbuilding companies in the Republic of Korea. This is because the methodology and analysis used in this research can be

adopted other companies.

1.2. Research Objectives, Scope and Methodologies

1.2.1. Research Objectives and Scope

This research has two main objectives. One is finding encountered problems and recommending solutions for the HHI. The other is finding a prospective market and giving suggestions related to those sectors, which can improve competitiveness for the company, in an innovative way.

As objectives are based on the HHI, the scope is also based on that. This research is focused on external and internal factors, which can affect the company's business activities. The company is in the business ecosystem, so external factors include all of the parties at the international and national level. In addition, internal factors will cover all supporting activities for production, and the entire production process.

In addition, the core businesses² of the company is shipbuilding and offshore. Therefore, research will be focused on those two business parts, but the identification of a promising market will be open to every sector. If the suggestions help the company become profitable and competitive by using its resources, then those can be acceptable solutions. Moreover, this dissertation is limited in scope as it focused mainly on the HHI. Other companies, SHI and DSME, are for comparison purposes.

1.2.2. Research Methodologies

To achieve two main objectives, this research will use four-step approach and the

² Core business is “*the primary area or activity that a company was founded on or focuses on in its business operations*” (<http://www.businessdictionary.com>).

methodology is illustrated in Figure 1.

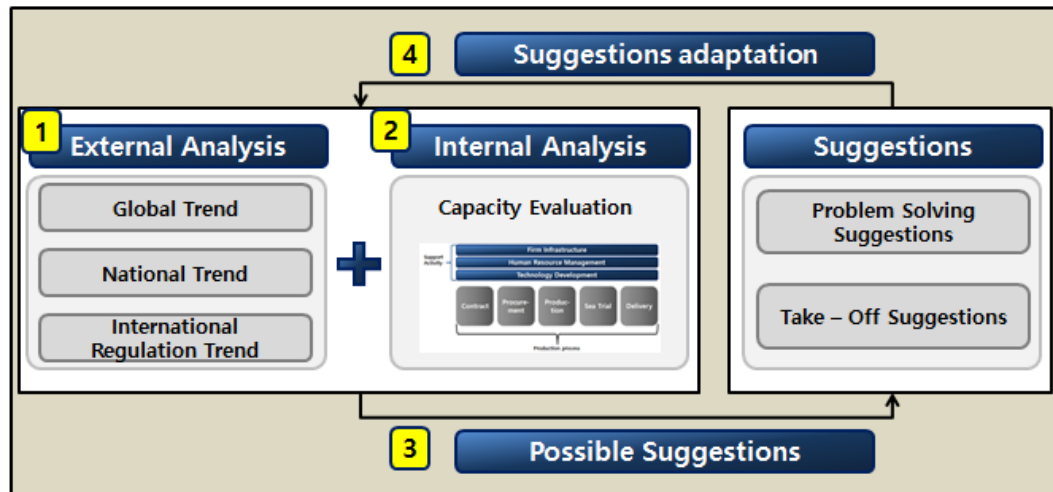


Figure 1 *Research methodology*

Source: organized by author

The first step is an external analysis³ to identify the trends in the overall trends of the shipbuilding industry. To identify the trends, a multi-dimensional approach will be used. The three dimensions are global trends from world trade global competition, national trends from the Korean governmental approach, and International regulation trends from IMO regulations. The common points of the three dimensions are the trends in the shipping industry and capturing those trends is the key to success in the future markets.

The second step is an internal analysis⁴. To do an internal analysis, it is necessary to look into the general background of HHI first and then by use a capacity evaluation tool to identify the existing resources and problems of the company. The idea of a capacity evaluation tool was adapted from Michael Eugene Porter's value chain⁵.

³ The external analysis looks into surrounding environmental of companies. It is useful for determining market trends, opportunities and threats.

⁴ The internal analysis covers all situations inside companies. This analysis usually used to find strengths and weaknesses of companies.

⁵ Value chain is a tool for identifying ways to create more customer value. It consists of nine

Because of the characteristics of the shipbuilding industry, this dissertation tailored and used that tool. It consists of support activities and production process. Supporting activities consist of firm infrastructure, human resource management and technology development. In addition, the production process consists of contract, procurement, production, sea trial and delivery. The supporting activity of technology development will cover ongoing projects regarding three trends, which are extracted from the first step.

The third step is to find possible suggestions and those suggestions are divided into two parts. One is problem-solving suggestions and the other is take-off suggestions. Those two suggestions are linked to the two goals of this research. Problem solving suggestions drive from the internal analysis problem part, and will help to solve the existing problems. In addition, take-off suggestions, which are related to finding promising markets, are linked to the external analysis trends part and will give ideas for a promising market.

The fourth step is suggestion adaptation and to adapt each suggestion combining and reorganizing suggestions from the third part is required. Because some suggestions are highly linked with each other, by conducting this process, suggestions are consolidated into a smaller number of suggestions. The next process looks into the status of internal resources, external competition and needed time to assess suggestions. Those three approaches are crucial for this step, because those are criteria for doing feasibility tests and prioritizing suggestions. Based on prioritized suggestions this dissertation will find ripple effects. This part will cover effects of highly recommended suggestions, which consist of problem solving suggestions and take-off suggestions, followed by medium level suggestions, and low-level suggestions.

strategically relevant activities, which are five primary and four support activities (Kotler & Keller, 2009).

1.3. Limitations

The business sector is always open to unexpected factors, and it may be affected a lot for that reason. In addition, those factors could possibly act as crucial information that is not covered in this paper. In addition, suggestions described and prioritized here are not necessarily the one best way. Therefore, all possibilities of suggestions and measures are open. Companies can find more suitable suggestions from either recombinations or new findings.

2. External Analysis

The coexistence of companies and society is essential in the 21st century. That is because those parties influence and interact with each other to build a business ecosystem. For companies, making good performances and drawing blueprints for the future requires information. Especially, reading trends is a key factor to lead to business success. The reason is that trends can act as indicators of customers' needs and wants. Therefore, by reading trends in the business ecosystem, companies can find opportunities in certain business sectors.

For these reasons, the aim of the external analysis chapter is finding trends in the maritime industry. In the maritime field, many different interests are entangled, so a multi-dimensional approach is needed to look into different parties. The multi-dimensional approach has three angles. Those are global trend (world trade global competition), national trend (Korean governmental approach) and international regulation trend (IMO regulation). By looking at those approaches, this research can find common points in the three angles. Those points will be the trends in the maritime industry. Moreover, because trends are linked to opportunity, results from the external analysis will be used for internal analysis and prospective market identification.

2.1. Global Trend (World Trade Global Competition)

The shipping industry links the whole world and conducts business at the global level, so a global level of competition is one of the important aspects of the identified trend.

Therefore, the first dimension of the identified trend is a global trend, which is related to world trade global competition. At this stage, the dissertation can establish three key words, which are smart shipping, environmentally friendly and quality of life.

2.1.1. Smart shipping

TGIF is not a restaurant branch anymore and we call 2010s the TGIF generation, which represents Twitter, Google, I phone and Facebook. That movement is possible with smartphones and internet connection. Thanks to both of them, the world is getting closer. Accessing information all over the world is possible as is contact with others at the opposite side of the globe. The paradigm of the whole industry has changed.

Smartphones and maritime business have a common point. Vessels also connect the world by the ocean. As Figure 2 indicates, world seaborne trade makes up around 75 percent of world merchandise trade. The larger the portion of the market share⁶, the higher the possibility to play a key role. Figure 2 shows world seaborne trade is continuously increasing and Figure 3 also shows that the increasing trend is valid in all sectors of trade, which are container, other dry cargo, five major bulk, and oil and gas. It means if a vessel is equipped with ICT (information and communications technology) devices and can manage information, or if it can connect with smartphone, value created from there will be significant.

In addition, “smart” can be defined by increasing automation level. One hot issue in the maritime industry is shortage of seafarers. Because of this problem, Drewry’s Manning 2014 Annual report mentioned the carrier profitability has problems and it forecasted that the problems would worsen. Estimated current officer supply is around 610 thousand, and the shortfall of seafarers is around 19 thousand personnel

⁶ Market share is “a percentage of total volume of sales in a market captured by a brand, product, or company” (<http://www.businessdictionary.com>).

and it is estimated to reach an additional 38.5 thousand persons by 2018 ("Carrier Profitability in," 2014). Therefore, increased customization level will be a good solution for this matter.

In this stream, the concept of e-navigation is surfacing. Initially, this concept was raised for safety reasons, but it is extending to all ICT⁷ related business. The movement has started. Regarding e-navigation, the United Kingdom Hydrographic Office (UKHO) is conducting a world seminar of 23 spots until 2015, which started on March 26th 2014, in Dublin, Ireland (Ministry of Oceans and Fisheries , 2014). In addition, IMO is putting in place 17 essential services of e-navigation which it plans to adopt until 2019 (Kim, 2015). Therefore, in the world trade global competition, smart shipping is an ongoing and prospective issue.

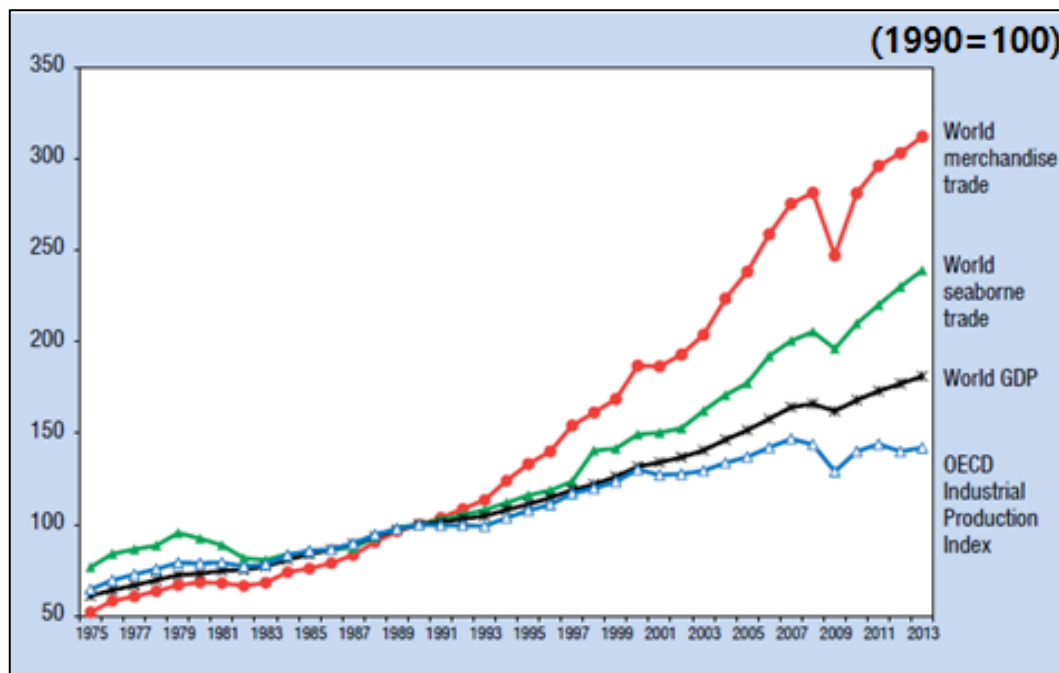


Figure 2 *The OECD Industrial Production Index and indices for the world*
Source: UNCTAD, 2014

⁷ 'ICT' is an abbreviation of Information and Communications Technology

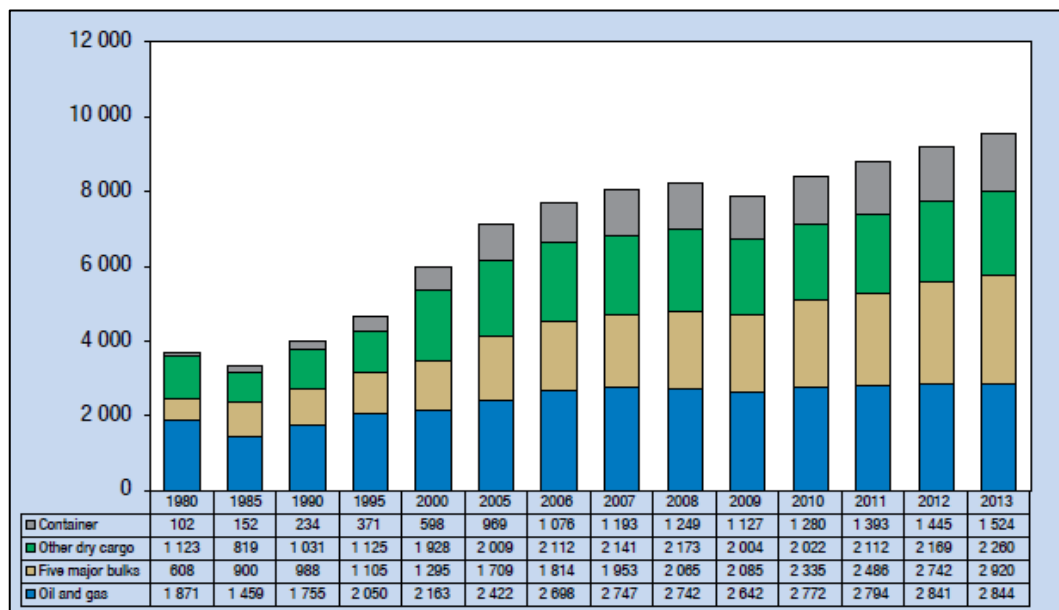


Figure 3 *International seaborne trade, selected years (Millions of tons loaded)*
Source: UNCTAD, 2014

2.1.2. Environmental Friendly

Environmental issues are always hot in all industry and the maritime field is not an exception. Among many environmental issues in the business field, there is more interest in issues that can create revenues. Therefore, issues which are not only environmentally friendly and but also revenue friendly are hot issues of global trends.

One example is energy efficiency. Energy efficiency can reduce GHG (greenhouse gas) emissions, so IMO adopted additional guidelines and amendments in April 2014. IMO's Marine Environment Protection Committee (MEPC) continuously tries to improve the design of ships, their size, and operational measures that can achieve better speed management, especially efficient use of fuel (UNCTAD, 2014). It can reduce the emissions of CO₂, GHG emissions and other toxic substances.

In addition, this issue is also beneficial from the economic point of view. The business world generally follows the flow of money and it depends on supply and demand. If a ship owner wants a certain product, the shipbuilder will build that product. As energy efficient vessels are directly linked to reduction of operation costs,

they are sufficient to attract ship owners. The reason is that in the highly competitive society, service fees are almost fixed by the market. In this situation, to increase profit, ship owners have to reduce costs. As from 50 to 60% of the cost of running a vessel is from fuel oil, effectively managing energy consumption will give a significant cost savings effect. Therefore, many stakeholders including IMO, government, ship owners and ship builders willing to increase the energy efficiency of vessels. Those facts make global trends.

2.1.3. Quality of Life

Development and accumulated knowledge of medical technology change human life style. As Figure 4 shows, compared to the 1960s, life expectancy in 2012 was longer. Longer life expectancy triggered people to think about quality of life. People started to think about life after retirement and it makes differences.

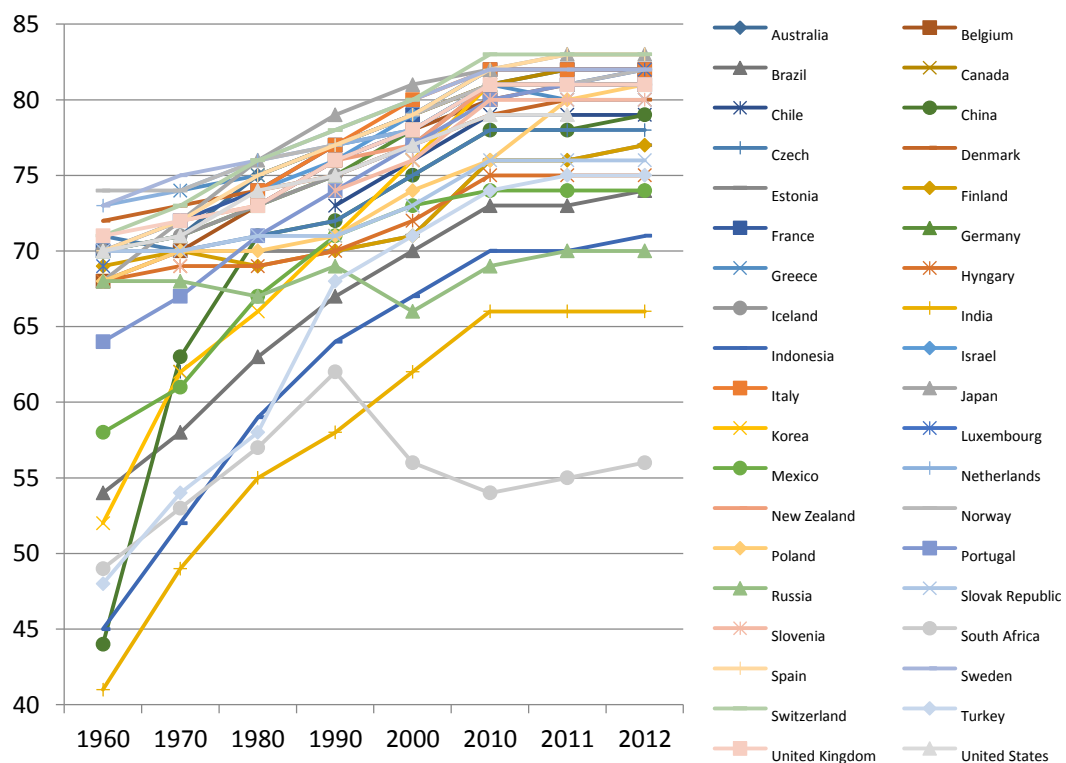


Figure 4 *Life expectancy*

Source: <https://data.oecd.org/healthstat/life-expectancy-at-birth.htm>

In addition, a World Tourism Organization (UNWTO) report shows arrivals of international tourists grew by 4.8% in the first eight months of 2014 and world travel trends shows continuous upward movement (Messe Berlin GmbH, 2014). Table 2 also supports the travel trend, which has continuously increased since 2011. Therefore, a longer life span drives people to think about quality of life and that movement affects increasing rate of travel.

Table 2 *World travel trends (change in % over respective previous year)*

	2011	2012	2013	2014 YTD
Outbound trips	+5%	+4%	+4%	+4.5%
Outbound nights	+4%	+2%	+4%	+3%

Source: Messe Berlin GmbH, 2014

2.2. National Trend (Korean Government Approach)

Characteristics of maritime business place much importance on global trends. However, Korean shipbuilding companies do their business in Republic of Korea and regulations and support affect companies. That is why, the national trend, which is related to the Korean government approach also needs to be considered. The national trend includes the Government of the Republic of Korea approach and Korean Ministry of Oceans and Fisheries approach. Both parties have political effects on the Korean shipbuilding industry. Regarding the national approach, this research consists of four sub-chapters. Three of them, which are ICT shipping (smart shipping), maritime policy (improve maritime tourism), maritime safety and environment (green growth) are trends pertaining to the Korean government approach, especially the approach of the Korean Ministry of Oceans and Fisheries. In addition, the financial support part will describe all levels of the Korean government, and how their support can be obtained relevant to the three trends.

2.2.1. ICT Shipping (Smart shipping)

Traditionally, the main roles and functions of cellphones were phone calls and text messages. However, the introduction of the smart phone has resulted in significant changes in the role of cellphones. Only five years after the smartphone was adopted in Republic of Korea, 80% of people are using smartphones (Lee, 2014). In addition, as Figure 5 represents, functions of the cellphone were shifted to web and apps. More than 50% of people use smart phones for applications and to search on the mobile internet, which is a shift that was hard to predict 5 years earlier. In the 21st century, the majority of sectors use highly digitalized technology. However, because of internet problems, people who work inside vessels hardly enjoy this privilege.

Nevertheless, the maritime field started changing from analog to digital and the Korean government highly supports the trend toward e-navigation. The Minister of Oceans and Fisheries supports mobile application of vessel monitoring systems, for real time vessel location (Ministry of Oceans and Fisheries, 2015a). Moving platform to mobile indicates that the maritime field has also started to jump into the smart business, which has infinite possibilities. Especially, by managing information, parties in this industry can get benefits.

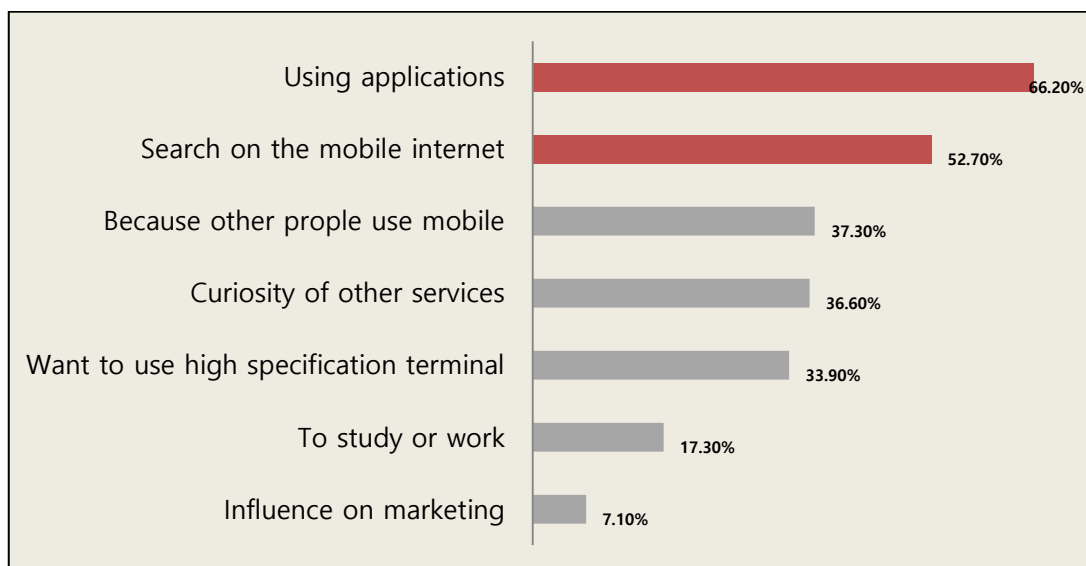


Figure 5 *Reasons of using smartphone (plural response)*

Source: Lee, 2014

However, the definition of e-navigation is slightly different from IMO and government perspectives, which may cause misunderstanding. The definition of e-navigation from IMO is:

“The harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment” (<http://www.imo.org>).

This definition suggests that e-navigation is developing for safety, security and environment, but government has a broader idea.

The Minister of Oceans and Fisheries contracts business agreements with Busan National University Hospital regarding remote medical examination and treatment in oceans. In addition, remote medical examination and treatment is one of the 17 essential services of e-navigation which is planned to be adopted by 2019 by IMO (Kim, 2015). This means the boundary of e-navigation for the government is not only a navigating function, but includes other functions. The government opens the possibility to whole sector of ICT. Therefore, in this dissertation, the extended concept of e-navigation will be referred to as smart shipping or ICT shipping.

In addition, the Korean government also tries to establish a sound foundation regarding smart shipping. A government did feasibility test regarding e-navigation from January to November of 2014 and plans to invest KRW 130.8 billion, about USD 130.8 million, from 2016 to 2020. Republic of Korea, Denmark and Sweden are international Test-Beds of e-navigation and are pushing ahead to establish international standards (Ministry of Oceans and Fisheries, 2015a). Therefore, smart shipping is supported by the Korean government, so this is one of the national trends.

2.2.2. Improve maritime tourism (Maritime Policy)

Improvements in quality of life make changes in customers' patterns of consumption. Because of the Korean War, the 50s and 60s in Republic of Korea focused on finding food, shelter, and clothes to survive. However, today Koreans have started to think about how to improve their quality of life. For that, Koreans are highly interested in health and entertainment.

In this stream, the government also supports the entertainment industry. From May 20th to 22nd of 2015, the Minister of Oceans and Fisheries, Gi Jun You held what was termed '2015 Korea Cruise Shanghai Networking' to revitalization of the cruise industry with his Chinese counterparts. At this meeting, both countries signed a bilateral MOU (memorandum of understanding). In addition, the Minister of Oceans and Fisheries established the Cruise industry enhancement law (Ministry of Oceans and Fisheries, 2015b). Those facts indicate that the cruise business is highly supported by the government.

In addition, at the national level, the cruise market is growing itself. As Figure 6 shows, the cruise market has continuously increased over the last 10 years. The number of calls at ports of Republic of Korea increased around 12 times and passenger growth has increased around 35 times. In the maritime field, a steady increase in certain parts is an exceptional record. Because of the global financial crisis, the BDI (Baltic Dry Index) dropped from 11,793 to 633 in 2008 and it caused dark ages in maritime industry. In this period, the cruise market was not as affected as the other parts. Those facts indicate that cruise market is also a national trend.

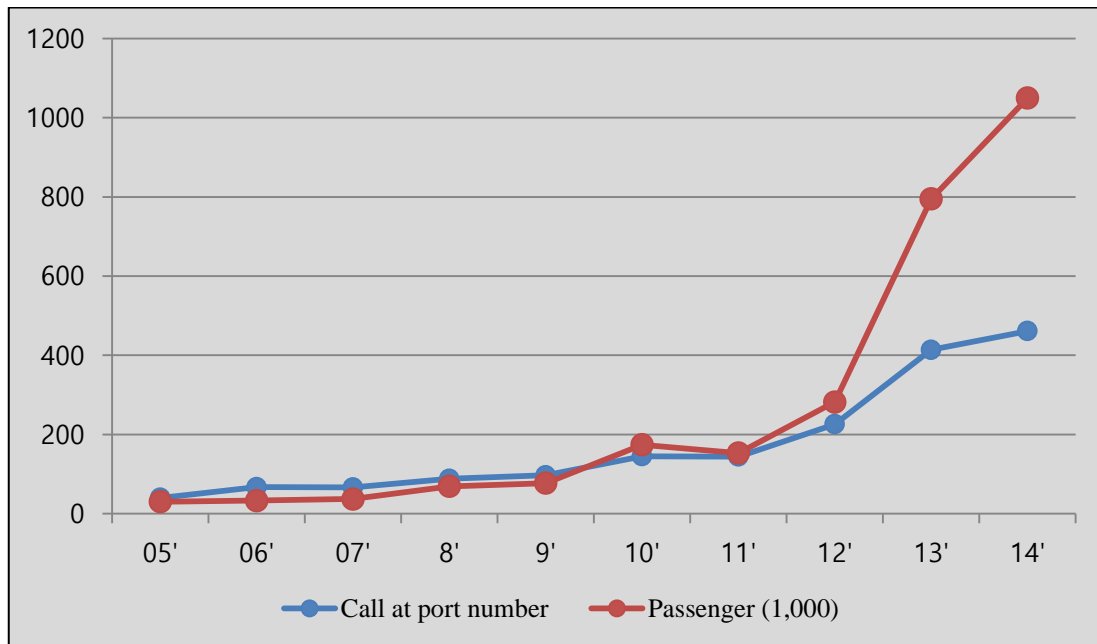


Figure 6 *Increasing tendency of cruise market in Republic of Korea*

Source: organized by author based on (Ministry of Oceans and Fisheries, 2013); (Lee, 2015)

2.2.3. Green growth (Maritime safety and environment)

The Korean government and IMO are highly linked with global regulation. In addition, safe and environmentally friendly business is always a hot issue for the IMO. As IMO regulations are going with government policies, the Korean government is monitoring ongoing projects and trying to get preoccupancy of the global standard. Toward that goal, the Minister of Oceans and Fisheries has invested in new technology related to safety and environmental protection. The budget for research and development was around 10.203 million dollars in 2012, 13.475 million dollars in 2013, 18.800 million dollars in 2014 and 13.472 million dollars in 2015 (Ministry of Oceans and Fisheries, 2015a).

In addition, regarding green growth, the government also put efforts into enhancing their safety and environmental levels. As Table 03 indicates, the field, title, study period and investment amount of the research undertaken.

Among many existing studies, the Korean government put more effort into green vessels. The Minister of Oceans and Fisheries invested around 65.5 billion dollars in safety and the environment, and the largest investment is in green vessel TSC system building which is around double the amount of the second biggest sector, Ballast water treatment systems. With all of these factors, we can assume that from the government side, safety and environment are hot issues and green vessels are especially important. Those factors will be trends at the national level.

Table 3 *Research and development list*

Field	Title	Study period	Investment (thousand USD)
Maritime Safety Technology Development	IMO vessel safety and environmental regulations correspondence research	'11 ~'15	500
	Maritime safety prevention system research	'14~'17	7,500
	Polar code technologies research	'14~'17	5,000
Environment Friendly Vessel Technology Development	Green vessel TCS system building	'11~'16	22,000
	Vessel exhaust gas improvement and effect analysis	'12~'16	9,100
	Green energy maritime transport technology investment	'11~'15	1,000
	Free contest task	'12 ~	1,600
Ballast Water Treatment System Development	USCG standard BWTS technology development and found certification infra	'13~'17	12,000
Maritime Traffic Infrastructure	Multipurpose Differential Global Positioning System(DGPS) standard development	'15~'17	6,800

Source: Ministry of Oceans and Fisheries, 2015a

2.2.4. Financial support Sectors (Governmental level support)

Described national trends from 2.1.1 to 2.1.3 are basically Korean Ministry of Oceans and Fisheries approaches. Shipbuilding companies are highly related to this administration, but also belong to the Government of the Republic of Korea.

Therefore, reading the tendency of the governmental approach is also crucial for identifying trends.

The governmental approach is important not only because of trends but also because of benefits. Compared to other products, shipbuilding requires large amounts of capital. If a company can get financial support from the government, it will be helpful. Therefore, this part will cover financial support related to three trends.

A common method of government support is through subsidies. According to the 2015 budget of the Korean government, the Korean government can afford to subsidize its industries. As Figure 7 shows, the amount of subsidies increases continuously and average growth rate is 6.5% (Ministry of Strategy and Finance, 2014). As the inflation rate of 2015 is expected to be 0.7%, 6.5% of growth rate is comparatively high. In addition, as Table 4 shows, subsidies in 2015 increased in 100 percent of sectors. That means shipbuilding companies have the opportunity to absorb this amount of subsidies for running their business.

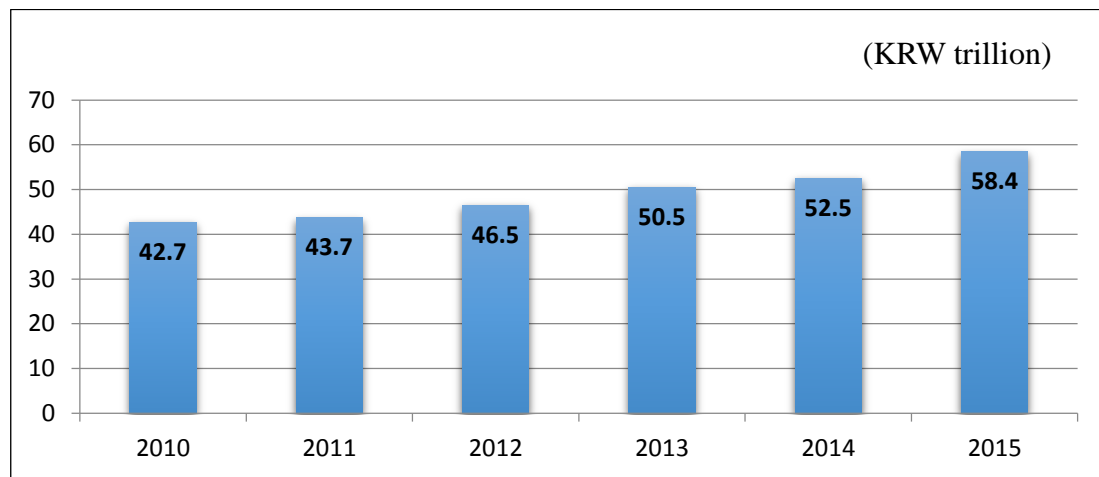


Figure 7 *Subsidies amount*

Source: Ministry of Strategy and Finance, 2014

Table 4 *Increasing rate of subsidies*

(KRW trillion)

Type	Budget	Increasing rate	Type	Budget	Increasing rate
Health and welfare	115.5	8.5 ↑	SOC	24.4	3.0 ↑
Education	53.0	4.6 ↑	Agriculture and Forestry	19.3	3.0 ↑
Culture, tourism	6.0	10.4 ↑	National Defiance	37.6	5.2 ↑
Environment	6.7	4.0 ↑	Unity of Diplomacy	4.5	6.9 ↑
R&D	18.8	5.9 ↑	Public order Safety	16.9	7.1 ↑
Industry, Energy	16.5	7.0 ↑	Administration	59.2	3.4 ↑

Source: Ministry of Strategy and Finance, 2014

However, because of WTO regulations, there are restrictions on subsidies for the Korean shipbuilding industry. In 1995, WTO was founded and regulations were strengthening between member states, generating conflicts. Especially, import and export related industries, such as steel, vessel, aircraft and energy industries were affected a lot (Lee & Um, 2014).

This is because if any trading nation thinks that there has been an unfair trade, that nation can file a litigation, which can affect sales. For example, EC (European Community) sued the Korean vessel finance supporting system in 2005. The Export-Import Bank of Korea provided APRG (Advance Payment Refund Guarantee) and PSL (Pre-Shipment Loan) to avoid bankruptcy. EC thought it was unfair trading and this problem was hard to resolve through bilateral consultation. In addition, Korea and EC also have legal problems regarding TDM (Temporary Defense Mechanism for Shipbuilding) (Lee & Um, 2014).

Even though the conflict is not visible, business is based on human-to-human

relationships, so minimizing conflict is crucial. In addition, understanding and adoption of WTO regulations differs among countries. Therefore, getting financial support in an indirect way is better than a direct way. There exist two major ways to gain indirect support from the government. Those are reducing taxes and indirect subsidies.

● Reducing Taxes

Reducing taxes is one method of indirect support. The Korean government already gives advantages to the industrial sector through a low electric tax rate. As Table 5 indicates, except for agricultural, the industrial electric fee is cheapest among all sectors. Apart from electric tax, the government can also give advantages to the shipbuilding industry by reducing the cost of materials for shipbuilding, for example, steel tax or import machinery, which are engine, telecommunication system, pump and other machines. Reducing tax for employees of the company is also a suggestions. In the industrial level, companies have room to negotiate with the government.

Table 5 Trends in average revenues per kWh sold

(Unit: won/kWh)

Year	Residential	Public &Service	Educational	Industrial	Agricul- tural	Street light	Mid- night	Total
2001	111.71	107.99	92.74	61.56	43.51	68.14	24.06	77.06
2002	110.31	104.42	90.78	60.08	43.16	66.22	26.03	75.21
2003	107.96	100.59	90.24	60.30	43.45	65.75	29.72	74.68
2004	110.41	96.85	89.05	60.23	41.95	65.33	30.61	74.58
2005	110.82	95.24	89.00	60.25	41.67	65.65	32.39	74.46
2006	114.33	97.91	77.48	61.92	42.96	68.61	34.60	76.43
2007	114.31	97.68	77.20	64.56	42.45	71.47	38.93	77.85

2008	114.97	95.30	78.58	66.24	42.38	72.50	78.7	78.76
2009	114.45	98.50	83.56	73.69	42.13	76.65	47.16	83.59
2010	119.85	98.93	87.23	76.63	42.54	81.13	50.49	86.12
2011	119.99	101.69	94.18	81.23	42.72	87.18	54.35	89.32
2012	123.69	112.50	108.84	92.83	42.90	98.89	58.65	99.10
2013	127.02	121.98	115.99	100.70	45.51	107.33	63.52	106.33
2014	125.14	129.75	114.15	106.83	47.31	113.39	67.33	111.28

Source: Korea Evaluation institution of industrial technology, 2015

● Indirect subsidies

An indirect subsidy is also a good method for financial support. These subsidies are from other sectors, which do not directly go to shipbuilding companies; cross-subsidizing shipbuilding industry from other industries that are not into heavy industries can be a good idea.

Table 5 shows that the Korean government divided subsidies into 10 parts, which are health and welfare, education, culture, tourism, environment, R&D, industry and energy, SOC (social overhead capital), agriculture and forestry, national defense, unity of diplomacy, public order and safety, and administration. In addition, most of these have the possibility to link with business boundaries of shipbuilding companies.

To effectively get indirect subsidies, companies have to look into strategies of governmental budget allocation and follow the stream of that. The 2015 budget is focused on economy, safety and hope sharing and the shipbuilding industry is mainly related to the economic part. As Figure 8 shows, the economic part can be divided into two parts, which are revitalizing the economy and creating economic power, and each objective has a detailed strategy. Among those specific strategies, four specific streams are related to the national trend of the shipbuilding industry.

Four budget strategies, which are related to the shipbuilding industry are smart challenge project, energy efficiency, and tourism and educational-industrial cooperation. First of all, the smart challenge project is related to ICT shipping. The

main idea of the smart challenge project is to try to combine ICT with existing business. The shipbuilding business is also an existing business, so this business can join this project. Secondly, energy efficiency can be linked to green growth. Part of green growth is environment and energy efficiency is also one of the environmental issues. Therefore, it is also possible to be a part of energy efficiency budgeting. Thirdly, the tourism category contains maritime tourism. Therefore, this budget strategy from the government is also related to this trend.

Finally, educational-industrial cooperation is related to all three trends. This is because it is related to human resource management and every business needs humans. Moreover, by doing educational-industrial cooperation, companies obtain benefits from not only financial support but also innovative thinking from students with positive company image.

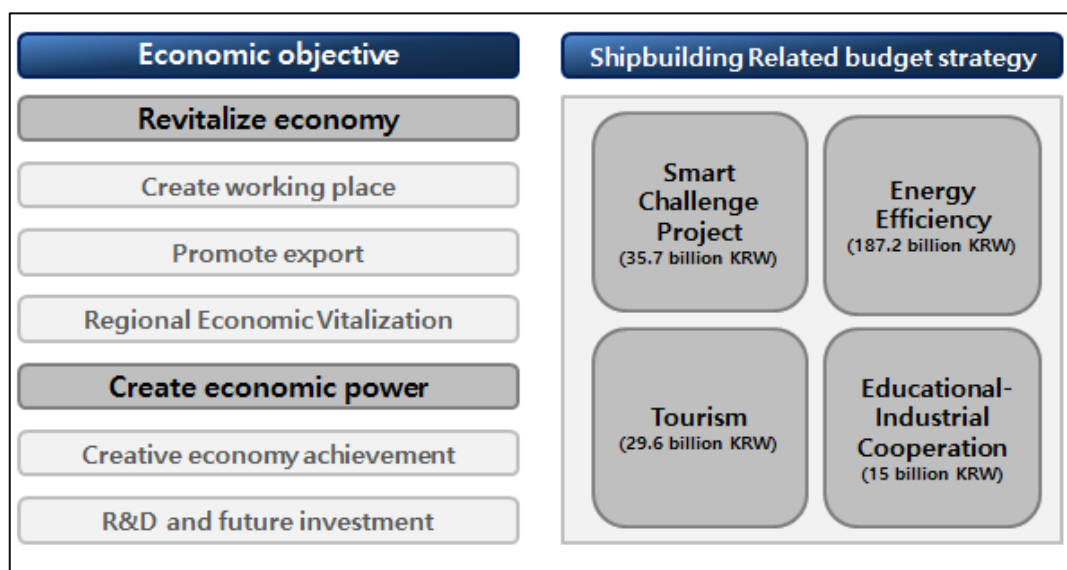


Figure 8 *Shipbuilding related government budget strategy*

Source: organized by author based on (Ministry of strategy and finance, 2014)

2.3. International Regulation Trend (IMO Regulation)

International regulations can also be other dimensions for extracting trends. This is

because when a company is doing business under certain jurisdiction, that company has to follow the rules in that place. As maritime business is a world business, there is an organization that tries to establish regulations for member states. That organization is IMO and the Republic of Korea is also one of the member states. Therefore, looking into ongoing projects from the IMO side also helps to identify trends. For IMO, safety and environment are always hot issues. There exists a safety issue and an environmental issue regarding the shipbuilding industry. The safety issue is e-navigation and the environmental issue is environmentally friendly shipping.

2.3.1. E-navigation (On-line communication)

For safety reasons, IMO is interested in e-navigation. Miscommunication and inefficiency can occur in ship-side and shore-side communication. To increase efficiency and accuracy, the concept of e-navigation is suggested and actively under investigation. The concept of e-navigation is illustrated in Figure 9.

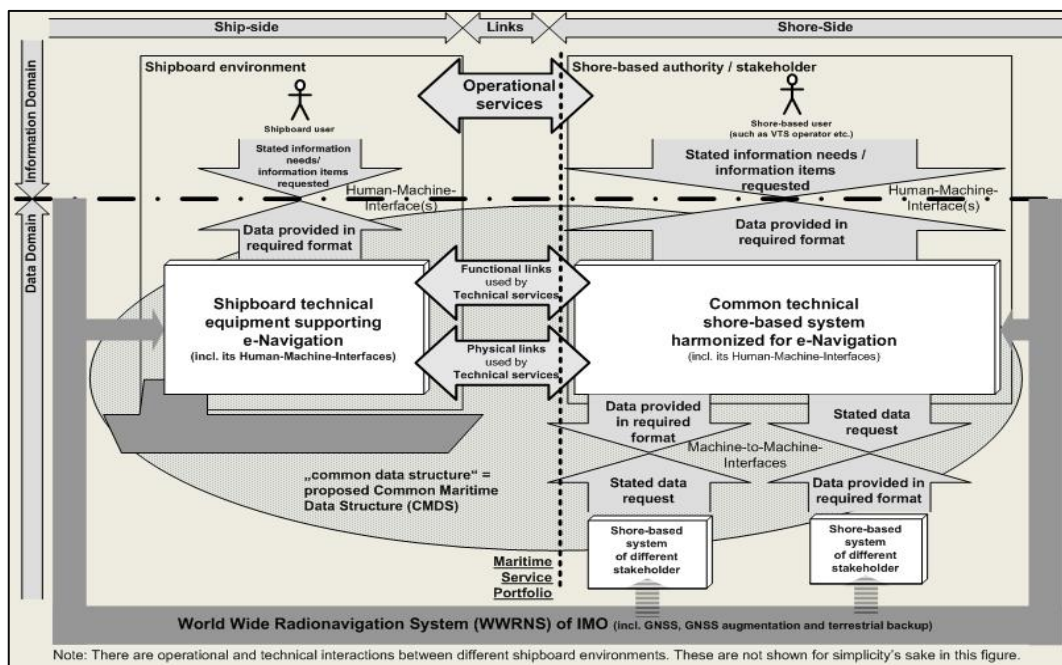


Figure 9 Concept of e-navigation

Source: retrieved from <http://www.imo.org/OurWork/Safety/Navigation/Pages/eNavigation.aspx>

According to IMO's Annex 7 of the draft e-navigation strategy implementation plan, shipping is moving to the digitalization. This movement also involves the provision of digital information and infrastructure. Digitized information means that IMO and other parties can easily use and process that information. It can be used for not only safety reasons, but also security or environmental protection. It also will reduce administrative burdens and increase the efficiency of maritime trade and transport. With those considerations, IMO has given attention to e-navigation, and has started to take actions. From 2015 to 2019, IMO has set objectives and a timeline for e-navigation (<http://www.imo.org>). This shift will affect the whole maritime industry and also the shipbuilding industry.

2.3.2. Environmentally friendly (Sustainability)

Environmental issues are also continuously raised by IMO for sustainable growth. Among environmental issues, energy efficiency and ship-source pollution are highly related to the shipbuilding industry.

First of all, energy efficiency is a growing issue. That is because increased energy efficiency drives greenhouse gas emission reduction. Here is an example. IMO's MEPC held a session regarding GHG emission reduction. That was the committee's sixty-sixth session which ran from 31st of March to 4th of April 2014. The background of that session was the measurement of increased energy efficiency and reduction of GHG emissions. In addition, during that session, member states discussed energy efficiency, technical cooperation, energy efficiency measurement, international shipping GHG-emission update and climate change. As increasing energy efficiency can reduce GHG emissions, this will be a trend for international regulations.

Secondly, ship-source pollution is also important for IMO because of sustainable growth. For ship owners those regulations are considerable. The reason is that after entry into force in nations that do business with ship owners, it could be directly

linked to their profits. The Ballast Water Management (BWM Convention) could be a good example of this issue. It is adopted but has not yet entered into force. However, once it enters into force, ship owners have to install ballast water treatment systems and it will directly affect the related parties. Therefore, this topic is also trend for international regulations.

2.4. Opportunity⁸

By integrating three approaches, this research found three trends in the shipbuilding industry. These will affect shipbuilding companies as external factors. In addition, the trends related markets have special meaning. Those markets are prospective and have a lot of opportunity. That is because the main characteristics of trend driven business are increasing market size and representing customers' needs. Therefore, those will be attractive sectors for companies to expand and develop their business.

Prospective markets could attract too many companies, which might cause cut-throat competition. However, if the company has enough capability, it will provide a good opportunity for the growth of the company. Therefore, looking into trends to find opportunities is first step and then choosing appropriate trends by matching with their resources is the next step. The first step is covered in this chapter and next step will be cover in the following chapters.

The extracted three trends are green business, smart business and entertainment business. The process of extracting trends is described in Figure 10. Each component of global trends, national trends and international regulation trends can be grouped into three categories, which reflects general trends of the maritime sector.

⁸ Extracted trends, extracted from external analysis are sources of market opportunities.

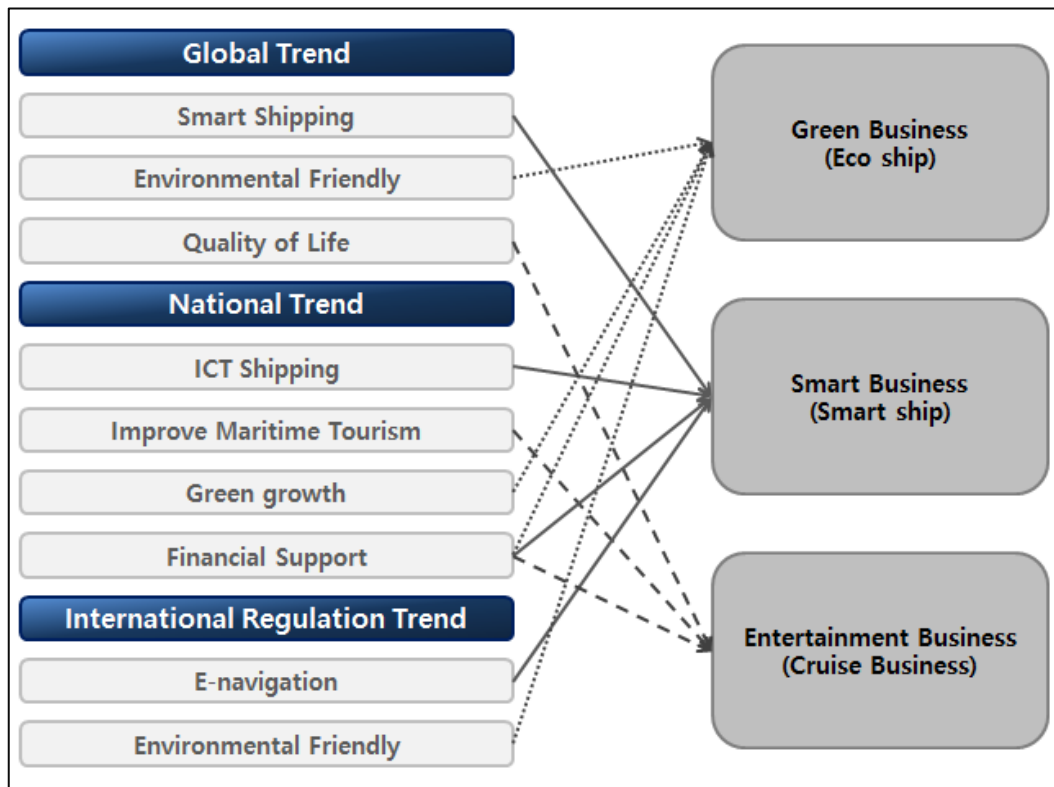


Figure 10 *Process of find global trends*

Source: organized by author

2.4.1. Green business (Eco Ship)

Green business is related to all three dimensions. The Global and international regulation trend of environmental friendliness, and the national trend of green growth along with financial support factor go to green business. In addition, in the shipbuilding industry, all trends can bind with eco ships.

2.4.2. Smart business (Smart ship)

Smart business is also linked with the three trends. The global trend toward smart shipping, the national trends of ICT shipping and financial support and international regulations regarding e-navigation are related to smart business. Key issues of smart business are digitization and ICT. Moreover, smart business is highly connected with smart ships, which are ongoing products in the shipbuilding industry.

2.4.3. Entertainment business (Cruise business)

The entertainment business is supported by two categories. The global trend of quality of life, and national trends toward improving maritime tourism and financial support. The other trends are supported by all categories, but the entertainment business is not. However, this business also provides a great opportunity for companies. That is because global trends are moving toward enjoyment of life rather than survival. In addition, this trend has a huge amount of support from governments and lot of market needs. If a company has enough resources to develop this business, it could also be a big trend.

3. Internal analysis

Internal analysis covers all information to identify the resources and problems of a company (HHI). Resources⁹ and problems are important to diagnose as is understanding a company's situation. In addition, this will link to the following chapters. Resources will be used to find attractive markets, combined with the three extracted trends and feasibility testing. Problems are also used to identify suggestions.

To find those two components, an internal analysis will look into the general background of HHI and capacity evaluation. In addition, to look specifically into the current situation, HHI is the targeted company and SHI and DSME are competitors of the target company. SHI and DSME exist in a similar environment and have similar segments and positioning in the maritime industry. Therefore, comparing the three companies will be helpful for internal analysis.

3.1. General back ground of the company (Hyundai Heavy Industries)

Hyundai is one of the biggest Chaebol companies, which has characteristics of conglomerate family-controlled corporate groups in Republic of Korea. Ju Yung Chung founded Hyundai in 1947 and he decided to establish shipbuilding in the early of 1970s.

⁹ Internal resources indicate what company contains. In addition, managing and allocating resources are important to the success for company.

In addition, HHI has six business divisions, which are shipbuilding, off shore and engineering, industrial plant and engineering, engine and machinery, electro electric system, green energy and construction equipment. The core business division is shipbuilding and most of the other divisions are doing related business. Moreover, as Table 6 indicates, HHI has a good records of performance. It has the highest market share and order amount in Republic of Korea. However, as Table 1 indicates, its financial statements are problematic. Among the three companies, HHI is the only company which had a net loss in 2014.

Table 6 *Market share in shipbuilding*

	2014		2013		2012	
	Order amount	Market share	Order amount	Market share	Order amount	Market share
HHI	9,374	44.8%	17,731	64.4%	6,669	52.9%
DSME	5,142	24.5%	4,470	16.2%	2,068	16.4%
SHI	2,561	12.0%	3,371	12.3%	1,128	9.0%
Others	3,920	18.7%	1,940	7.1%	2,735	21.7%
Total	20,952	100%	27,512	100.0%	12,600	100.0%

Source: Hyundai Heavy Industries, 2015a

3.2. Capacity Evaluation

To effectively identify resources and problems, a capacity evaluation will use a capacity evaluation tool, which is customized from Michael Porter's value chain. Because of the characteristics of the shipbuilding industry, using the exact same value chain is unsuitable. However, to effectively diagnosis a company requires a tool, so by tailoring this tool, an appropriate capacity evaluation tool has been developed.

As Figure 11 shows, the capacity evaluation tool consists of two parts. One is support activity, which is separate from shipbuilding itself. The other is the production process, which is the actual work of shipbuilding according to a timeline.

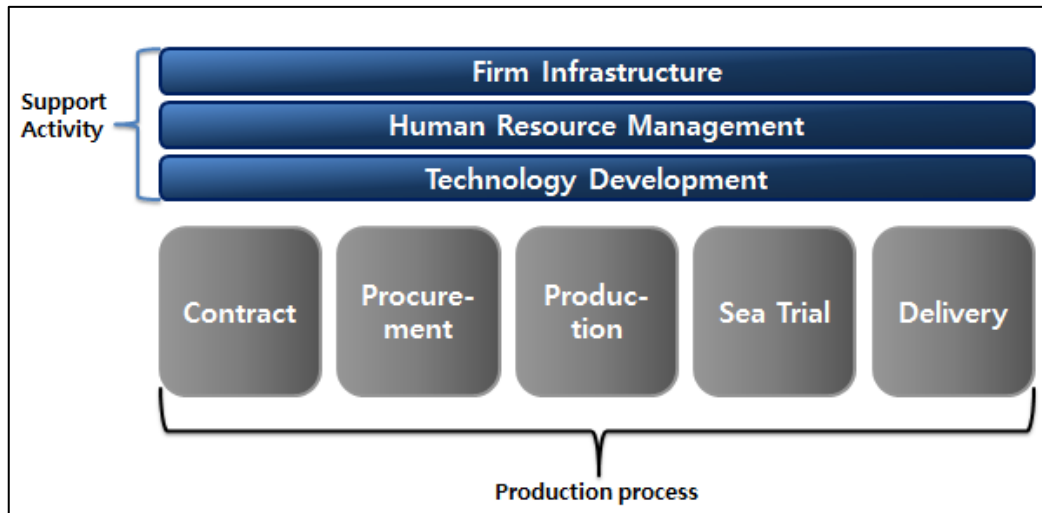


Figure 11 *Capacity evaluation tool*

Source: organized from author based on (Kotler & Keller, 2009)

3.2.1. Supporting activity

Supporting activities consist of firm infrastructure, human resource management and technology development. In addition, components of this element support real production activities.

3.2.1.1. Firm Infrastructure

Firm infrastructure includes general management, planning, finance, accounting, legal and relationships (Kotler & Keller, 2009). Therefore, firm infrastructure will look into resources related to those parts.

● Managerial Core business

The core business of HHI, SHI and DSME is shipbuilding and offshore. In 2014,

shipbuilding accounted for 31.2% of sales and offshore accounted for 13.4% of sales. These sales figures ranked second and third out of the whole HHI group. The highest recorded sales were from the refining part, but those sales derived from a subsidiary company, Oilbank (Hyundai Heavy Industries, 2015a). Therefore, the core businesses of HHI are shipbuilding and offshore. Moreover, DSME also has strength in the same division. The shipbuilding and offshore department accounts for 58.04% of sales. SHI is also in the same situation. This company can be divided into Shipbuilding and offshore, and E&I. In SHI, sales of shipbuilding and offshore are more than 4 times higher than in E&I. Therefore, all three companies have strengths in shipbuilding and offshore.

● **Strategic product sector**

Among shipbuilding and offshore capabilities, Korean major shipbuilding companies focused on two sectors. One is high value-added special ships, and the other is offshore facilities. However, the three companies have different strategies and outputs in those sectors.

HHI has more strength in shipbuilding than offshore. For example, HHI puts a lot of effort into building engines and other machinery inside vessels and successfully production and sales. The company also has a record for the world's first smart ship build, achieving 100 million GT in 2012. In addition, sales in shipbuilding are around 2.5 times the offshore shipbuilding industry. Its shipbuilding encompasses wide spectrum of ships in contrast to other shipyards.

SHI puts balanced efforts into shipbuilding and offshore in value added products. According to SHI's sustainability report 2014, the company has remarkable results in both sectors. In the shipbuilding sector, SHI developed the world's first bi-directional arctic shuttle tanker and also built a super-large container, which is a 20,000TEU containership. The offshore department also has a record of building the world's largest LNG- FPSO. Moreover, SHI has also built the largest number of drillships

and FPSO market products all over the world, and has had outstanding progress with NNG-FPSO, TNP, and fixed platforms.

DSME is putting more focus on its offshore department. DSME is the only company, that has the technologies and knowhow to build the whole spectrums of offshore products including FPSO, fixed platforms, jack up rigs, semisubmersible drilling rigs, and drillships. These accounted for 54.9% of sales in 2013, and compared to sales of 2010 this is 17.4% higher. The naval ship sector is also strategic for DSME. Based on 30 years history, the company established a division of special ship business and won contracts with the navies of the UK and Norway (Daewoo Ship building & Marine Engineering, 2015a). However, DSME focuses more on offshore facilities.

● **Inappropriate Investment**

Regarding financial investment, investing in offshore and plant was an inappropriate investment. As Table 7 shows, the three sectors, that recorded the highest operating loss in 2014 were shipbuilding, plant and offshore. Among them, operating losses in shipbuilding will be discussed in chapter 2.2.2. However, accumulated operating losses in offshore and plant are driven by inappropriate investment. HHI declared its operating loss of USD 3 trillion in the financial statement at the end of 2014 and it was abrupt change from being green to red. The main reason for this result is lack of original technology; the company borrowed 100% design from other countries (Special Economy, 2015). This is one of the big problems of the financial net loss of HHI. In addition, this result indicates that investing in certain department requires careful consideration. According to the half term report of 2015, HHI has already noticed that plant and offshore drive net loss and sales levels are also lower than other competitors.

Table 7 *Status of operating profit¹⁰ and loss*

(KRW million)

	Shipbuilding	Offshore	Plant	Engine	oil refining
2011	2,191,255	390,964	252,416	602,215	595,619
2012	1,041,449	318,193	106,002	346,844	307,213
2013	12,560	282,355	61,376	118,295	404,388
2014	(1,895,913)	(230,305)	(1,130,818)	10,870	228,451
	Industrial Plant	Green energy	Finance	Electro electric system	
2011	461,914	(174,994)	89,712	(153,212)	
2012	276,140	(106,448)	94,706	(75,309)	
2013	194,271	(103,155)	34,489	90,508	
2014	(33,391)	(16,532)	36,290	86,342	

Source: Hyundai Heavy Industries, 2015a

Moreover, DSME and SHI are in the same situation. Those two companies put shipbuilding and offshore in the same department, so it may seem hard to figure out the exact amount of money from offshore and plant. The three companies started to use their invested assets to cover liability; it resulted in net loss. The amount of net loss from January 1st to June 30th of 2015 is presented in Table 8. Even though that department gives sales for the company, if invested assets are much higher, it will give a net loss for the company. This fact indicates two important lessons. One is to find appropriate new growth power is important. The other is considering about sunk cost and fast exit when companies notice certain markets.

¹⁰ Operating profit is the profit from business operations, and formula of this is ‘gross profit – operating expenses’. If gross profit is higher than operating expenses, it results in operating profit.

Table 8 *Net profit of 2015 half term*

(KRW million)		
HHI	SHI	DSME
- 461,281	- 242,400	-2,434,986

Source: organized from author based on (Hyundai Heavy Industries, 2015b); (Samusng Heavy Industries, 2015b); (Daewoo Shipbuilding & Marine Engineering, 2015c)

● Ship building facilities

HHI has 10 drydocks, nine are in Ulsan and one is in Gunsan, and it has 9 Goliath cranes and latest construction facilities. With that infrastructure, HHI can build 9.6 million G/T per year and also can manage 1.4 million tons of steels per year. In addition, as Table 9 indicates, each drydock has its own specifics and is designed to effectively build certain types of ships. For example, drydock no.1 is suitable for building drillships, no.3 has advantages for building containerships and tankers together; drydocks no.6 and no. 7 can be used for naval vessels and special purpose ships; and drydock no.8 is used for LNG ships. The Gunsan Shipyard can build 20 ships annually. The shipyard which was built in 2009 and features a 1.3 million DWT drydock, a 1,650 ton Goliath crane and cutting edge production facilities. (Hyundai Heavy Industries, 2015d). These facts will be the strength and resources of HHI. That is because, as Table 9, 10 and 11 shows, compared to other companies, HHI has the largest number of drydocks and capacity, and covers diverse types of ships. Therefore, shipbuilding facilities are one of the resources of HHI.

Table 9 *Specifics of drydocks*

Drydock No.1	Drydock No. 2
- Length: 390, Width 80, Height 12.7(m)	- Length 500, Width 80, Height 12.7(m)
- Length 165, Width 47, Height 12.7(m)	- Crane: Share with drydock no.1
- Crane: 1,290(t)x1, 450(t)x2, 40(t)x2, 30(t)x2	- Maximum size: 700,000(t)
- Maximum size: 700,000(t)	

Drydock No. 3	Drydock No. 4
- Length 672, Width 92, Height 13.4(m)	- Length 380, Width 65, Height 12.7(m)
- Crane: 1,290(t)x1, 450(t)x2, 150(t)x1, 80(t)x1, 30(t)x2, 20(t)x1	- Crane: 350(t)x2, 200(t)x1, 150(t)x1, 80(t)x1
- Maximum size: 1,000,000(t)	- Maximum size: 400,000(t)
Drydock No. 5	Drydock No. 6
- Length 380, Width 65, Height 12(m)	- Length 260, Width 43, Height 12(m)
- Crane: Share with drydock No.4	- Crane: 200(t)x1, 150(t)x1, 20(t)x1
- Maximum size: 400,000(t)	- Maximum size: 150,000(t)
Drydock No. 7	Drydock No. 8
- Length 170, Width 25, Height 11(m)	- Length 460, Width 70, Height 12.7(m)
- Crane: Share with drydock No.6	- Crane: 900(t)x1, 30(t)x2, 20(t)x1
- Maximum size: 15,000(t)	- Maximum size: 500,000(t)
Drydock No. 9	Drydock No. 10
- Length 460, Width 70, Height 12.7(m)	- Length 700, Width 115, Height 18(m)
- Crane: 900(t)x1, 30(t)x2, 20(t)x1	- Crane: 1,650(t)x1, 80(t)x1, 40(t)x2, 30(t)x1
- Maximum size: 500,000(t)	- Maximum size: 1,300,000(t)

Source: retrieved from http://www.hhi.co.kr/division/division01_02.asp

Table 10 *Specifics of dock (SHI)*

Dock	Size	Ship type
Dry dock No.1	283M * 46M	LNG ship, drill ship
Dry dock No.2	390M * 65M	LNG ship, drill ship, FPSO
Dry dock No.3	640M * 98M	Container ship, LNG ship, LNG-FPSO
Floating dock No.1	270M * 52M	Oil tanker, drill ship, FPSO
Floating dock No.2	400M * 55M	LNG-SPSO, Oil ship, container ship
Floating dock No.3	400M * 55M	Containership, VLCC

Floating dock No.4	420M * 70M	Containership, VLCC
Floating dock No.5	157M * 131M	Offshore

Source: retrieved from http://www.shi.samsung.co.kr/Kor/Company/learn_guide.asp x

Table 11 *Specifics of dock (DSME)*

Dry dock No.1	Dry dock No. 2
- Length: 530, Width 131, Height 14.5(m)	- Length , Width 80, Height 12.7(m)
- Crain : 1x900t gantry, 1x200t jib crane, 3x50t jip crane, 1x60t traveling tower, 1x60t tower, 4x50t jib	- Crane: Share with drydock no.1
- Maximum size : 1,000,000 DWT, wide 120m plant	- Maximum size: 700,000(t)

* Four Floating dock which has 150,000 ton capacity

Source: retrieved from <http://www.dsme.co.kr/pub/publicize/exploreDSME.do>

● Group relationship

Hyundai is one of the biggest group companies of the Republic of Korea and each company affects and is linked to the others. This factor can be a double-edged sword. One of the advantages of a group relationship is that it can act as a hedging strategy for other companies. According to its 2014 business report, HHI uses consolidated financial statements, consisting of 57 companies. Most of the companies are related to heavy industry and HHI has between 45.21% and 100% ownership share of each. In addition, certain companies act as cash cows for HHI. For example, The Oilbank accounted for 40.1% of sales in 2014.

The other advantage is HHI can share its knowhow and resources with other affiliated companies. Apart from heavy industry related companies, Hyundai group

also has a wide scope of companies from doing B2C¹¹ (Business to Customer) business, like hotel or department store, to B2B¹² (Business to Business) business. However, this situation can also be a disadvantage. In some cases a certain company might have a problem or request a favor to increase its profits, which causes decreasing profits for the other companies. Sometimes it is hard to refuse.

SHI and DSME are also big group companies in the Republic of Korea, but all of the companies have their own characteristics. Table 12 shows, that the three companies have a common point and two differences. The common point among theof three companies is that they have shipbuilding affiliates, which are highly dependent on each other for financial status. However, different characteristics exist in the existence of non-related group companies and level of dependence between group companies. Those differences derive from the country's history and company's culture. Originally, HHI, SHI and DSME belonged to a big group company. Nevertheless, because of the 1999 Korean IMF economic crisis, Daewoo Group went bankrupt and only a few financially-sound groups survived. In 2000, DSME was established and in 2001 the company was listed on the stock market. Therefore, DSME has independence from group companies. On the other hand, SHI has a strong relationship with other Samsung group companies. The reason is that the Lee family, who established Samsung group, has strong power and statically controls the companies as a big picture. On the other hand, HHI has a medium level of dependence with group companies. It has non-related group companies, but tries to bind similar companies and control.

¹¹ B2C is an abbreviation of business to customer, and this business is transacted between firms and end user.

¹² B2B is abbreviation of business and business, and this is transacted between firms to firms.

Table 12 *Characteristics comparison table*

	Shipbuilding affiliates	Non-related group company	Dependence between group company
HHI	O	O	Middle
SHI	O	O	High
DSME	O	X	Low

Source: organized by author

3.2.1.2. Human Resource Management

The scope of human resource management is everything related to human resources. It can cover from recruitment to retirement.

● Matured Human Resources

Mature human resources are a major strength of HHI. Table 13 shows that HHI has more than 10,300 workers engaged in shipbuilding and among them around 10% of personnel are allocated to design, and they have Engineering College and University degrees. In addition, around 20 years of average working experience represents enough time to accumulate knowhow for workers and the company.

Table 13 *Workforce status (HHI)*

Office work and administrative position	Shipbuilding : 3,040 persons Heavy industry : 10,010 persons
Production and administrative position	Shipbuilding : 7,300 persons Heavy industry : 14,930 persons
Average age	44.1 years old
Average working years	18.8 years (enough period for get mature technics)
Shipbuilding part design workforce	1,490 persons (1,030persons graduated from Engineering College/ University)

Source: retrieved from http://www.hhi.co.kr/division/division01_02.asp

● **Human Resources Development system**

The human resources development system is also well designed. HHI believes that the success factor of heavy industries derives from people, so to develop their employees they run programs. For example, HHI has a Top Strategic Management Course, Business Courses at Top Business Schools, Global Manager Course, and a Junior Board Course. In addition, it has also had HTEI (Hyundai Technical Education Institute) since 1978 to educate on techniques of manufacturing and safety regulations in the workplace (<http://www.hhi.co.kr>). SHI also has its own programs, which are Socio-MBA (for strategic and supporting personnel), Techno-MBA (for manufacturing personnel), global program, leadership program and cyber program. DSME has DSME MBA and other programs regarding leadership and business sense. All companies have different programs but all three companies have designed suitable programs for their companies.

● **Distance from capital**

Distance from the capital is a problem for HHI. For recruiting and maintaining capable human resources, money is not the only motivating factor. In Korean society, the location of a company is a strong motivating factor. Fiscal or emotional closeness to the capital is a big motivational factor. It will help in talent hunting young and capable human resources and maintaining them. As Figure 12 shows, the population of Seoul accounts for around 50% of the population among six Korean major cities. It means the majority would like to live and work there. In addition, there is another reason that shows that the location of a company is important. Koreans believe that the name value of a university is a measurement of success. On this belief, the location of famous universities is also a factor. The top 3 universities, which are Seoul National University, Yonsei University and Korea University are located in Seoul and the majority of other famous universities are also located in Seoul.

SHI and DSME have seriously considered this situation and taken actions. For example, SHI established its R&D center in Pangyo, near the city of Seoul, and started to work there in December of 2014 (<http://blog.samsungshi.com/535>). Therefore, employees who are responsible for design and R&D work there. Before, establishing that building, SHI also provided busses form Geoje Island to Seoul, every weekend. DSME has also invested in an R&D and engineering center in Seoul and will finish building in 2017 (DSME, 2015c). However, HHI have not taken any actions in term of location.

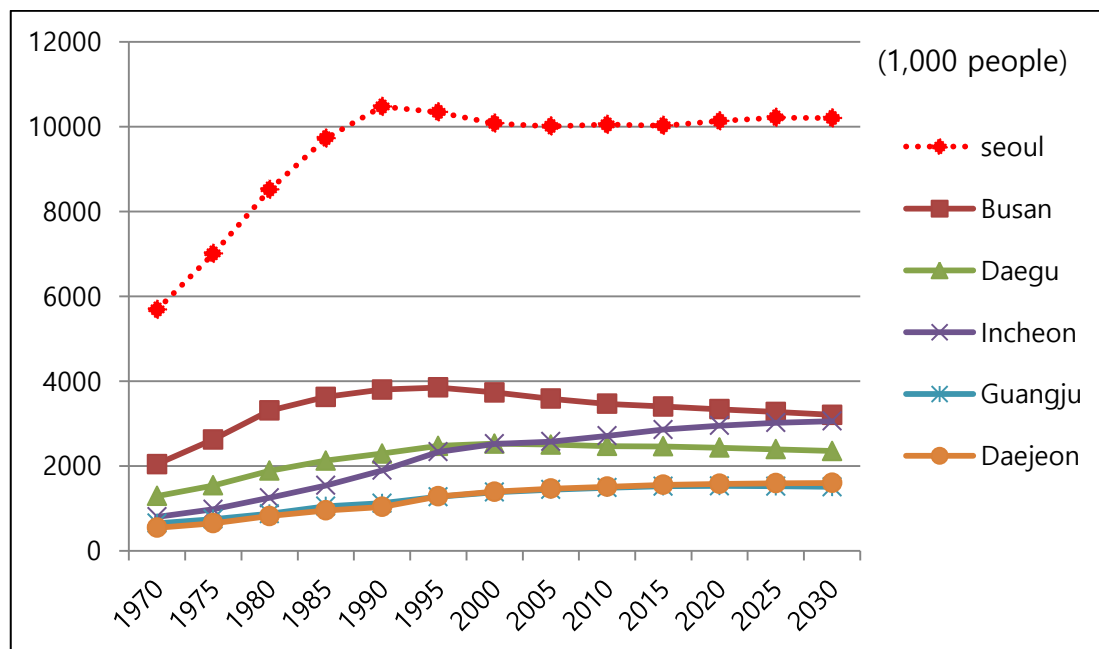


Figure 12 *Population of Korean major cities*

Source: KOSIS of Statistics, 2014

3.2.1.3. Technology Development

Technology development will cover the three companies' technology development status. In addition, this part is focused on the three extracted trends from the external analysis. This is because investing and putting effort into promising markets is good for a company's growth. Therefore, by looking into green business, smart business

and entertainment business, this research will identify resources and problems of HHI.

- **Green business**

- **Effective managing shipyard**

Effective management of its shipyard is not only good for a company but also good for the environment. By trying to find optimized management, companies can reduce their costs by cutting ineffective or unnecessary inputs. It also drives environmentally friendly operation by reducing usage of resources. The three Korean shipbuilding companies are managing their shipyards effectively and that is the companies' resource.

HHI is using a high level of automation and latest production technologies, to increase effectiveness and level of environmental friendliness. For example, the company is using off-line welding robots and indoor production of 40m long blocks, and doing two-component proportioning system in painting (Hyundai Heavy Industries, 2015d). Those efforts allow the company to reducing shipbuilding time and increase quality of products.

SHI has also increased its rate of automation, by using robots. SHI Geoje Shipyard has developed and deployed a variety of AI robots built with unique technologies that ensure safety as well as quality (Samsung Heavy Industries, 2015c). For example, a Spider robot carries out welding, a vacuum-blasting robot performs inspection and cleansing and an automatic cleansing robot also does inspection and cleansing. There exist other robots for increased automation level. New ship building technologies also increase the productivity of SHI. The company has mega block method and tera block method technology. The mega block method, which was developed in 2002, uses a combination of floating docks and offshore cranes. In addition, SHI introduced the tera block method, which requires only two super-sized blocks to build ships and succeeded in carrying 9,283-ton blocks, the heaviest in 2012

(Samsung Heavy Industries, 2015c).

DSME has also tried to increase efficiency and reduce GHG by increasing the rate of automated machinery, and optimizing equipment operation. For instance, DSME gets around 40% of electricity reduction and approximately 700 tCO₂eq of GHG emissions decrease per year by using internally developed air injection nozzles on air compressors. Moreover, the company has also reduced cooling energy consumption by around 43% by developing and applying high efficiency, low cost Vortex Tubes to the cooling vests (Daewoo Ship building & Marine Engineering, 2015b).

- Green Vessel

Green vessel is highly related with environmentally friendly vessels. The three companies have their own strengths regarding this issue. The fact that HHI produces its own machinery is one of its. For example, HHI puts continuous efforts into producing engines. In 2010, HHI developed the first eco- vessel engine in the world; in 2013 they also developed a high efficiency and environmentally friendly G-type engine. The company also produces other environmentally friendly machinery. A good example is a ballast water treatment system. They obtain approval from IMO in 2010 and received America AMS in 2014 (Hyundai Heavy Industries, 2015a).

Moreover, HHI not only produces their machine but also uses their machine inside the vessel. For example, HHI collaboratively produced main engine for shipbuilding. As Table 14 shows, average 93.89% of main engine production is conducted from the HHI and other company's collaboration. Even though the company does not have any experience in installing their main engine inside multipurpose cargo carriers, in general more than 90% of self-supply is possible. This ability is a big resource of the company. Table 14 also indicates, that after 14th of January, 1999, HHI has used 100% of their own products. Therefore, producing and using their machinery is a strength of HHI and it is linked to green vessels.

Table 14 *Producer of Main engine*

Type	No.	HHI Collaboration Product	Non-HHI product	Portion of collaboration product (%)	Last delivery date of Non- HHI product
Crude Oil Tanker	383	369	14	96.34	Jan 20 1981
Product carriers	131	129	2	98.47	July 20 1981
Full containership	572	559	13	97.73	Mar 20 1981
Bulk carriers	369	331	38	89.70	Jun 30 1982
LNG container	47	39	8	82.98	Jan 14 1999
Car carriers	52	49	3	94.23	Mar 31 1986
OBO Carriers/VLOO	46	39	7	84.78	May 12 1983
Ro-Ro Passenger Ship	2	2	0	-	-
Chemical Tankers	12	9	3	75.00	Feb 08 1994
Ro-Ro Ships	17	4	13	23.53	Aug 09 1990
Multipurpose cargo carriers	44	0	44	0	Sep 1986
PROBO Carriers	3	3	0	100	-
Refrigerated Cargo Vessels	5	5	0	100	-
Total	1638	1538	145	93.89(*)	

(*) Total portion of collaboration product part is portion for total numbers of vessels and HHI collaboration product

Source: organized by author based on (Hyundai Heavy Industries, 2015d)

SHI also set the slogan and put effort into to building eco-ships. As Figure 13 shows, under the slogan of ‘GHG Free, Energy Saving, and Pollution Free’, the company is in the process of R&D (Research and Development) for the world’s best eco ship.

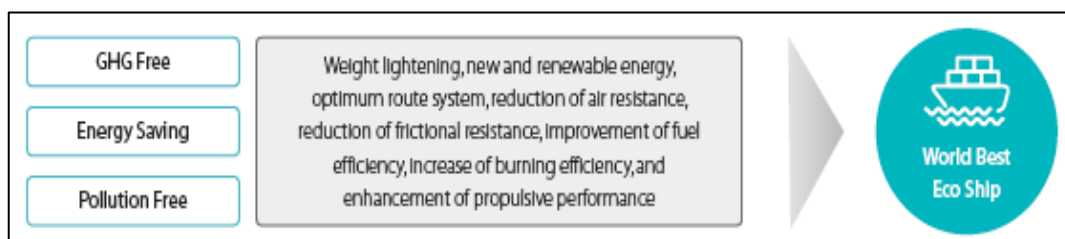


Figure 13 *Developing eco-friendly products*

Source: (Samsung Heavy Industries, 2015c)

DSME also builds eco-ships for the environment, sustainability and future. A characteristic of DSME's eco-ship related project is integrated management. The company does integrated management by conducting several projects together regarding eco-ships. As Table 15 indicates, DSME has 7 major environmentally friendly ship programs and those projects can save totally KRW 30.7 billion (USD 304 million). This management style does not exist in HHI and it could be a weaknesses for HHI.

Table 15 *Major programs and performances*

PROJECT	Background and Details of Technology Development	Environmental Effect	Cost Reduction
Development of eco-friendly vessel system	<ul style="list-style-type: none"> • Development of vessel system to denitrify NO_x and inhibit the generation of VOCs and CO₂ 	Inhibition of generation of environmental pollutants	KRW 1.92 billion
Development of liquid CO₂ carriers	<ul style="list-style-type: none"> • Preoccupying the market of liquid CO₂ carriers equipped with CCS (Carbon Capture & Storage) • Completed the certification of the concept of self-developed DSME ECO₂ Carrier's cargo transportation • Completed the development and verification of lab Scale equipment 	Prevention of global warming by directly treating CO ₂	KRW 0.43 billion
Development of NO₉₆ CCS (Cargo Containment System) to	<ul style="list-style-type: none"> • Increasing demands for LNGC with low BOR • Detail design, relevant analysis, and evaluation through test • Evaluation on thermal insulation method 	Reduction of energy use for BOG treatment	KRW 1.25 billion

reduce BOR (Boil-Off Rate)	• Evaluation on economic feasibility and risk		
Research on development of hull forms and propeller of DSME 8600TEU	• Development of standard ship for DSME 160K LNGC	Reduction of CO2 and harmful gas emissions by fuel saving	Fuel cost reduction of KRW 2.4 billion
Model test for development of standard 160K LNGC	• Development of standard ship for DSME 160K LNGC	Reduction of CO2 and harmful gas emissions by fuel saving	Fuel cost reduction of KRW 1.5 billion
Model test for development of hull form of Zodiac 14,000TEU containership	• Development of standard ship for DSME 14000TEU containership	Reduction of CO2 and harmful gas emissions by fuel saving	Fuel cost reduction of KRW 1.6 billion
APMM 18,270TEU containership - Estimation of roll reduction performance by AR	<ul style="list-style-type: none"> • Request for comparison of roll reduction effects between large bilge keel and ART by ship owner in 1Q 2011 • Conducted research on performances between 800mm bilge keel and ART combined with 400mm bilge keel until 4Q 2011 • Determined to apply ART combined with 400mm bilge keel method with low roll and resistance to the ship (until 1Q 2012) • Showed a decrease of 2% in resistance compared to 800mm bilge keel 	<ul style="list-style-type: none"> • Securing competitiveness by helping owners reduce fuel costs • Weight lightening of lashing bridge and more containers on board 	Fuel cost reduction compared to large bilge keel USD 304 million In operating 20 ships for 20 years

Source: Daewoo Ship building & Marine Engineering, 2015b

- Green energy

The green energy department negatively effects the financial status of HHI, and it is a problem for the company. In 2011, HHI built its green energy department and started to do business. This department covers solar energy generation, wind turbine and energy storage system. However, that department has a problem with its profit earning system. Table 7 shows that the green energy department is the only division which creates an operating loss. This means that the department has recorded a

continuous loss since it was established. According to Table 7, the amount of operating loss decreased to 16,532 in 2014. Compared to 2013, this loss represents an 84% decrease. This fact may seem to indicate that green energy is a sound department, but actual sales show that this is not true. Figure 14 shows that the green energy division has a continuously declining sales records. That means the green energy department reduces its losses by cutting costs. Without growth of sales, trying to cut costs makes it continuous growth difficult. Therefore, HHI needs to find ways to increase its sales in the green energy department.

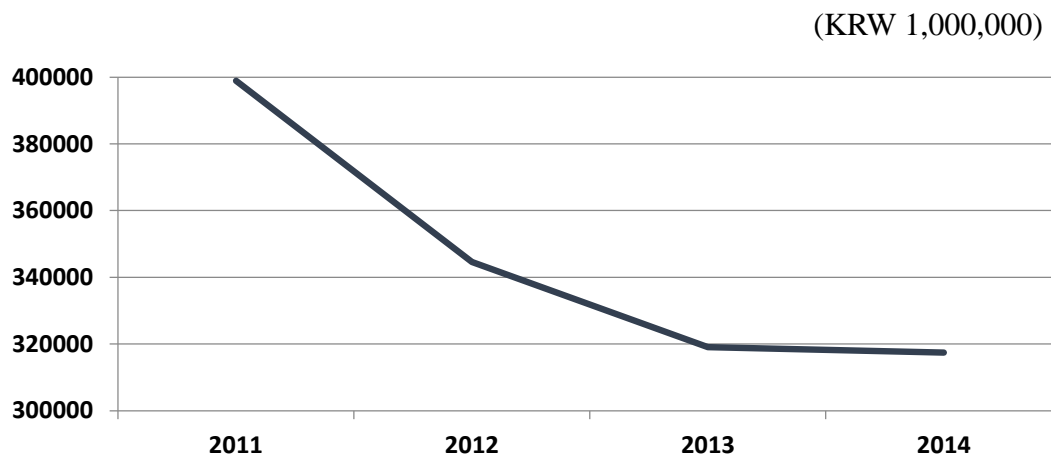


Figure 14 *Sales of green energy*

Source: organized by author based on (Heavy Industries, 2015a)

In addition, SHI does not have equivalent projects related to green energy, so it is hard to compare with this company. DSME does business related to wind energy, but has not established a department to connect with shipbuilding. However, DSME is trying to achieve related diversification. DSME has developed a ‘Standard Wind Turbine Installation Vessel’. This product is a collaborated product with shipbuilding technology and renewable energy technology. This product increases work efficiency while decreasing costs by transporting and installing wind generators manufactured on land in vessels (<http://www.dsme.co.kr>). While HHI tries to do unrelated

diversification, DSME tried to merge core business with non-core business.

- **Smart business**

- **Trends leading smart vessel technology**

HHI leads in smart vessel technology and it is a resource of the company. According to the press center of HHI, in smart ships, HHI developed the first smart ship in 2011. A smart ship can manage its own data and navigation, and find environmentally friendly and safe navigation routes by using weather and currents. Smart ships increase economic feasibility by effective shipping. In addition, by 2015 August HHI had won contracts for 195 smart ships and has already delivered 104 vessels. Those facts indicate, that HHI is an early starter and trend leading company in smart vessels. In the rising market, preoccupation of the market is important, now HHI is in the right direction.

SHI and DSME have also jumped into smart ship and are developing their technologies. SHI has adopted a differentiation strategy and the SHI Central Research Institution, vessel and ocean technology department is trying to undertake development to achieve its goal (Hyundai Heavy Industries, 2015c). DSME also contracted an MOU with SK telecom on May 27th, 2014 to develop Smart ships (Korea Logistics News, 2014). In addition, its two strategies were to establish the concept of smart ship and Quick-Win. Quick-Win relates to finding the prevalent specification of smart ship and preoccupying the market depending on shipyard capacity. However, first developer of the smart ship was HHI and the company preoccupied the market.

- **Connected Smart Ship**

The connected smart ship will be a big strength of HHI, and it is also an innovative

concept. This is an ongoing project, but the company has a specific concept and blue print. The press center of HHI released information regarding connected smart ships on 17th of August, 2015. As Figure 15 indicates, HHI concluded a contract with Accentual for a cooperative project. Because of the strengths of both companies, this cooperation is important and produces synergy. Accentual has global digital business capability and HHI has smart ship technology. If those two resources mix, the company can build advanced smart ships, called connected smart ships.



Figure 15 *Cooperative project of smart ship (HHI)*

Source: organized by author

The connected Smart Ship can manage the whole value chain of maritime transportation, related to logistics and vessel information. That information will be given to ship-owners to develop their market service. A visualization of the whole idea of connected smart ships is illustrated in Figure 16. To achieve their goals, both companies plan to connect the ‘Hyundai Intelligent Vessel as a Service’ and ‘Accenture Connected Platform as a Service’ by satellite by 2020. By then their specific objectives are to optimize sailing and vessel prediction maintenance by using big data. Under their goals and time line, both companies are trying to open a new market, the connected smart ship.

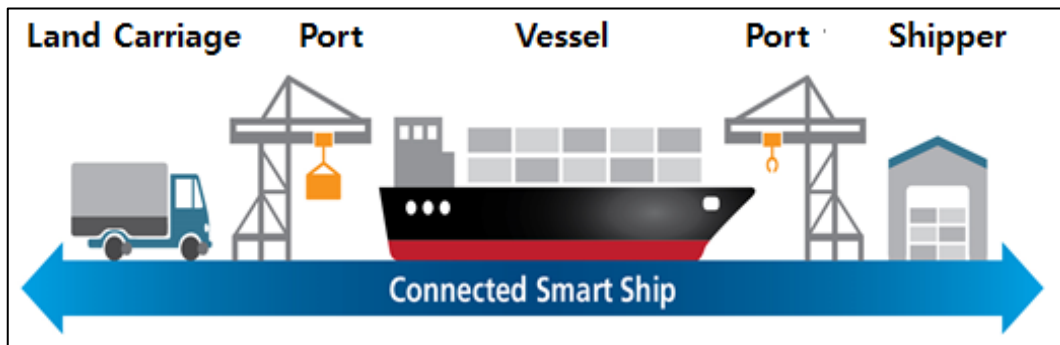


Figure 16 *Connected smart ship*
Source: Hyundai Heavy Industries, 2015

- **Entertainment business**

The entertainment business is highly related with passenger ships. All three companies, HHI, SHI and DSME, have experience building passenger ships. Differences regarding this business relate to their target products. As Table 16 indicates, HHI built Ro-Ro passenger ships, SHI built large passenger ships and DSME built ferries.

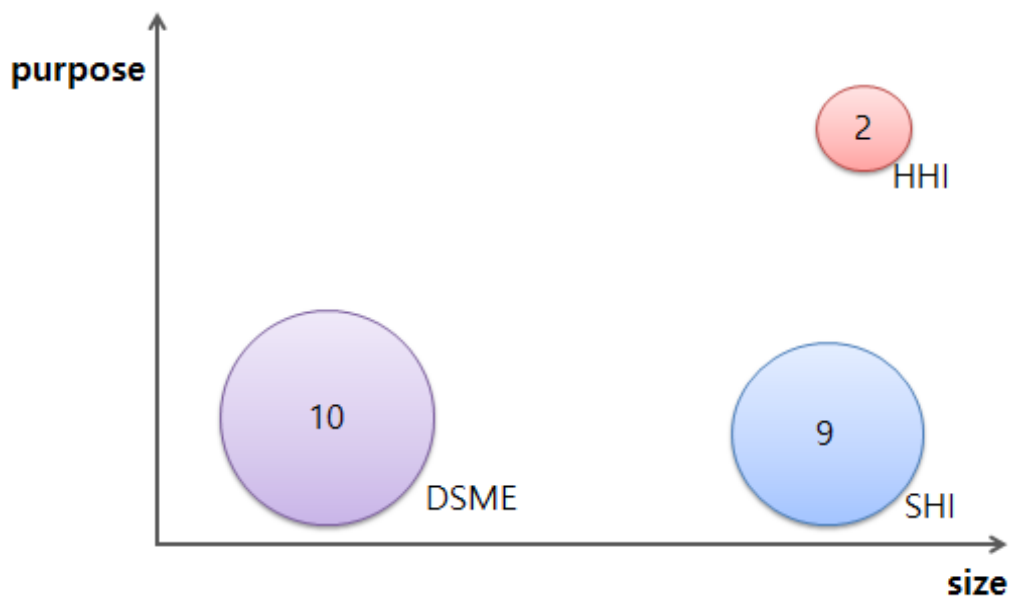
Table 16 *Status of passenger ships*

Company	Product	Number of shipbuilding
HHI	Ro-Ro Passenger ship	2
SHI	Large Passenger Ship	9
DSME	Ferry	10

Source: organized by author based on (Hyundai Heavy Industries, 2015d); (<http://www.shi.samsung.co.kr>); (<http://www.dsme.co.kr>)

Based on the product line of each company, research can identify a purpose size matrix to visually show the three companies' production situation, and it is illustrated in Figure 17. The X-axis represents the size of the vessel, the Y-axis indicates the

purpose of the ship, and the size of the circle shows the number of built. HHI has built the smallest number of vessels, but targeted multipurpose and comparatively large size vessels. SHI build sole purpose ships of large size. DSME built single purpose and the smallest size product, but built the largest number of vessels. In addition, because of different targeting, the competition level is low, but HHI has the least experience with one kind of vessel.



*Size of circle represents number of built

Figure 17 *Passenger ship matrix of companies*

Source: organized by author based on (Hyundai Heavy Industries, 2015d); (<http://www.shi.samsung.co.kr>); (<http://www.dsme.co.kr>)

3.2.2. Production Process

Production process will cover the actual manufacturing processes for the companies' core business products. This is considered on timeline basis, and its components are contract, procurement, production, sea trial and delivery.

3.2.2.1.Contract

The contract is the first step in the production process and requires understanding the customer's needs and effective negotiation skills. The contract stage covers price negotiation power, customer relations and spectrum, and brand image.

● Price negotiation power

As Table 17 represents, among 11 sectors of the business, shipbuilding ranks the highest net loss. According to the Korea offshore and shipbuilding association, the market share of HHI was 44.8% of all orders in 2014. With this record, having a KRW 1,769,215 million net loss indicates one of the causes of this result is bargaining power of price. Managing the cost of production is important for net profit, but contract with profitable price after production also a crucial requirement for increasing net profit. Therefore, improving price negotiation power is necessary for increased profit.

Table 17 Profit and loss per department in 2014 (HHI)

(KRW million)

	Shipbuilding	Offshore	Plant	Engine	Electro electric system	Industrial Plant
Sales	17,354,463	4,653,906	2,566,403	2,138,868	2,584,795	3,620,415
Internal sales	(922,243)	(525)	(157,170)	(620,786)	(230,216)	(753,630)
Profit	(1,895,913)	(230,305)	(1,130,818)	(10,870)	86,342	(33,391)
Net profit	(1,293,834)	(210,493)	(1,143,003)	7,226	75,547	(65,977)
Depreciation	329,806	53,066	12,623	84,759	51,423	44,938
	Green energy	Finance	Oil refining	Etc.	Consolidated adjustments (*)	Total
Sales	317,446	748,576	25,940,550	499,542	(7,842,560)	52,582,404

Internal sales	(5,143)	(6,096)	(4,853,409)	(293,342)	7,842,560	-
Profit	(16,532)	36,290	228,451	(287,627)	4,918	(3,249,455)
Net profit	(36,973)	26,548	51,939	(263,374)	646,329	(2,206,065)
Depreciation	25,763	6,455	255,370	65,293	(5,972)	923,524

(*) Consolidated adjustments exclude consolidated adjustments and include intercompany unrealized profits, share appraisal amount of relational company and common business investment, etc.

Source: Hyundai Heavy Industries, 2015a

● Customer Relationship and Spectrum

Based on more than 40 years of business experience, all three companies have wide and strong relationships with customers. The long lifespan of the companies will be addressed in the production, accumulated knowhow section. In addition, during the last 43 years, HHI delivered more than 1890 ships to 291 ship-owners from 50 countries (Hyundai Heavy Industries, 2015d). This wide network is a strength of HHI.

● Brand Image

HHI has a strong brand image in the shipbuilding industry. If a company wins many contracts and actively does its job, that company is likely to have a good reputation and brand image. In the shipbuilding industry, a backlog can represent ongoing construction and looking into those records shows how actively the company is doing its job. According to Clarksons, the top 5 shipyards with the largest backlogs are Korean shipyards. As Table 18 shows, DSME ranks 1st, SHI ranks 2nd and HHI ranks 3rd. However, Hyundai Samho Heavy industries and Hyundai Mipo Dockyard are subsidiary companies of HHI and use consolidated financial statements. Therefore, HHI group records a higher backlog than DSME and SHI. In addition, all of the Korean big three companies have strong brand power.

Table 18 *Backlog of shipyard*

As of July, 2015

World Ranking	Shipyard	Backlog
1	DSME Okpo Shipyard	8.57 Million CGT
2	SHI Geoje Shipyard	5.22 Million CGT
3	HHI Ulsan Shipyard	5.06Million CGT
4	Hyundai Samho Heavy Industry	4.04Million CGT
5	Hyundai Mipo Dockyard	2.62Million CGT

Source: Clarksons Shipping Intelligence Network 2010

3.2.2.2. Procurement

● Bargaining Power

The procurement stage is the step of purchasing materials and in this stage, bargaining power for raw materials is important. That is because the price of raw material affects production cost and production cost affects price competitiveness and profit margin.

Comparing three companies is an effective way to measure bargaining power for raw materials. Table 19, 20, and 21 show HHI, SHI and DSME's price and suppliers of raw material. Among the three companies, DSME has the highest bargaining power and HHI has the lowest bargaining power. For example, in 2014 HHI's purchase price for steel plates was around 69.2% higher than DSME's, section was around 3.7% higher and paint was around 51.6% higher. Therefore, DSME has the best bargaining power for raw material. The reason that drives this result is that DSME chooses more than one supplier to do business with and tries to find appropriate suppliers. In addition, comparatively low bargaining power is one of the problems of HHI.

Table 19 *Price of raw materials (HHI)*

(KRW)

	2014	2013	2012
Steel Plate(Ton)	1,100,000	1,110,000	1,110,000
Section(Ton)	840,000	1,025,000	1,025,000
Paint (\$/L)	\$4.70	\$4.70	\$4.93

*Calculated companies are POSCO (steel plate), Hyundai-steel(Section) and KCC(Paint)

* 1 dollar is 1099 KRW in 2014

Source: Hyundai Heavy Industries, 2015a

Table 20 *Price of raw materials (SHI)*

(KRW)

	2014	2013	2012
Steel Plate(Ton)	1,100,000	1,110,000	1,110,000
Section(Ton)	820,000	1,020,000	1,020,000

*Calculated companies are POSCO (steel plate), Hyundai-steel(Section)

Source: Samsung Heavy Industries, 2015a

Table 21 *Price of raw materials (DSME)*

(KRW)

	2014	2013	2012
Steel Plate(Ton)	650,000	730,000	850,000
Section(Ton)	810,000	825,000	880,000
Paint (L)	3,408	3,588	3,642

*Calculated companies are POSCO (steel plate), Dongkuk steel, HHI, Doosan heavy Industry, Hyundai-steel etc.

Source: Daewoo Shipbuilding & Marine Engineering, 2015a

3.2.2.3. Production

After contract and procurement, shipbuilding companies start production. In addition, this stage requires shipbuilding facilities, range of ship design and accumulated knowhow.

- **Shipbuilding facilities**

As firm infrastructure part covers, HHI has 10 drydocks and each has special usages. It is one of the resources of production part and also outstanding point among three major Korean shipbuilding companies.

- **Range of ship design**

A wide range of ship design is a capability of HHI. As Tables 22, 23, and 24 shows, HHI has the ability to build diverse types of vessel, compared to its competitors. The company can build 17 kinds of vessels. On the other hand, DSME has 5 kinds and SHI has 10 product lines. That means HHI has the advantage of building a wide range of products. In addition, its building volume is also highest. While SHI and DSME built 1029 and 999 vessels, HHI built 1,898 vessels.

Table 22 *Performance by ship type (HHI)*

As of December 31, 2014

Product	No.
Crude Oil Tankers	383
Product Carriers	131
Full Containerships	572
Bulk Carriers	369
LNG Carriers	47
LPG Carriers	127

Drillships	14
Car Carriers	52
OBO Carriers / VLOO	46
Ro-Ro Passenger Ships	2
FPSO / Offshore Rigs	14
Chemical Tankers	12
Ro-Ro Ships	17
Multipurpose Cargo Carriers	44
PROBO Carriers	3
Refrigerated Cargo Vessels	5
Special Purpose Vessels	60
Total	1,898

Source: Hyundai Heavy Industries, 2015d

Table 23 *Performance by ship type (SHI)*

As of December 31, 2014

Product	No
Oil tanker	376
Container Ship	375
LNG Ship	124
Bulk Carrier	57
Large Passenger Ship	9
Total	1029

Source: retrieved from http://www.shi.samsung.co.kr/Kor/Product/ship_intro.aspx

Table 24 *Performance by ship type (DSME)*

As of August 2013

Products	NO	GT
LNG Carrier	83	9,006,680
LPG Carrier	22	721,400
Oil Tanker	333	34,986,334
Full Containership	234	17,765,708
Ro/Ro, Car Carrier	64	3,685,035
Bulk Carrier	193	11,900,884
Ferry	10	193,831
Wind Turbine Installation Vessel	2	-
OSV	2	-
Naval & Special Ship	56	69,980
Total	999	78,329,852

Source: retrieved from <http://www.dsme.co.kr/pub/business/business011401Q.do>

● Accumulated Knowhow

Accumulated knowhow is also a resource of HHI and it indicates that a company has its own competitiveness.

As Figure18 indicates, the average lifespan of companies is decreasing and, after 2000, lifespan has been consistently less than 20 years. That means a company that has more than 20 years of history has its own strength. HHI was established in 1972, SHI in 1974 and DSME in 1973. Each of them has more than 40 years' history, which is more than two times higher than the average lifespan. Therefore, they have their own accumulated knowhow to maintain their companies. In addition, it also indicates it is time to change to survive in the rapidly changing market and shortening lifespan of companies. Finding an innovative approach and promising market is necessary to lengthen the lifespan.

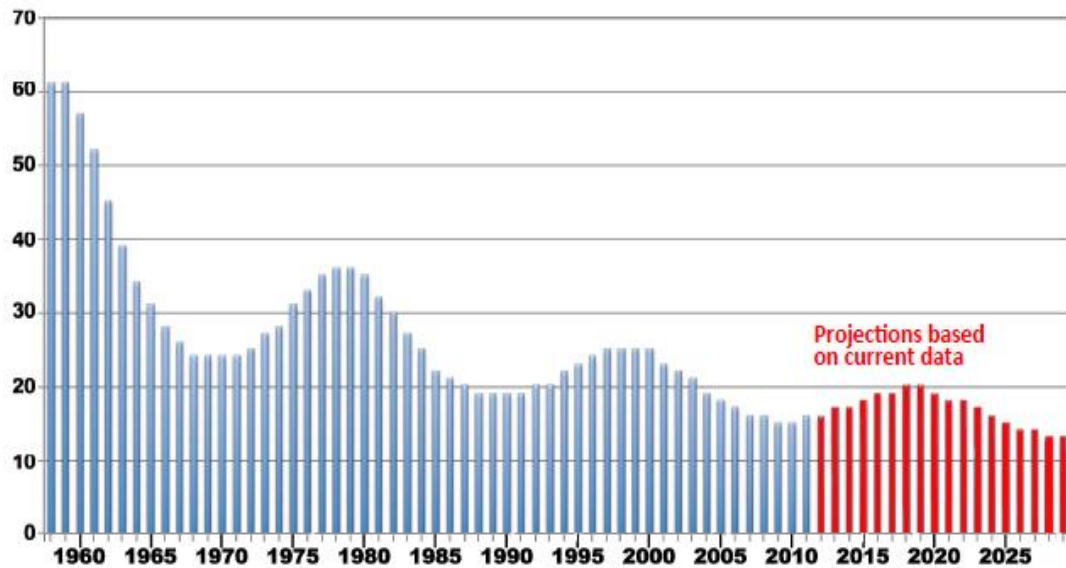


Figure 18 Average company lifespan on S&P 500 Index (in years)

Source: INNOSIGHT, 2013

3.2.2.4. Sea trial

● Place to sea trial

The location of the Republic of Korea has advantages for ship building companies. The Republic of Korea consists of the peninsula and islands, so companies can find advantageous locations for their shipyards. Therefore, all three companies have found appropriate places to conduct the shipbuilding process. As mentioned under chapter 3.2.2.4., firm infrastructure, HHI is located in Ulsan and Gunsan. In addition, DSME is in Geoje Island and Okpo. SHI is based in Geoje Island. All locations can use the open sea and this is a crucial resources for sea trials.

● Human resources

HHI has enough human resources and the company can request officers from HHI's shipyard to undertake the sea trial process.

3.2.2.5. Delivery

Delivery is usually under the ship owner's account so this can be dependent on the contract.

3.3. Resources and Problems (HHI)

In the capacity evaluation section, this paper analyzed retained resources and problems. Those resources and problems will be used in the next chapters. Resources can be used to find adoptable strategies, capacity evaluation and further guidelines for the company. In addition, the problems will be used to find possible suggestions. Therefore, before finishing the internal analysis process, organizing all components is helpful for further research. Table 25 contains all of the extracted resources and problems from the internal analysis. Each stage has its own resources and problems and totally HHI has 17 resources and 8 problems.

Table 25 *Resources and problems*

Evaluation step	Resources	Problems
Firm Infrastructure	1. Shipbuilding and offshore capability 2. Shipbuilding facilities 3. Group relationship	1. Group relationship 2. Inappropriate investment
Human Resource Management	1. Mature human resources 2. Human resource development system	1. Distance from capital
Technology Development		
Green Business	1. Effectively manage shipyard 2. Production of environmental friendly machinery	1. Integrated management of eco-ship 2. Green energy strategy
Smart Business	1. Trend leading smart vessel	

	technology 2. Connected smart ship	-
Entertainment Business	- Experience of passenger ship	1. Limited experience and product line
Contract	1. Customer relationship and spectrum 2. Brand image	1. Price negotiation power
Procurement		1. Bargaining power
Production	1. Shipbuilding facilities 2. Wide range of ship design 3. Accumulated knowhow	-
Sea trial	1. Place to sea trial 2. Human resource	
Delivery	-	-

Source: organized by author

4. Possible Suggestions

Possible suggestions can be divided into problem solving suggestions and take-off suggestions. Problem solving suggestions are linked to internal analysis problems and identifying possible suggestions to solve those problems is the objective. In addition, take-off suggestions are linked to external analysis and its objective is to find a promising market based on the three extracted trends¹³. This chapter focuses on brain storming for possible suggestions and the next chapter will conduct a feasibility test with existing resources, which are extracted from the capability analysis tool¹⁴.

4.1. Problem solving suggestions

This section will cover possible solutions for problems encountered by HHI. As the internal analysis Table 25 shows, the company has eight problems, but certain problems are linked to each other so that problems can be combined and suggestions identified. As Figure 19 shows, from eight existing problems five combined suggestions can be presented.

¹³ Three extracted trends are covered in chapter 2 and the components are green business, smart business and entertainment business.

¹⁴ Capability analysis tool is covered in chapter 3, internal analysis, to find out resources and problems of the company (HHI).

Group relationship, price negotiation power and bargaining power of procurement relate to profit maximization. Distance from the capital is related to shortening distance. Inappropriate investment and integrated management of eco-ship are related to eco-ship projects. Inappropriate investment and green energy strategy are related to diversification. Finally, inappropriate investment and limited experience and production of passenger ships are linked to increase in passenger shipbuilding.

Among eight extracted problems from the internal analysis, inappropriate investment is linked to almost all suggestions. Those arrows, which are from inappropriate investment indicate, that if there exists an acceptable and prospective market, efforts should be put into that market. In addition, it also indicates that if a company notices that entering a certain market was an inappropriate decision, it should forget about sunk costs leave the market quickly.

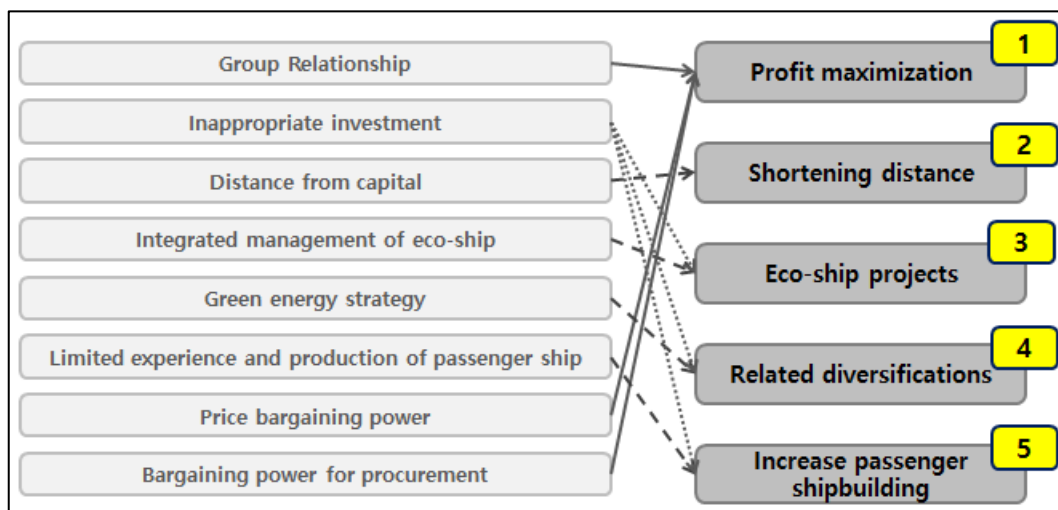


Figure 19 *Problem solving suggestions*

Source: organized by author

4.1.1. Profit maximization

Three problems are related to profit maximization and those are group relationships,

price negotiation power and bargaining power. In addition, to solve those problems, a profit maximization method is suggested.

As the formula below indicates, profit is production cost subtracted from selling price to increase profit. To maximize profit, either increase selling price or decrease production cost. Increasing selling price is related to price negotiation power. That is because, during the contract stage, winning the contract with a higher price is crucial.

$$\text{Profit} = \text{Selling price} - \text{Production cost}$$

In addition, production cost is related to group relationships and bargaining power for procurement. As the internal analysis of procurement indicated, HHI purchases its main raw material at prices from 3.7% to 69.2% higher than DSME. In addition, suppliers of those materials to HHI are POSCO, Hyundai-steel and KCC. An interesting fact is that HHI uses the same supplier as SHI of steel plates and sections, and KOSCO provides the same price to both companies but Hyundai-steel has charged higher price to HHI for three consecutive years. Even though Hyundai-steel is under the Hyundai group, HHI pays more for the procurement of raw materials. In addition, KCC also has a strong relationship with HHI. KCC holds 5.31% of stocks of HHI (Asia economy, 2015). Usually a group owner's family has no more than 5% of stocks, so this indicates that KCC and HHI have a strong relationship with each other. This fact could affect the choice of company and decide the price. Therefore, specific tailored action plans are needed to maximize profits of HHI.

4.1.2. Shortening distance

As mentioned in the human resource management section, around 50% of major city residents live in Seoul. By providing proximity to friends and family members, a company can attract potential candidate. For that HHI can take an emotional approach and physical approach. In addition, other competitors have already taken actions in this regard, so HHI can benchmark specific methods of other companies

ongoing solutions. As an emotional approach, they can provide shuttle busses to Seoul on weekends. This suggestion could have positive effects on not only weekly users but also non-users. This is because non-users also appreciate easy to access to the capital city. For the physical approach, the company can establish a certain department in or near Seoul. However, problems with this suggestion are costs to build the company and distance between the shipyard and other departments.

4.1.3. Eco-ship projects

HHI continuously develops the main engine and other environmentally friendly machinery. In addition, as the main engine consumes the majority of fuel while sailing, it could be a big advantage of building an eco-ship. However, integrated eco-ship projects are needed to successfully build the eco- ship. This is not only for building environmentally friendly ships, but also for effective marketing methods. By managing and organizing eco-ship projects, the company can systematically manage how many benefits can be realized from each project. From that, the company can meet the customer's needs and attract them. For example, as Table 17, which is in internal analysis of technology development shows, since DSME gives both environmental effect and cost reduction, the company can get tangible benefits from CSR and increase profit. To the contrary, HHI's shipbuilding strategy is "*by developing environmental friendly, energy efficient design, to create and increase demand*" (Hyundai Heavy Industries, 2015a). However, a tangible number and specific projects are not available to customers. To get credibility from the customer, undertaking visible eco-ship projects is suggested.

4.1.4. Related diversifications

To solve two problems, inappropriate investment and green energy strategy, related diversification is suggested. The Green energy department was newly established

department in 2011. Creating separate departments means, the company would like to create profit from independent divisions. However, since the green energy department was established, it has continuously recorded operating losses¹⁵ and decreased sales. In this situation, HHI has to choose to either abandon this department, or increase market its size.

If it abandons this department, HHI will be burdened with sunk costs from R&D and other costs of its green energy division, especially solar energy generation. However, even though HHI has a poor financial statement regarding green energy, the company already has high quality technology. For example, HHI passed Ammonia Corrosion Resistance Test and IEC 61701 (Salt Mist Corrosion Test) Passed (HHI Green Energy Division, 2014). Moreover, HHI achieved the highest level (Tier-I) of solar energy from England's new regeneration energy research organization BNEF (Bloomberg New Energy Finance), consecutive three quarter (<http://www.hhi.co.kr>). In addition, HHI expects the green energy market will be experience continuous growth because of regulations. Therefore, keeping that department and finding other solutions is better.

To increase its market size, there exist distinguishing strategy and diversification strategy. However, HHI already has a distinguishing point in terms of high quality and it is not very effective. Therefore, diversification strategy will be a method to solve this problem. The core business of HHI is shipbuilding and it already has resources and capabilities in this regard. If HHI can adopt green energy technology for shipbuilding, it will generate synergy and also positive effect on financial status.

¹⁵ Operating loss is the losses from business operations, and formula of this is 'gross profit –operating expenses'. If operating expenses is higher than gross profit, it results in operating loss.

4.1.5. Increase passenger shipbuilding

Increasing passenger shipbuilding is a suggestion for inappropriate investment, and limited experience and production of passenger ships. Increasing awareness of quality of life makes the entertainment business an important issue. Therefore, at the international level and governmental level, there are trends toward that business and Korean government supports it a lot. However, as mentioned in the entertainment business section, regarding passenger shipbuilding, HHI has only one kind of ship design experience and only two instances of shipbuilding experiences. As HHI had experience of building 1898 vessels by the end of 2014, passenger ships accounted for only 0.1% of its total builds. To solve this problem and meet the international trend, HHI has to increase its sales. To achieve this goal, HHI has two options. One is to diversify its product line. As HHI has experience building passenger ships, if the company can modify and put in more effort, it can diversify its product line. However, it takes time and capital. The other possibility is achieving competitiveness with its existing passenger ship, which is the Ro-Ro passenger ship. If HHI would like to be competitive in certain passenger ships, it needs to give a different value to customers than its competitors.

4.2. Take-off suggestions

Take-off suggestions are further suggestions for trend driven markets. Just solving the visible problem is not enough for companies' growth or sustainability. If we look into the Sony and Apple cases, Sony did not notice or read the market change and was reluctant to innovation, so it lost its reputation. However, Apple creates its own trends and creates customers' needs. It not only reads but also creates customers' needs and convinces them to use its products. That is innovation and it has changed the paradigm and broadened the size of the market, by integrating with other industries or small ideas with their core business. For example, Apple tried to put innovative 'design' in electronic goods which did not exist during that period, but

Steve Jobs read the possibility of the market and, based on that, created a new trend in the market¹⁶. That is innovation and the starting point is an idea from the market trend. Market trends can indicate potential needs of customers.

In the shipbuilding industry, the market trends were green business, smart business and entertainment business. By look into those three sectors and combination of trends, the take- off suggestions section will find possible suggestions for innovation. This consists of green business, green business + smart business, smart business, smart business + entertainment business, and entertainment business. In addition, each has its own suggestions.

4.2.1. Green business

- **Energy efficient vessel**

Regarding green business, the most tangible aspect is increasing the energy efficiency of the vessel. That is because it will directly affect the voyage cost and will attract customers to HHI. In addition, as this vessel is a high tech value added product, the company can add premium cost and then sell. It is also one aspect of the differentiation strategy. As HHI makes an effort to increase energy efficiency, it will be a good idea to maintain the project and find differentiated points of energy efficient vessels. If HHI can achieve this goal, it can also drives increased selling power.

4.2.2. Green business + Smart business

- **Integrated managed green vessel**

¹⁶ Before Apple releases the iPod, electronics companies were focused on functions of their products. However, Steve Jobs positioned the product in to fancy item, which looks beautiful. It hits the market and other competitors started to put design in their products.

By connecting with ICT technology, a vessel can holistically manage the whole situation of a green vessel. This includes two situations. First of all, it can manage the process of shipbuilding. By electronically monitoring and finding optimized solutions by reducing inefficiencies and waste, HHI can achieve cost reduction. Secondly, during a voyage, the vessel could be traced and information or suggestions given to the captain or ship-owner. This means the vessel is not only efficient itself, but can also effectively manage its resources. This is a win-win strategy. The ship owner can reduce its costs and HHI can broaden its business to the service sector. In addition, it will act as a customer relationship manager to give continuous service.

4.2.3. Smart business

- **Advanced connected smart ship**

A connected smart ship basically manages maritime transport and gives information to ship-owners. With this information, a ship owner can give information to its customer and develop its market service. However, if HHI can extend the range to inland distribution and use that information as data, infinite possible business sectors will be open to HHI. Like Google did, managing information gives a lot of power. By accumulating information and managing it, the company can create new markets. Moreover, this is highly related to the connected smart ship, and a further project of that. Therefore, it will be easier to make specific blue prints.

4.2.4. Smart business + Entertainment business

- **Entering B2C¹⁷ business**

¹⁷ B2C is an abbreviation of business to customer, and this business is transacted between firms and end user.

HHI is highly dependent on the B2B business sector. In addition, among B2B businesses, the shipbuilding business is a high risk business. Because it requires long periods with large amounts of money to build vessels, the company takes risks to do business. However, the B2C market has different characteristics. B2C is usually dependent on mass movement, so it has less risk. If the company can get both the B2B and B2C markets, it will be one of the hedging methods.

Two key words of this suggestion are ‘cruise passenger’ and ‘ICT’. Whatever idea relates the two keywords is fine with this suggestion. That idea will be the steppingstone for extending the B2C business. For example, ‘Social commerce¹⁸ tour’ will be one of the ideas. It contains cruise passenger and ICT. If HHI make an ICT platform and do social commerce business, which is related to whole products and services of cruise passenger. To that company can be a tourist specialized social commerce company and it will be a starting point of extending B2C business.

Social commerce is by giving special offers, social commerce encroaches on the online market. It started with group purchase of a few products in 2010, and only 5 years later has made remarkable progress. The Coupang¹⁹ has the highest sales records in Republic of Korea, among social commerce companies. It has recorded KRW 348.5million in sales with 8.1 million users, and also Coupang is planning to extend its business to the open market (Seoul Finance, 2015). This means the market is large and has a lot of potential. In addition, no company is doing business in specialized entertainment social commerce. That means it could act as niche market or blue ocean for HHI.

¹⁸ Social commerce is a business sector, which is based on group purchases. Social commerce companies give platform to customers and sellers, and systemically manage group purchases. This business was started from few group purchases, but numbers of users attracted sellers. Therefore, nowadays this business covers various products and services. It threatens online shopping malls in the Republic of Korea.

¹⁹ Coupang is a social commerce company, which ranks first in that industry in the Republic of Korea. This company has various categories of social commerce products and service, from small items to big furniture, events, services and others.

4.2.5. Entertainment business

- **Building passenger ships**

Increasing the number of passenger ship is a suggestion for passenger ships. For that, the company has to put efforts into either increasing the volume of Ro-Ro passenger ships or diversifying its product line. Detailed information in this regard was presented in the problem solving suggestions section.

5. Suggestions adaptation

The purpose of this section is tailoring suggestions to HHI and prioritizing them. The possible suggestions covers potential solutions. However, even if it is a great suggestion, if the solutions is not fit for the company itself or its circumstances, it is hard to accept. Therefore, in the strategic adaptation chapter will sort out feasible suggestions, by matching them with the company's situations. For that purpose, this chapter will look into internal resources, external competition and required time to find feasible suggestions. After that, it will prioritize suggestions to use the company's limited resources effectively.

5.1. Feasibility test

Chapter 4 covers twelve suggestions for problem solving and take-off. However, some of the suggestions are similar so that they can be combined. Therefore, in the feasibility test, the first step is combining suggestions which are highly related to each other. After that, each ideas is assessed to find out whether it is suitable for the company or not.

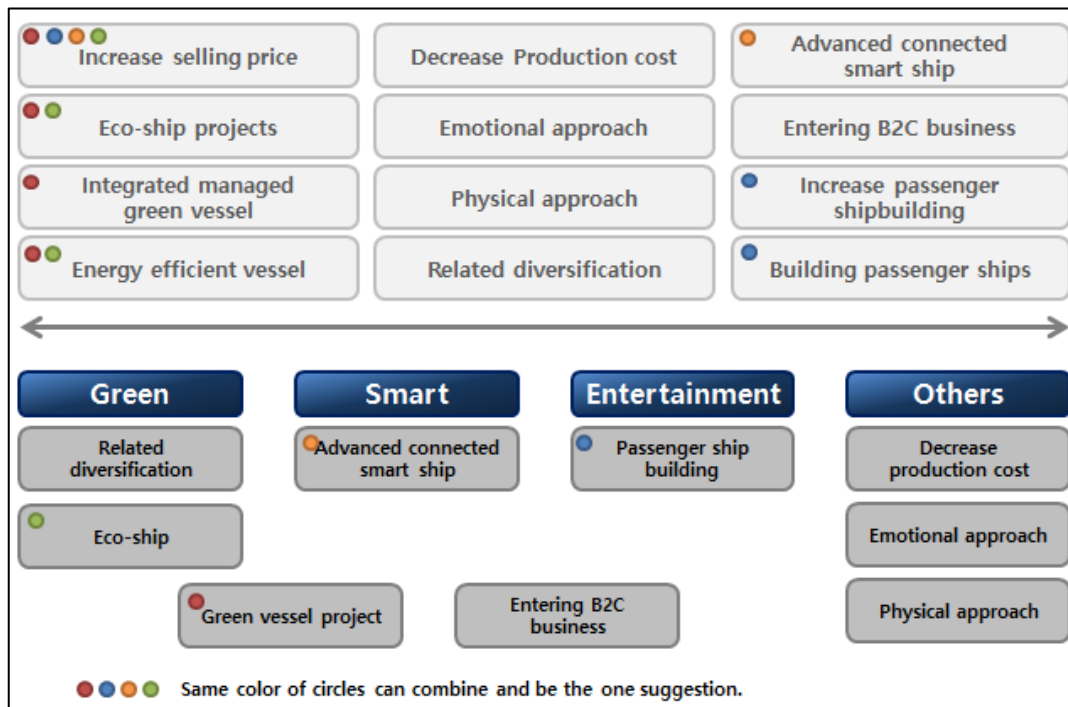


Figure 20 *Combined suggestions*

Source: organized by author

Figure 20 illustrates nine integrated suggestions from twelve possible suggestions. The nine suggestions can be categorized as green, smart, entertainment, others, green/smart, and smart/entertainment²⁰. In addition, different colored circles are used to indicate components that are combined in one suggestion under certain categories. For example, the components increase selling price, eco-ship projects, integrated managed green vessel and energy efficient vessel make up green vessel project under the green/smart category. Similarly, Increase selling price, increase passenger shipbuilding, and building passenger ships are integrated to become passenger ship building under the entertainment category. In addition, eco- ship in the green category is made up of eco-ship projects and energy efficient vessel. Lastly, increase

²⁰ Categories is basically based on chapter 2, external analysis extracted overall trends part, which are green business, smart business and entertainment business. In addition, to organize MECE (Mutually exclusive and completely exhaustive) way, put an 'others' category additionally.

selling price and advanced connected smart ship form advanced connected smart ship in the smart category.

Increasing selling price has special characteristics. It can combine with every other combined suggestion. The reason is that if the company can produce value added products, it is linked to an increase in selling price. Because of competition in the shipbuilding industry, the normal prices of major products are almost fixed. As Table 26 shows, Clarkson calculated the price of vessels and released the results. Therefore, to increase the price of a vessel, the company has to put more value into it and creates differences. That is why this suggestion is combined with many other suggestions.

Table 26 *Price of major products*

(1,000,000 USD)

Product		2014	2013	2012
Tanker	VLCC	97.0	94.0	93.0
	SUEZMAX	65.0	59.5	56.5
B/C	PANAMAX	29.0	27.8	25.8
Container	13,000 TEU	116.0	113.5	107.0
LNG	160,000 CBM	200.0	198.0	199.5

Source: Clarkson research, 2015

After combining all possible suggestions, nine suggestions are available for feasibility testing. To look into each components of the suggestions, the feasibility test will analyze internal capability, external competition, and time required for adaptation.

5.1.1. Related diversification

Related diversification is a suggestion for solving the green energy division problem.

To increase the sales of this division, this paper suggested integrating green energy technology with vessel design. Achieving this goal requires several internal resources. For example, the company needs human resources, renewable energy technology, shipbuilding facilities, knowhow, R&D capability and capital to invest. Other resources are already owned by HHI, and the only needed resource, capital, is also available when the company thinks necessary. The external potential competitor situation is in the middle level. That is because the importance of sustainability and energy efficiency are continuously increasing. Therefore, competitors have started to design their vessels related to this trend. For example, as discussed in the internal resources section, DSME developed a 'Standard Wind Turbine Installation Vessel'. It has not been delivered to a customer and is not yet well developed, but if the company becomes competitive and attracts customers, it will be a blue ocean for HHI. It has not been delivered to the customers yet, but movement regarding this is an ongoing issue. However, combining vessels with green energy technologies and making a difference will require more than 10 years.

5.1.2. Eco- ship

Eco- ship is related to environmentally friendly vessels, so it is highly related to energy efficiency and protection of the environment. HHI has the capability to build eco- ships. As per the internal analysis, HHI has firm infrastructure resources to produce environmental friendly machinery. In fact, the company independently developed an environmental friendly gas engine and started to export it in June of 2012. It continuously develops environmentally friendly engines (Hyundai Heavy Industries, 2015a). Externally, other companies also develop eco-ships. According to reports of DSME and SHI, they forecasts that customer interest is shifting to eco-ships. Regulations regarding energy efficiency and environmental protection are driving this movement. However, from now on every company is on the way to developing eco-ships in their own sectors and in their own way, so competition in eco-ships is not that high. Moreover, eco-ships are a continuously improving product.

Therefore, it is recommended that it keeps improving on an ongoing basis.

5.1.3. Green Vessel Project

Green vessel project is an integrated project that covers not only the whole process of building energy efficient vessels but also managing information related to energy efficiency. To achieve this project, ICT technologies, R&D capability, human resources, shipbuilding facilities and capability are needed.

However, among them ICT and R&D are especially needed by HHI. That is because the company does not have integrated management experience of eco-ships. In addition, the R&D status of energy efficiency is focused on main engines. To manage the whole process of green vessels, the company needs put in more effort. However, external competition regarding this suggestion is not that high. As the internal analysis chapter covers, all companies try to develop environmentally friendly vessels, but non-remarkable companies exist. Therefore, external competition is acceptable. However, to achieve this integrated project and achieve a high performance could take around 5 to 10 years.

5.1.4. Advanced Connected Smart Ship

Advanced connected smart ship is a suggestion for the next step of connected smart ships, which is a project scheduled to finish by 2020. The company has already won the contract with Accenture, and has experience building smart ships. Therefore, internal resources are enough to use. In addition, the external situation is favorable because the company acquired prior occupation for smart ships. In terms of information and software competition, prior occupation is important to dominate the market. This is because it has a network effect. Therefore, the company can start on advanced connected smart ships right after the connected smart ship is finished.

5.1.5. Entering B2C Business

Entering B2C business means broaden the market to unexplored parts of shipbuilding companies. It can change the norm of the shipbuilding industry and by dominating and preoccupying this part, HHI can be the maritime version of Google. That is because, based on B2C business, the company can get a powerful tool, which is called information. Internally, HHI itself already has ICT technology and maritime specialization, but it does not have B2C business experience. However, the company has the Hyundai group relationship and some of the companies in the group are doing B2C business. HHI can learn knowhow and get ideas from those companies. The external situation is also acceptable for the company. Other competitors use ICT as a tool for navigating to increase safety and efficiency, so if this concept is successfully settled, it will be an innovation. In addition, the social commerce market, which is one of the ideas for B2C business, is a niche market for the entertainment business. In Republic of Korea, customers of travel agencies are moving to social commerce and home shopping. In the shifting time, there are always opportunities. In addition, if HHI decides to launch the B2C department and start business with a specific idea, it will take less than one year to settle down.

5.1.6. Passenger Ship Building

Regarding passenger ship building, the company has facilities, ship design knowhow and personnel. However, differentiating the product requires a large amount of effort to make the vessel competitive. In addition, the external situation is unfavorable. European Shipbuilding Companies' core business is passenger ships and they have competitiveness. As Figure 21 represents, European shipyards dominate cruise shipbuilding. For example, Meyer Gmbh Papenburg (in Germany) records 28%, Fincantieri Monfalcone (in Italy) records 26%, and Aker yards SA-St Nazaire (in France) records 20% of market share of cruise ship order books. These results show that the core business of European shipyards is cruise vessels and they have

competitiveness and distinguishing points in the cruise sector. In this situation, for HHI to build a better model than those companies requires too many resources. However once they established the design, HHI has facilities to build the ships, so it takes not that much time to build the ship after the initial stages of the shipbuilding process are completed.

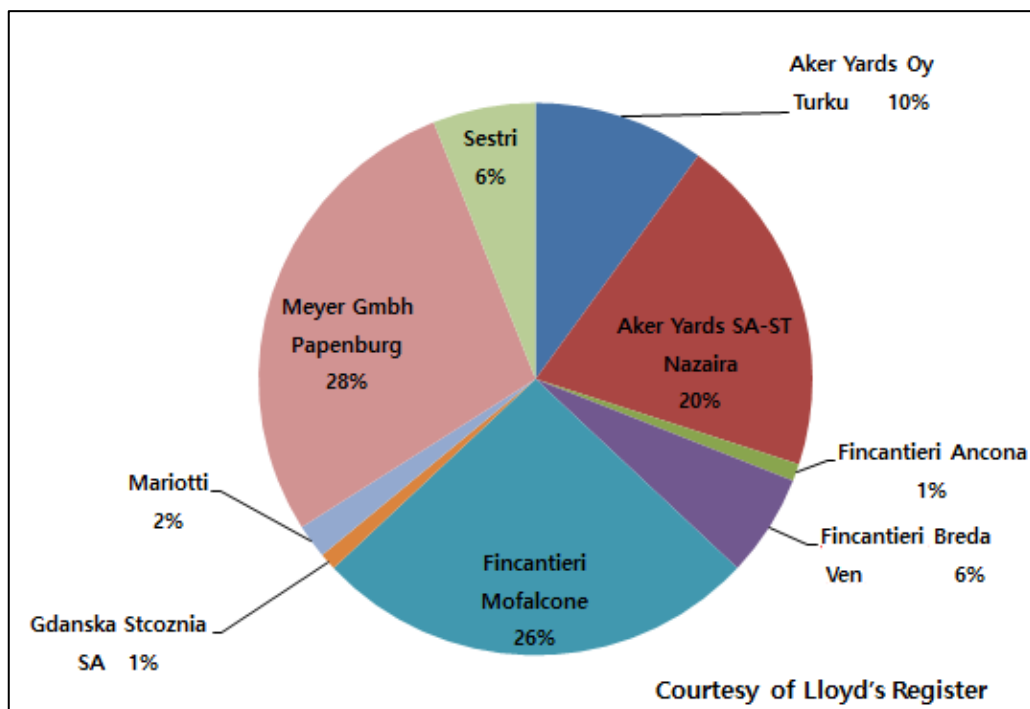


Figure 21 *Cruise ship order book market share by GRT*

Source: retrieved from <http://www.worldcruise-network.com>

5.1.7. Decrease Production Cost

Decrease production cost is a suggestion for increasing profit margin. Decreasing production costs requires reducing the cost of raw materials. To achieve this, the company has two options, changing the supplier or renegotiating for with the suppliers. Since Hyundai-steel and KCC are highly related to the Hyundai group,

HHI could be reluctant to change those two suppliers to do business. Therefore, to find a way to renegotiate procurement price or get equivalent benefit from those companies to reduce production cost is necessary. In addition, regarding steel plates, the company can reduce its price by combining with other suppliers or changing the supplier entirely. The company, that has highest bargaining power, DSME, adopted a multi-supply strategy and by using that method reduced steel plate costs by 69.2%. As the internal analysis of procurement found, HHI has the lowest bargaining power, but differences between SHI and HHI are in a negotiable range. HHI pays 2.4% more for sections and the same price for steel plates. The company has brand power and has a group relationship, so HHI has capable resources to find ways to decrease production costs. In addition, this suggestion requires less time to realize than the other suggestions.

5.1.8. Emotional Approach

The emotional approach is related to providing shuttle busses to make employees feel closer to the capital city. To accept this suggestion, the company just needs one round trip bus per week. Compared to other suggestions, the company requires fewer resources, which can be internally afforded, if needed. In addition, as other competitors have already taken physical actions to shorten the distance between the company and the capital city, the level of external competition is high. Finally, it would take less than one year from making the decision to accomplishing the action.

5.1.9. Physical Approach

The physical approach is a suggestion to find a place for work in Seoul or near Seoul. Internally, the company needs resources to find a place to settle a department, and the company also has to consider which departments have the potential to move. However, moving certain department requires not only large amounts of money and

time, but also requires the risk of miscommunication between departments, which are located in Ulsan and Seoul. In addition, this is a supporting activity, so it is hard to visualize the exact outcome. Externally, other competitors are already dealing with this problem, so HHI is lagging behind. Furthermore, it would take around five years to finalize all issues and move departments.

5.2. Prioritize Suggestions

A feasibility test is used to assess nine suggestions. That process was needed to prioritize suggestions and identify the recommendation level, by using three criteria. Table 27 represents the recommendation level of each suggestion. Resources indicate internal resources of HHI, competition is the external competition situation, and time is how long it takes to achieve that suggestion. Resources and competition are classified as high, medium or low and that identifies the level of recommendation. For example, resources high means that after assessing the internal resources situation, the suggestion can be highly recommended. Time is divided is categorized into High (less than 5 years), Medium (5 to 10 years) and Low (More than 10 years). Lastly, Recommendation represents the average score of the three sectors of assessment. However, even if other factors are highly recommended, if one factor has a low recommendation level, that suggestion receives a low final recommendation. That is because it could be hard to overcome that low recommendation and HHI has limited resources.

Table 27 *Recommendation level*

Suggestion	Resources	Competition	Time	Recommendation
Related diversification	High	Medium	Low	Medium
Energy efficient vessel	High	Medium	High	High
Green vessel project	Medium	High	Low	Medium
Advanced connected smart ship	High	High	Medium	High
Entering B2C business	Medium	High	High	High

Passenger ship building	Medium	Low	Medium	Low
Decrease production cost	High	Medium	High	High
Emotional approach	High	High	High	High
Physical approach	Medium	High	Medium	Medium

Source: organized by author

As Table 27 shows, high level recommendations are energy efficient vessel, advanced connected smart ship, entering B2C business, decrease production cost and emotional approach. Among them, energy efficient vessel is an ongoing process, so keeping up with that project and creating competitiveness is important. In addition, decreasing production cost and emotional approach do not require further technology development or long achievement time. They can be achieved with comparative ease. Finally, advanced connected smart ship and entering B2C business are innovative and need much effort to achieve good results. However, it is a promising market and has favorable circumstances for HHI.

After applying the high level suggestions, and if there are any remaining resources middle level suggestions can be considered. Those are related diversification, green vessel project and physical approach. In addition, the final consideration will be the low level suggestion, passenger ship building.

5.3. Ripple effect

Accepting suggestions will give two ripple effects. One is putting the company's financial statement in a sound situation. The other is increasing the size of market share for the entire shipbuilding industry. In the suggestion adaptation chapter, nine suggestions were made and those were divided into three categories, high, medium and low level of recommendation. From high level recommendations, ripple effects were identified. High level recommendations were divided into two parts, solving encountered problems and promising markets to extension. If HHI accepts and manages the recommendations of energy efficient vessels, decreasing production cost

and emotional approach, HHI will achieve net profit instead of net loss. This is because those three suggestions are derived from existing problems. However, just avoiding net loss is not enough for a business.

Recovering this financial statement from net loss to profit is the first step. Further improvement is needed to survive in the competitive society. Therefore, shipbuilding companies need to find ways for promising market to extend in tailored ways. This research made highly recommended suggestions, which are related to the promising market. Advanced connected smart ship and entering B2C business were suggested. Both of those are related to smart business and could change the ecosystem of the shipbuilding industry. As the smart phone changed the ecosystem, smart ships will change the maritime world. Shifting from hardware to software, the company can manage information, and create a new business sector. Therefore, spin-off from that shift will be enormous and infinite. A favorable fact regarding smart business is that HHI is an early performing company compared to competitors. If the company develops and continuously leads the smart business sector, HHI can be the maritime sector's Google.

After highly recommended suggestions, if the company has other resources remaining, HHI can consider medium level suggestions. The physical approach is related to supporting activity and can be partly covered by the emotional approach, but two other suggestions are related to green business. If the company can manage those suggestions, it will get more gain from other promising markets. In addition, a low level recommendation, passenger ship building also can be considered in the final stage.

In addition to those recommendations, by looking into trends in the maritime field and resources of the company, HHI can get new ideas or combine presented suggestions. Moreover, SHI and DSME can use the analysis as a benchmark use some parts, such as the external analysis, directly. Through this, the Korean shipbuilding industry can improve its competitiveness.

6. Conclusion

An external factor, the financial crisis of 2008 which originated from subprime mortgage loan, affected the whole maritime industry and the shipbuilding industry is not an exception. The Korean shipbuilding industry is suffering from an unsound financial statement and needs stabilization. However, just stabilizing companies by solving obvious problems is not sufficient. Finding new promising markets to diversify into is also needed. Promising markets can increase the whole market size of the shipbuilding industry and also act as a hedging strategy. Therefore, this dissertation set the goal of giving suggestions for not only solving existing problems, but also finding promising markets to extend.

To achieve those two goals, this research undertook a case study of HHI to show the whole process of finding suggestions. Following the whole process will help other Koreans shipbuilding companies. This is because they have similar environments, so by either adapting or modifying the ideas, the companies can improve their competitiveness.

In addition, this research also suggested a methodology to achieve these goals. This consists of four steps. The first step is an external analysis to find trends in the shipbuilding industry. The three trends extracted from the external analysis were green business, smart business and entertainment business. For that, a three dimensional approach was applied. The first dimension was finding global trends and those were smart shipping, environmental friendliness and quality of life. The second approach was national trends, which involved the Korean government's approach.

Trends identified by this approach were ICT shipping, improving maritime tourism, green growth and financial support sectors. The last approach was international regulation trends, and that consists of smart shipping and environmental friendliness. Through those approaches, this dissertation found three common trends: green business, smart business and entertainment business. Those sectors are opportunities for the shipbuilding industry and also reflections of market trends.

The second step is internal analysis, which is to identify the resources and problems of the company. For that, chapter three covered the general background of the company, and did a capacity evaluation. The capacity evaluation has three supporting activities and five production processes. Supporting activities consists of firm infrastructure, human resource management and technology development. The technology development part covered the three overall trends. In addition, components of production processes are contract, procurement, production, sea trial and delivery. Through the internal analysis, this dissertation found seventeen resources with eight problems. Covered resources are shipbuilding and offshore capability, shipbuilding facilities, group relationships, mature human resources, human resource development system, effectively managing shipyard, production of environmental friendly machinery, trend leading smart vessel technology, connected smart ship, experience of passenger ship, customer relationship and spectrum, brand image, shipbuilding facilities, wide range of ship design, accumulated knowhow, place to sea trial and human resource for sea trial. Moreover, other problems found are group relationship, inappropriate investment, distance from capital, integrated management of eco-ship, green energy strategy, limited experience and product line, price negotiation power and bargaining power for procurement.

Possible suggestions, which is the third stage is based on internal and external analysis. In addition, this stage consists of problem solving suggestions and take-off suggestions. Problem solving suggestions are linked to internal problem analysis. Among the eight problems, this dissertation combined similar problems and found five possible suggestions. Those are profit maximization, shortening distance, eco-

ship projects, related diversifications and increasing passenger shipbuilding. In addition, take-off suggestions are related trends from the external analysis, and there are five categories. Those are green business, green business + smart business, smart business, smart business + entertainment business, and entertainment business. After all possible suggestions were considered, total of twelve suggestions were put forward.

The next step was suggestion adaptation to prioritize all possible suggestions. However, the listed twelve suggestions contained similar suggestions, so combination and reorganization was required before undertaking an assessment. With this process, this research found nine suggestions. Suggestions are related diversification, eco-ship, green vessel projects, advanced connected smart ship, B2C business, low cost production, emotional approach, and physical approach. After that, assessment according to internal resources, external competition and time needed, feasibility testing and prioritizing of suggestions were completed. Highly recommended suggestions were energy efficient vessel, advanced connected smart ship, entering B2C business, decreasing production cost and emotional approach. Medium level recommendations were related diversification, green vessel project and physical approach. A low level recommendation was passenger ship building. This is followed by ripple effect, which covers how suggestions can affect HHI. By giving suggestions with recommendations and reasons, a company can take action, either by solving problems or entering a promising market. To solve the encountered problems of the company, HHI can choose the highly recommended suggestions, which are energy efficient vessel, emotional approach and decreasing production cost. This is because those three recommendations resulted from internal problem solving suggestions. In addition, by accepting the remaining highly recommended suggestions, which are advanced connected smart ship and B2C business, the company can extend its business to a promising market. As HHI has enough resources and dominates the smart vessel sector, those suggestions may have infinite possibility. Another level of suggestions can also be considered if the company has enough resources to invest.

Furthermore, while this research was specifically meant for HHI its can also be adopted for other Korean shipbuilding companies. This is because the external analysis is a common factors for the shipbuilding industry in the Republic of Korea, and the methodology is also easy to adapt and tailor to each company.

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