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WORLD MARITIME UNIVERSITY

Shanghai, China

**Analysis on Global Special General Cargo
Shipping Market**

By

WENG XINGYUE
(China)

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

MASTER OF SCIENCE

In

INTERNATIONAL TRANSPORT AND LOGISTICS

2010

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.

(Signature): _____

(Date): _____

Supervised by
Professor Shi Xin
Shanghai Maritime University

Assessor
World maritime university

Co-Assessor
Shanghai maritime university

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ABSTRACT

Title of Dissertation: Analysis on Global Special General Cargo Shipping Market

Degree: Master of Science in International Transport and Logistics

Abstract: In the context of globalization and elaboration, recent years are witnessing increasing investment in exploration of ocean energy, engineering equipments or construction infrastructures, and other special general cargoes which have special loading, transporting and discharging requirements. The demand for transportation of these cargoes forms the special general cargo shipping market. This segmented market is proved to be a comparatively stable and promising market.

This dissertation firstly conducts an overview of the special general cargo shipping market, in which Five Forces Model is used to illustrate the features of the market. In addition, the thesis deeply examines the market through both demand and supply point of view. The special cargo trade is discussed in demand sector while the specialized vessel types, fleet size and hire rate are investigated in supply sector. Trend Prediction Model is adopted for the forecasting of future two or three years' multipurpose vessel hire rate. What's more, the dissertation gives some suggestions to traditional special general cargo shipping companies on future developments.

KEY WORDS: Special General Cargo, Market Analysis, Specialized Vessels, Trend Prediction Model, Five Forces Model

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LIST OF ABBREVIATIONS

CAPEX	Capital Expenditures
COSCO	China Ocean Shipping (Group) Company
DWT	Deadweight Tonnage
FLO/FLO	Float-on/Float-off
GCT	General Cargo Tramp
LNG	Liquefied Nature Gas
LO/LO	Lift-on/Lift-off
MPP	Multipurpose
OHT	Offshore Heavy Transport
RO/RO	Roll-on/Roll-off
SMM	Shipping Market Model
ZMPC	Shanghai Zhenhua Heavy Industry

Chapter 1 Introduction

1.1 Background

Special general cargo shipping market is the market where specialized vessels are employed for shipment of the special cargo with special handling and shipping requirements. Because of the oversize, overweight or irregular shaped features of the special goods, ordinary containerships or bulk carriers are not able to meet the transporting requirements. The burden of shipment is being laid on the specialized vessels with special cargo capacity, thus, the special general shipping market is segmented and formed.

In the context of globalization and elaboration, the demand for special cargo seaborne transportation is increasing dramatically. Specifically speaking, with the growth of world economics, recent decades are witnessing the mounting demand for energy and further exploration of ocean energy. Under this circumstance, heavy lift vessels, which have heavy loading and discharging equipments of their own are highly desired by ocean oil and natural gas industry to meet the requirements of shipping heavy equipment or infrastructure to remote ports or oilfields. Besides, offshore drilling platform positioning, which can not be fulfilled without dependable means of transportation and installation technologies, urges the emergence of semi-submerged ship, with precise positioning and installing facilities. In addition, engineering equipments or construction modules are usually manufactured in one region with lower labour costs, and mass shipped to another region for assembling. This situation leads to new demand for the specialized carriers for shipments. What's more, the developments of wind power, nuclear power and ocean energy resources exploration, urged by people's strengthening consciousness of environmental protection, bring

opportunities to special general cargo shipping market as well. Consequently, special cargo seaborne transportation industry, as an extremely segmented market, is playing an increasingly significant role in shipping industry and proves itself one absolutely promising market of high potential.

Unfortunately, most importance is being attached to both container and bulk shipping industry, crude oil shipping market, or even some more segmented markets such as coal or iron ore shipping market. Comparatively, there is no enough attention in neither practical nor academic world paid to the special cargo shipping business. No market analyses on this market have been published yet. The most relevant essays conformably concentrate on the successful efforts made by COSCO Shipping. Therefore, this research paper is trying to make up this gap by focusing on the current and future situation of the special general cargo shipping market, by examining the supply and demand side of the market, by forming a reasonable prospect over the market. Another aim of this dissertation is to help decision makers in the shipping companies to think through the implications of the current and future market and to make the right and valuable decisions on the enterprise development.

1.2 Literature Review

Methodology of Market Analysis

With respect to the methodology of market analysis, Haberberg, A. & Rieple, A. (2001) and Ireland, R.D., Hoskission, R.E. & Hitt, M.A. (2006) mentioned PEST method for macro-environment analysis and Porter's five forces model of competition for industry analysis. Besides, SWOT analysis is usually adopted with the combination of PEST and five forces model (e.g. Vrontis, D., Kogetsidis, H. & Stavrou, A. (2006)). Besides, Methodology for Market Analysis (2004, March 24)

believed that market analysis should be done through relevant product or geographic market segmentation and market power assessment. More importantly, in the shipping dimension, Stopford, M. (1997) concretely figured out one method named the Shipping Market Model (SMM) for producing a market analysis based on a freight rate forecast, covering eight separate stages including economic assumptions, the seaborne trade forecast, average haul forecast, the ship demand forecast, the merchant fleet forecast, ship productivity forecast, the shipping supply forecast, and finally the balance of supply and demand.

Methodology of market analysis can also be found adopted in some market analysis and prospect articles in the sector of international bulk (e.g. Chen, S.G. & Zhao X.Y. (2008), Miao, F.L. (2001), Sun, J. (2007)), crude oil (e.g. Chen, J.Y. & Liu, X.H. (2003), Gu, J.J. (2007), Li, X.F. (2000)), general cargo (e.g. Guang, Y. (2003), Zhou, W.M. (1999)), or more segmented, iron ore (e.g. Zhang, M.X., Zou, Z.Y. & Zhang, J.S. (2006)), coal (e.g. Ye, M. (2008)), grain (e.g. Jiang, X.N. (2008)), car carrier or RORO (e.g. Cai, W. & Jin, Y. (2005), Sun, W.Y. (2007)), or LNG (e.g. Chu, L.Y. & Li, H.M. (2000)) shipping market. Of all of the above-mentioned articles, most have mentioned from the supply and/or demand perspective, but emphasize different points. To be specific, when examining dry bulk shipping market as a whole, main cargo variety, seaborne trade volume and trading routes are included by Miao, F.L. (2001) in its analysis on cargo for shipment. Chen, S.G. & Zhao X.Y. (2008), Liu, Y. (2007), Ye, M. (2008) and Zhang, M.X., Zou, Z.Y. & Zhang, J.S. (2006) all put forward factors working on the ups and downs of their discussed market, such as world economic situation, global consumption demand of the specific cargo, etc. Besides, Chu, L.Y. & Li, H.M. (2000), Ye, M. (2008) and Zhang, M.X., Zou, Z.Y. & Zhang, J.S. (2006) made world seaborne trading analysis through export and import way as

well as bird's-eye view. Gu, J.J. (2007) also took the relationship between ship price and freight rate into consideration. Chu, L.Y. & Li, H.M. (2000) introduced the vessel particulars and age structure to identify the current and future fleet structure. Except for the analysis on global market, there are researches on certain specific region markets (e.g. Sun, W.Y. (2007), Xu, Q.F. & Zhao, B. (2007), Zhu, F.C. (2009)). For example, Zhu, F.C. (2009) analysed the general cargo market in Australia in detail in the aspects of general cargo types, influential carriers and major ports to seek potential opportunities. Besides, Sun, W.Y. (2007) focused on the national production, import and export situation in economic dimension as well. Xu, Q.F. & Zhao, B. (2007) used time-series method to forecast the demand of general cargo in China, and come up with certain solutions and strategies for domestic general cargo companies.

To sum up, SWOT, PEST and Five Forces Model are three methods widely used in market analysis. It is more common for scholars to combine SWOT analysis with the other two in their research: on the one hand, look for opportunities and threats through PEST analysis when studying external environment, and on the other hand, identify strengths and weaknesses by Five Forces Model of competition when examining industrial environment. What's more, in the maritime world, when either studying the market as a whole or analyzing a segmented market, most scholars use a methodology based on the forecasts of supply and demand for merchant fleet and draw conclusions about market future developments on the basis of supply/ demand balance. For a general market like dry bulk market, most articles investigate the market through shipping volume, freight rate, and vessel types in specific route for specific cargo as well as vessel tonnage and hire rate in time charter market. In a more segmented market sector, from the demand perspective, factors affecting on trade as well as trading volume and routes is carefully concerned, while from the supply perspective,

vessels specification, fleet number and structure are involved in the discussion and analysis.

Current Research on Special General Cargo Shipping Market

Special general cargo shipping market is little studied in the academic world at present. Of all the relevant literature reviewed, more than half focused conformably on the successful efforts of COSCO Guangzhou or COSCO Shipping in the specialized vessel market (e.g. Liao, Z.W. (2006),(2008) & (2009), Shen, L. (2003), Zhang, X.T. & Xie, Z.D.(2006), Zheng, X.F. (2007), Qiu, B. & Yu, W.H. (2008)). Some of the others introduced the specifications of specialized vessels (e.g. Wang, C.R. (2007) & (2007)). The limited rest mentioned the current situation of the special general cargo shipping market. The main points can be concluded as follows: Firstly, the commodities carried by specialized vessel are special general cargo with personality or special loading, discharging and shipping requirements so that they can not be shipped by containers or bulk carriers in either technical or economical perspective of thinking, according to Liao, Z.W.(2006), Xu, Q.F. & Zhao, B. (2007). Zheng, X.F. (2007). Secondly, to identify the opportunities of the special market, world oil exploitation projects, marine engineering construction and constant booming of car exporting and importing business will be contributable to the growth of the discussed market, mentioned by Qiu, B. & Yu, W.H. (2008), Shen, L. (2003) & Zheng, X.F. (2007). What's more, the segmented market has independent and monopolistic features. Owing to high technology required by the specialized vessel, there are limited anticipators in the market and it's relatively difficult to enter the market. Different from bulk or container shipping market, specialized vessel market remains comparatively stable even during the recession period, concluded by Liao, Z.W.(2006) ,(2008) & Zheng, X.F. (2007).

In conclusion, the recent research on special general cargo shipping market is limited to the bird-eye view of the whole market, introducing special cargo shipped by specialized vessels, types and specifications of specialized carriers, increasing demand from industrial and economical world as well as basic features of the identified market. Unfortunately, there is no analysis in detail on trading volumes and routes from demand perspective and world fleet structure from supply side. In addition, all the research is based on qualitative analysis, without any statistics support, which remains a research gap.

1.3 Research Structure and Approach

The paper consists of 6 chapters where introduction is followed by Chapter 2, the overview of the special general cargo market with a bird's-eye view. Chapter 3 and Chapter 4 analyze the special general cargo market from trading demand and fleeting supply side respectively by revealing the data collected and forecasting the future trend. In the following Chapter 5, the implications for traditional general cargo shipping companies are discussed. Finally in Chapter 6, the conclusion is come up with.

With respect to research approach, in Chapter 2, the author tries to use Porter's five forces model combined with SWOT analysis to identify the monopolistic market. Threat of new entrants, bargaining power of suppliers, bargaining power of buyers, threat of substitute products, and rivalry among competing firms will be discussed in detail for the identification of the features of the special general cargo shipping market. In addition, the opportunities and challenges of the industry are mentioned when we try to examine the current situation of the special general cargo market. Within Chapter 3 and 4, the majority analysis is qualitative analysis, by illustrating

the major commodities, specialized vessel types, etc. Nevertheless, we will also try to find data and statistics, and present them in graphs, tables or charts to demonstrate the movements of trade volumes and fleet number or structure. What's more, some basic forecasting methods will be adopted for the future market prediction, mainly Trend Prediction Model for multipurpose vessel's hire rate prediction.

Chapter 2 Overview of Special General Cargo Shipping Market

2.1 Introduction of Special General Cargo

To define a piece of special general cargo, there are three factors to be taken into consideration, namely the nature of cargo, the dimensions of carrier, the condition of routes and port facilities. Firstly, special general cargo should be the cargo which generates extra burden for loading, discharging, transportation and management and requires attachments of importance, according to the nature of cargo, including its length, width, height, volume, weight, loading, stowage or handling difficulties. Secondly, the special general cargo should be defined as the heavy or large cargo, compared with the dimensions of one particular carrier. A same piece of cargo can be treated as ordinary cargo for the larger vessel but special cargo for the smaller one. Last but not least, the size of special cargo is related to loading, discharging equipments and other port facilities as well as wind, flows, waves and other weather meteorological phenomena. An ordinary cargo can be regarded as special cargo under conditions of bad weather or difficulties in loading or discharging of it at ports.

Generally speaking, special General Cargo is the kind of general cargo which is not suitable for shipments by traditional general cargo carriers, due to either overweight or oversize restrictions or limited port loading and discharging conditions either on

board the vessel or at port or berth. The indivisible special cargoes are either oversized or overweight, and can not be loaded in normal containers or by conventional carriers. As a result, absence of standardization, as the characteristic of special general cargo, requires an individual transport planning for each piece of cargo. Typical special general cargo are heavy and oversized loads such as offshore drilling rigs, offshore production structures, modules for onshore industrial projects, military equipment, port and marine infrastructures, electricity generating equipments, chemical and refining equipments, heat exchanger, nuclear reactors, engines and other heavy floating and non floating cargoes.

These goods are generally of weights ranging from 1 ton to over 1000 tons and of dimension of more than 100 meters. On the basis of the weight of the cargo, these large and heavy goods can be categorized into three kinds- less than 600 tons, 600-1,000 tons and above 1,000 tons. The less-than-600-tons cargoes are classified as the traditional heavy goods, ranging from complete sets of equipments to vehicles and railway equipments, from normal heavy machinery to construction machines. The second group of cargo with 600-1,000 tons of weight mainly covers different types of energy machinery or equipments, namely, petrochemical equipments, nuclear power equipments, wind power and thermal power. The extremely heavy and oversized cargo above 1,000 tons contains offshore structures, e.g. offshore drilling rigs, offshore production structures, modules for onshore industrial projects.

2.2 Handling Methods of Special General Cargo

On account of the differences between various types of special general cargo, namely in nature, dimension and weight, majority of special general cargo requests loading

and discharging and is commonly loaded and discharged by means of lift-on/lift-off (LO/LO), roll-on/roll-off (RO/RO) or float-on/float-off (FLO/FLO) in practice.

2.2.1 Lift-on/lift-off (LO/LO)

A LO/LO operation is the method by which the cargo is loaded and discharged over the top of the vessel either by shore-side or sea-side cranes or derricks, but in most cases by the latter one. It is regarded as the most fundamental and least desirable method between the three. Normal and traditional special general cargo, like construction materials and project cargo can be handled by this method, lifted to a particular location on the vessel by cranes. The method is commonly used in the cases when traditional general cargo carriers or multi-purpose vessels are employed. These so-called “self-geared” vessels, which have deck-mounted handling cranes fixed on them, have the advantages in facilitating loading and discharging at ports with minimal facilities or inadequate shore-side cranes. Besides, these ships are able to carry almost any type of general cargo, from sacks of fertilizer to steelwork, from bags of sugar to military vehicles.

2.2.2 Roll-on/roll-off (RO/RO)

RO/RO method is the method which enables the cargo to be efficiently rolled on board the vessel at original port and rolled off at the destination by either built-in ramps or shore-based ramps. This method is designed for various types of static high and heavy cargoes, which can not be stacked like containers due to height differentiation. This type of cargo includes trucks, buses, boats, drums, cranes, railway carriages, tracked high and heavy, agriculture equipment, construction equipment and oil and gas equipment. It's worthwhile to point out that RO/RO is considered as preferred method for military unit equipment handling. The special

general cargo can be loaded on the chassis, trailers or low-boys at the warehouse or plant site in advance. Then have the vehicles transported to shore and loaded them directly on board the ship by rolling. After driven on board the vessel to the upper or lower decks, vehicles and equipments are in most cases safely stowed and strapped securely there to ensure no movements during transit. Despite of its cargo carrying capacity wastage, this handling method offers a lot of advantages in terms of handling speed as well as operational convenience. To be specific, by rolling goods on or off the vessel, the cargo handling time is obviously reduced, and so is the risk of damages. Traditional RO/RO systems, such as “driven-through” system, are able to reduce complexity of loading operations, thus allow the ships to call at smaller or less developed ports or terminals.

2.2.3 Float-on/float-off (FIO/FIO)

FIO/FIO is the method which enables the cargo to be loaded and offloaded by floating it over the vessel deck. The special cargo handled in this way includes extremely large or heavy cargo, e.g. rigs, offshore production modules, onshore projects as well as traditional barges, tug boats, yachts, floating cranes, landing crafts, single anchor leg mooring systems, and military equipments. In recent years, the FIO/FIO method is accomplished by semi-submersible ships, which is designed and operated similar to a floating marina in almost every case. This kind of ships has capabilities of taking ballast water in floodable tanks, thus is able to have the vessel partially submerged as requested. Then have the cargo floated over the submerged portion of the deck to the proper position for loading. After that, pump out water ballast or de-ballast, and surface over the cargo. In such a way, after the vessel is fully afloat, the heavy and large cargo is left on deck, well secured and fixed in place. The FLO/FLO method is known as an efficient and hassle-free loading and unloading method. Except for its

lower handling difficulties, it also has its obvious advantages in reducing load transfer time. For example, barges loaded or discharged can be only 90 minutes by FLO/FLO way¹. Besides, for the reason that FLO/FLO can be processed outside port, the constraints imposed by vessel dimension and port availability on the cargo flow through port is successfully removed.

2.3 Features of Special General Cargo Shipping Market

It is generally acknowledged that the special general cargo shipping market is a relatively close market with less correlation to the ever-changing overall shipping market, compared to bulk and container shipping market. The stability feature makes it a high value-added and attractive market. Probably it is on this account that an increasing number of new participators are involving in the promising segmented market, creating new features to the market.

2.3.1 Threat of New Entrants

The threats from new entrants are relatively weak in the special general cargo shipping market. The crucial reason for this feature is that the market sets high barriers for new participators to enter. On the one hand, due to the distinctiveness of the special general cargo, there are increasingly strict requirements for the transportation and handling technologies. For example, the demanding stowage plan of heavy lift or oversized cargoes allows no error. Therefore, computer calculation, elaborate design and electronic stowage are adopted to deal with the transportation safety matter. It's difficult to duplicate the high technology, making the market hard for new entrants to enter. On the other hand, shipping industry is always considered as

¹ A New Short Sea Shipping System (2007) . from http://www.tsotec.com/Site/Media_files/Schip%20en%20Werf%20March%2007.PDF

a capital intensive market. Specialized vessels are money-consuming without exception. Take COSCO Shipping as an example. Two units of 50,000 DWT (deadweight tonnage) semi-submersible vessels ordered by COSCO Shipping in 2007 cost 246,000,000 USD. The shipping company ordered 10 units of 27,000 DWT multi-purpose vessels at the end of March, 2010. It is estimated that the total ship-building price will be 310,000,000 USD.² The high capital requirements for specialized vessels building or purchasing indicates the difficulty to enter the market for normal shipping companies. Besides, the strong demand for specialized talented workforce, advanced managements as well as service network enhances the entry barriers.

2.3.2 Bargaining Power of Suppliers

The bargaining power is closely related to the real-time market situation. It is generally acknowledged that the shipping market is positively proportional to the world trade and even world economics situation. Take the moment right before the financial crisis in 2008, when the international economy is overheated, as an example. At that time, world energy exploration and construction projects were becoming increasingly prosperous, giving rise to the growing demand of special general cargo transportation. However, since the supply of specialized vessels falls behind the transportation demand, the specialized vessels are very busy with transportation work. There is even no enough ballast time between two voyages. The bargaining power of supplier is surprisingly strong. Suppliers have the right to choose the customers and the cargoes to be shipped. On the contrary, customers have to lower their expectations for the transportation service. Shipping companies can adopt tactics of acceptably

² COSCO Shipping Invests 10 Units Multipurpose New building ships (2010). From <http://finance.sina.com.cn/stock/t/20100401/05237673181.shtml>

increasing freight rate of transportation or reducing quality of transportation services to exert power over transportation service providers within the market. In a word, when the world economical situation is good and promising, the bargaining power of suppliers is strong, and vice versa.

2.3.3 Bargaining Power of Buyers

Similarly, the bargaining power of buyers in the special general cargo shipping market is strong during the low period of world trade. After the financial crisis broke out in 2008, a lot of energy exploration and infrastructure construction projects were cancelled or postponed, resulting in supply exceeding demand. Under the circumstances like this, bargaining power is switched to cargo owners, who are able to bargain for higher quality, higher levels of transportation services or lower freight rate for transportation. On the other hand, since vessels are fixed assets, the seal up costs of vessels are very high. As long as the margin of operation costs and transportation income exceeds the seal up costs, even if the freight rate is incredibly low, the shipping companies will make great efforts to seek opportunities by reducing price or improving service quality, instead of sealing up the vessels. On the whole, the bargaining power of the buyers in the special general cargo shipping market is strong when the supply outstripped the demand, which is absolutely a buyer's market feature. The reverse is true as well.

2.3.4 Threat of Substitute Products

The threats of substitute products are comparatively weak in the special general cargo shipping market. To transport special general cargoes, e.g. container cranes, offshore modules, floating vehicles, etc, wet tow or dry tow means of transportation can be adopted instead of dry transportation by merchant ships. Wet tow is to tow the cargo

on its own buoyancy while dry tow is to tow the cargoes with the help of barges. However, compared with above-mentioned substitute transportation means, the self-propelled dry transportation has its absolute advantages in higher speed and less voyage duration, flexible manoeuvre ability and better heading control as well as efficient risk management. At present, most offshore platforms are built in Asia, for example, in South Korea, Singapore and China, and transported to the deepwater oilfields in U.S. Gulf, West Africa, Brazil and other destinations, because of cost concern. Neither wet tow nor dry tow is obviously able to support the transportation of such a long distance. As a matter of fact, 60% of world offshore platforms are carried by dry transportation means with specialized vessels³. This fact proves that the threats of wet tow and dry tow to the traditional specialized vessels transportation industry are limited and not attractive enough to the special customers.

2.3.5 Rivalry among Competing Firms

Compared with traditional container liner shipping and dry bulk shipping industry, the competition in the special general cargo shipping market is less fierce. Firstly, there are a relatively smaller number of competitors specializing in the specialized vessel transportation for the super heavy and oversized cargoes. Especially, due to the high entry barrier of the market, the influential service providers involved in semi-submersible business are limited and can be counted on one's fingers, namely, Dockwise, COSCO Shipping, Fairstar, Offshore Heavy Transport (OHT). Besides, in the long term, the world will anticipate a growing trend in the market. With world economics' recovery from the financial crisis, the developments of marine petroleum and engineering projects are continuing, bringing about growth in the special cargo market. Since a growing market enables the reduction of the pressure of taking

³ Semi-submersible Vessel Market and Competitors Analysis (2008). Company Data from COSCO Shipping.

customers from participating competitors, rivalries in the special cargo shipping market is comparatively less intense. However, it's worthwhile to mention that for the reason that traditional multi-purpose vessels is developing to be capable of heavy-lifting and RO/RO, the high-end market targeted at the large mechanical equipments and heavy project cargoes shipping, will probably grow more competitive. To sum up, as a result of limited number of important competitors and rising trend expected from the long-run point of view, the market rivalry is acceptably intense, but will become increasingly fierce.

2.4 Current Situation of Special General Cargo Shipping Market

Despite of the growing trend of specialized vessel fleet, the overall world fleet still has difficulties to meet the demand of the overall shipping market, due to its shortage in supply. Currently, a lot of complete equipments and heavy lift equipments remain being carried and transported by multi-purpose vessels and even traditional bulk carriers. Only for those extremely heavy and dimensional cargoes, specialized vessels with super-thick deck, heavy lift derricks, specialized stability system and qualified handling capability are employed for transportation. The core services of transporting extremely oversized, super-heavy or offshore cargo are concentrated on limited number of competitive shipping companies, e.g. Dockwise and COSCO Shipping. These shipping companies mainly carry offshore drilling rigs, platform, military equipments, shore-based cranes and other heavy and large cargo, greatest volume of which are sets of equipments to satisfy petroleum exploration and developments as well as refinery and liquefied nature gas (LNG) plant construction. They cover the areas of South America, West Africa, the Caribbean, the Gulf of Mexico, the Mediterranean, Middle East, Southeast Asia, Far East, etc.

Great changes took place in international shipping market under the circumstances of global financial crisis in 2008. Despite of its anti-risk ability at some extent, special general cargo shipping market suffered considerably. 2008 experienced an earlier high and later low trend, featuring abundant cargo volumes and stable freight rate in the first half year while shortage of cargoes, surplus shipping capacity, slack transactions, and price slump in the second half. More specifically, exports of cargo like steel products or mechanical equipments from China to abroad were cut down dramatically. Meanwhile, a large number of engineering and construction projects at global scope were forced to be postponed or cancelled. Because of these, the freight rates of special general cargo reduced obviously, followed by decreased shipping volume. Besides, the pressure from containerships and bulk carriers makes the market more competitive. What's more, fluctuation of world oil price increases the difficulties of cost control and risk prevention as well as uncertainties of oil and gas exploration projects. All above these factors constitute the threats confronted with the special general cargo shipping market

At the present time, with the gradual recovery of global economy, special general cargo shipping market has gone through and starts to rise from the valley bottom. The future will probably witness an increasing trend in special general shipping market, as demand driven by energy and construction investment will exist and remain steady from long-term perspective. In particular, with transfer of global industrial areas, various infrastructure construction and engineering projects show great potential for improvements in developing countries, especially in Middle East, Southwest Africa, South America, China, Russia. However, due to its distinct hysteretic nature, the comprehensive recovery of the special cargo market is deemed to be a relatively slow process, lagging behind other segmented shipping market as well as overall economy.

The recovery period of financial crisis brings about opportunities for special general cargo shipping companies. Owing to continuing depression of the overall shipping market, banks have tighten financing policies of some vessels ordered by some shipping companies who have difficulties in their operations and suffer threats from closing down. Under such circumstance, majority companies tend to take this great chance to restructure their fleets by accelerating retirement or demolition of old vessels or by postponing or cancelling some shipbuilding orders. Therefore, the relationship between supply and demand in specialized vessel market is greatly improved. It is estimated that the special cargo market can expect a brand-new rising cycle by the end of 2011.

Chapter 3 Demand Analysis of Special General Cargo Shipping Market

3.1 Offshore Structures

3.1.1 Introduction

Offshore structures are those different types of equipments and structures used in oil and gas industry to realize its market segments of exploration, production and processing. Specifically speaking, in oil and gas exploration sector, offshore jack-ups and semi-submersible drilling rigs are operated for locating and developing new oil and gas sources. Within production dimension, various offshore production structures, including floating platforms, fixed platforms, and gravity based structures, are utilized to extract oil and gas. In the field of processing, oil and gas feedstock are used to run onshore and offshore industrial business, e.g. LNG liquefaction and chemical plants or terminals, refineries and so on.

Oil and gas industry shows great desire for the transportation supply from specialized vessel industry. Offshore drilling rigs are often moved between different exploration or production basins, or within the same basin. Newly-built offshore drilling rigs even have to be delivered from the construction yard to exploration or production. All these ask for specialized vessels for shipment. Even for those semi-submersible rigs which are self-propelled so that they can travel by their own, the speed of the rigs is so low, approximately 6 to 8 knots that shippers are more likely to use dry-transport method by specialized vessels with 10 to 12 knots.⁴ In addition, floating platforms require specialized vessels to have them transported from fabrication yard in Asia to proper installation sites, and installed by heavy cranes or float-over method, which is the absolute trend in cost and time saving as well as technical perspectives. What's more, in pursuit of lower environmental costs, shorter transit times and higher operation efficiencies, shippers have great intension to carry and transport modules for LNG, petro-chemical plants and refineries with specialized vessel.

3.1.2 Demand by Volumes

Transportation of offshore fleet is one demand for specialized vessels in the real practice at present. The structure of offshore fleet varies from 1985 to today, and will inevitably continue to change. The whole fleet expands dramatically in size these years. Not to mention that drill ships are estimated to be increasing 121% between 2005 and 2012, the semi-submersible rigs and jack-up rigs, which give rise to the demand of specialized vessel service, are also expected to grow, respectively 36% and 29% within above-mentioned 7 years (See Figure 1). According to Dockwise's statistics, around 7.5% of the offshore drilling rigs, mainly semi-submersible and

⁴ Dockwise Ltd. ·Annual Report 2009 (2010). from http://media.corporate-ir.net/media_files/irol/20/208652/11544_9002_JV.pdf

jack-up rigs will be moved more than 1,000 nautical miles from one given place to a new destination each year, which forms a great target market for special cargo shipping companies.

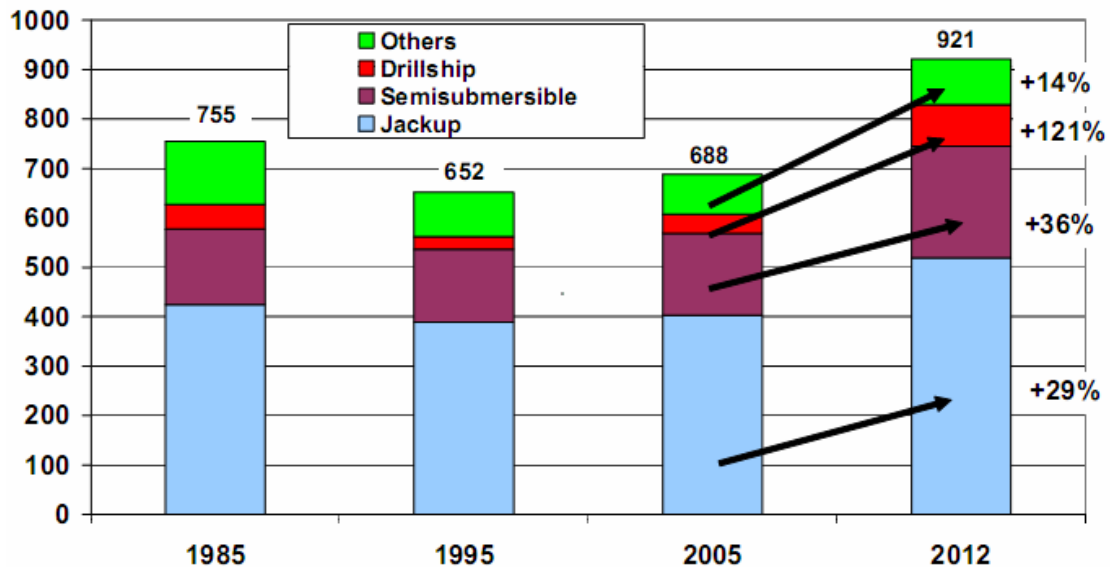


Figure 1 Offshore Fleet Make-up

Source: ODS-Petrodata. Cited by Strachan, G. (March 2010), *The Outlook for Offshore Drilling*. From: http://www.ods-petrodata.com/odsp/presentations/ODSP_Gavin_Strachan_March_2010.pdf

From historical statistics, it is easily concluded that the number of rigs is rising year after year (Shown in Figure 2). The regional transport activities of jack-ups are growing in general trend. Statistics from Dockwise reveals that around 60 jack-up rigs are under construction at the moment, and will be delivered from 2010 to 2012 in succession. In 2009, there were 24 new jack-ups entering the market. The number will be enlarged to 31 in 2010, due to the postponed delivery in 2009. Thus demand will be derived from the transportation of these newly built rigs from construction sites to offshore oil fields. In addition, 11% of global jack-up drilling rigs- both newly built and existing rigs- have been moved to another region in 2009. The oil and gas

industry is estimated to move stable percentage of existing jack-ups, around 7.0% or 7.5%, in the same basin.

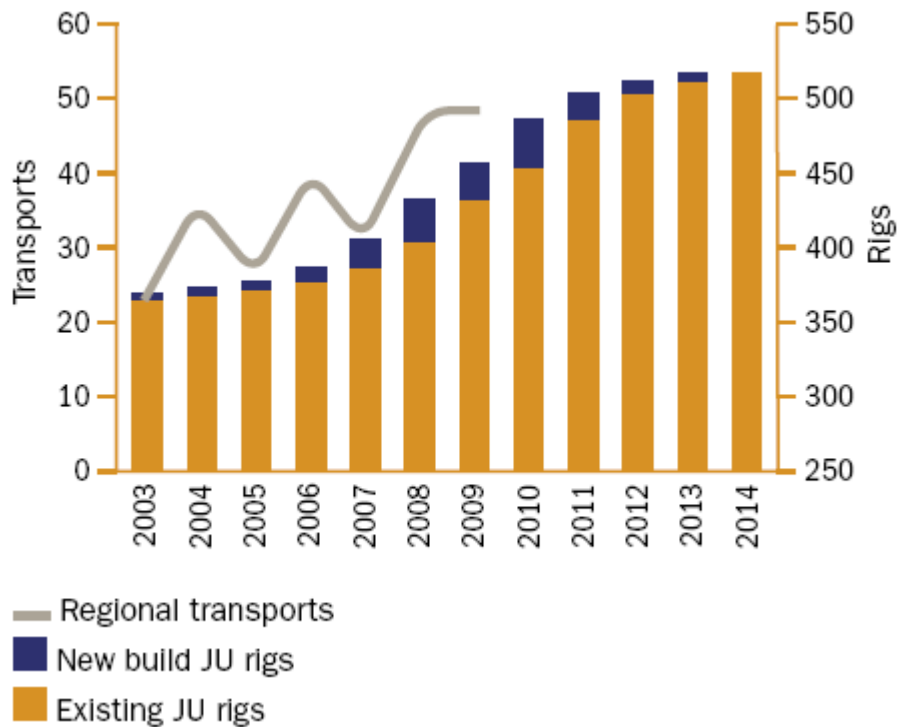


Figure 2 Jack-up Rig Transport

Source: ODS-Petrodata. Cited by Dockwise Ltd. Annual Report 2009 (2010).

http://media.corporate-ir.net/media_files/irol/20/208652/11544_9002_JV.pdf

Similar to jack-up drilling rigs transportation, there are around 40 semi-submersible rigs under construction at present and is scheduled to be delivered between 2010 and 2012. There will be over 200 semi-submersible rigs including approximately 20 units of newly built rigs deliveries at the end of 2010 (Shown in Figure 3). Owing to the global financial crisis, the deliveries of those rigs were delayed in 2009, making the obvious rising in deliveries in 2010. Majority of these new delivered rigs will be transported for operation, from its main construction site in Southeast Asia to deep waters near Brazil, which generates the high demand for special cargo shipping business.

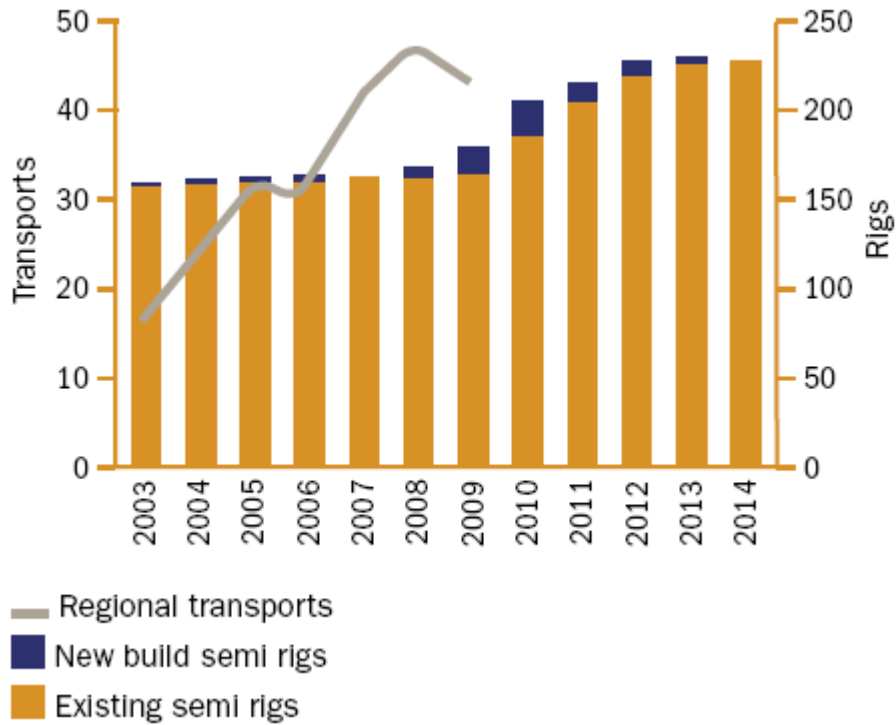


Figure 3 Semi-submersible Rig Transports

Source: ODS-Petrodata. Cited by Dockwise Ltd. Annual Report 2009 (2010).

http://media.corporate-ir.net/media_files/irol/20/208652/11544_9002_JV.pdf

3.1.3 Demand by Regions

Global oil and gas industry generates a large proportion of demand for specialized vessels. As is demonstrated in Figure 4 and 5, the world offshore oil and gas production volume has been increasingly dramatically for the past half century and the trend will continue in the next five years to 2015. It is predicted that oil and gas industry will produce over 12 billion's barrel oil (around 33 million per day) and over 1,200 billion cubic meters per year all over the world in 2015. From regional point of view, North America and Western Europe no longer see their advantages obviously. Asia, Middle East, Latin America and Africa will be promising emerging markets in recent decades. Especially in the oil sector, these four regions take over two thirds of the global production. Nevertheless, the offshore gas industry is dominated by Asia and Middle East.

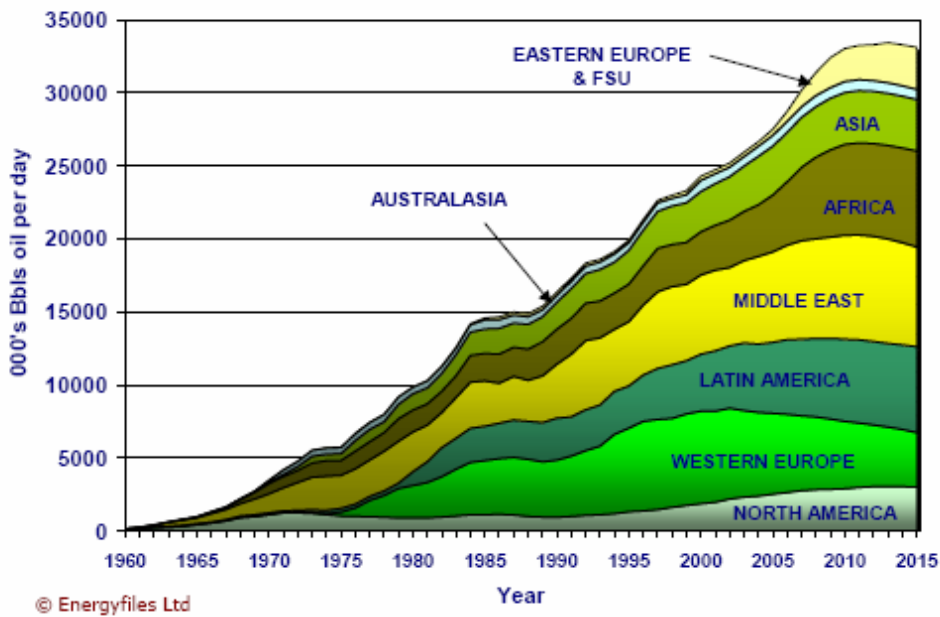


Figure 4 Regional Offshore Oil Production

Source: The World Offshore Oil & Gas Forecast. Cited by Westwood, J. (March 2005). *Offshore Prospects-A Long-term View*.

<http://www.globaloilwatch.com/reports/DouglasWestwoodprospects.pdf>

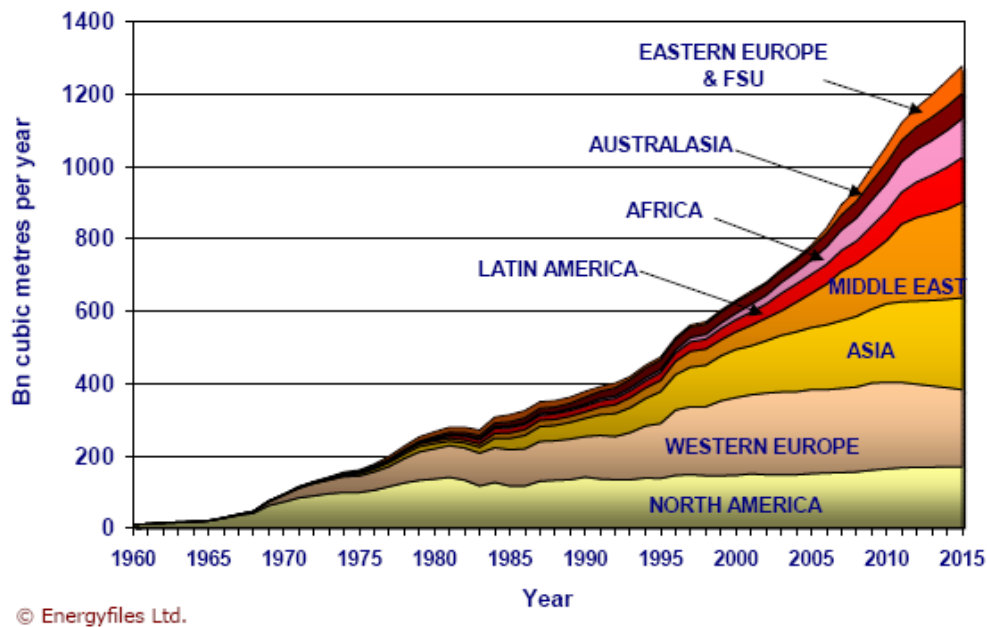


Figure 5 Regional Offshore Gas Production

Source: The World Offshore Oil & Gas Forecast. Cited by Westwood, J. (March 2005). *Offshore Prospects-A Long-term View*.

<http://www.globaloilwatch.com/reports/DouglasWestwoodprospects.pdf>

It is estimated that the future increase of drilling investment will be in the field of deepwater. Investment in deepwater drilling will increase by over 40%, compared with 6% increase in shallow water drilling investment. More shallow wells are drilled and foreign companies are encouraged to explore the natural gas reserves in the Persian Gulf. Except for the Persian Gulf, Russia and Azerbaidzhan have exploration potential in the long run. Analysis shows that the investment in shallow water exploration will remain in the near future, while deepwater drilling exploration is of rapid growth in nearly all regions, especially in West Africa, Brazil and Mexico. Nigeria, Indonesia and Angola have the potential to develop deepwater drilling business.

The World Deepwater Report 2010-2014, published by Douglas-Westwood, predicts that the whole world will spend \$167 billion between 2010 and 2014 in the deepwater sector, equating to a 37% increase on the five preceding years⁵. Over three quarters of total expenditures are concentrated in Africa, the Gulf of Mexico and Brazil, which is geographically called golden triangle. Among the triangle regions, Latin America is the absolute major beneficiary. Except in Latin America, as is demonstrated in Figure 6, there will be more or less increasing expenditures in the markets in Africa and Asia as well. It is highlighted in the above-mentioned report that the forecast period of 5 years will see deepwater markets in Asia continue to grow, from about 10 billion to 15 billion, accounting for nearly 10% of the total predicted Capex (Capital Expenditures) investment all over the world. By contrast, expenditures in deepwater markets in Australasia, North America and Western Europe are shrinking year after year.

⁵ New Douglas-Westwood Research Predicts Global Deepwater Expenditure of \$167 Billion between 2010 and 2014 (8th March 2010). from http://www.dw-1.com/files/files/531-Deepwater_2010_Press_Release_-_FINAL.pdf

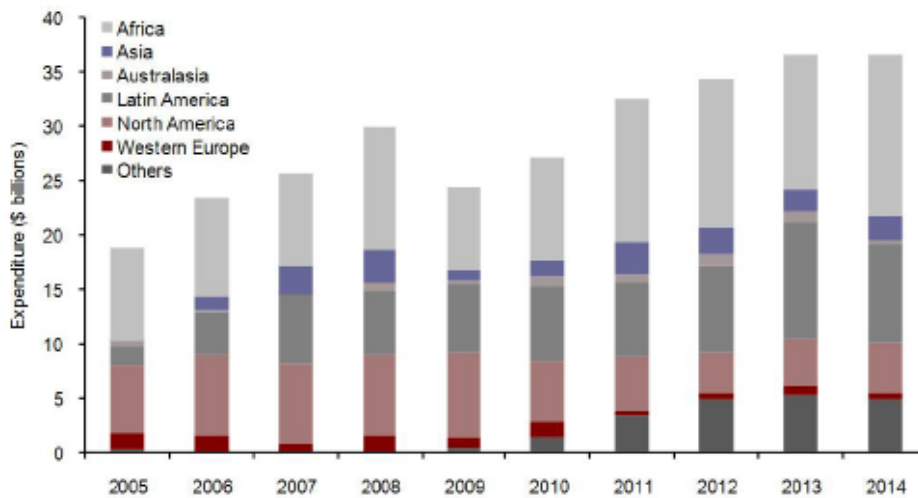


Figure 6 Deepwater Capex by Region

Source: The World Deepwater Report 2010-2014, Douglas-Westwood. Cited by Westwood, J. (March 2010), *Global Offshore Prospects*.

<http://www.dw-1.com/files/files/535-220310%20Britcham%20Singapore%20JW.pdf>

In accordance with Figure 7, the oil and gas industry will be in need of 1330 units of jack-ups in 2010 and 1349 units in 2011 for exploration and development of oil and gas business. Majority demand is concentrated in the regions of South America, Middle East, Far East and Australia, accounting for more than 60% of total demand. These jack-ups are required to be transported from shipyards to these exploration sites or between above-mentioned regions, which brings about semi-submersible vessel service. Score Index, which is compiled by Global SantaFe, global drilling platform operator, the rigs are increasingly transported from America or Mexico Gulf to Asia, due to the growing profitability in Asia as well as the comparatively low price of natural gas in America. Statistics from Pareto Security shows that, a fairly large number of 70 units of jack-ups in service in Mexico Gulf were shifted to Asia after their contracts expired.

Region	2009 avge	2010 Q1	Q2	Q3	Q4	2011 Q1	Q2	Q3	Q4
North America	27	35	35	25	27	34	32	27	31
South America	44	39	39	38	35	37	36	38	39
NW Europe	30	27	28	28	25	23	29	26	26
Mediterranean	17	17	18	18	17	18	16	17	18
West Africa	16	18	18	18	17	18	17	16	17
Middle East	82	86	91	93	96	94	94	95	95
Indian Ocean	34	31	27	28	35	34	35	33	36
Far East / Aus	68	64	78	84	78	76	74	75	75
Total	322	323	335	337	335	337	339	333	340

Figure 7 Worldwide Jack-ups Demand 2010-2011.

Source: ODS-Petrodata. Cited by Strachan, G. (March 2010), *The Outlook for Offshore Drilling*. http://www.ods-petrodata.com/odsp/presentations/ODSP_Gavin_Strachan_March_2010.pdf

Another origin of demand of specialized vessels is the transportation of offshore production module. On the basis of prediction from Pareto Security, the activities of deepwater oil production in the Mexico Gulf, West Africa, Brazil and Southeast Asia will be the emerging markets with increasing demand for the special general cargo shipping market in the long-run perspective.

To sum up, in the oil and gas industry, the demand of specialized vessels is in the regions of developing regions, namely, Asia, Africa, Latin America, etc, which have had their offshore exploration and production business for a relatively short period of time and have great room for improvement. However, the developed regions such as Western Europe and North America are losing their absolute advantages and dominant status. The demand of special cargo shipping is shifting from developed regions to developing regions, from north to south (North America to Latin America, Western Europe to Africa), from west to east (Western Europe to Asia or Far East).

3.2 Other Energy and Resources Products

In addition to traditional petrochemical energy and resources, human beings are exploring other types of energy, such as wind power, thermal power, nuclear power, as well as mining industry. Especially, green energy with plentiful, clean, renewable features and environmental protection advantages, e.g. wind power and water power, has become an increasingly popular and effective option. An outstanding example is wind power, whose power generation has grown over fivefold within 6 years from 2000 to 2006. In these types of energy and resources sector, the products are normally heavy and dimensional infrastructure projects, which require transportation by specialized vessels. A number of desalination plants, power plants as well as mining projects require the shipping services of heavy lift handling and onshore transport.

3.3 Military products

An important proportion of specialized vessels is served for military market. The army has a large number of navy vessels, vessel modules and submarines transported. For example, newly-built vessels have to be transported from their fabrication shipyards to the station or other working areas. Besides, parts of vessel modules and completed hulls, which are used under vessel construction, are often transported between different shipyards during newbuilding projects. Moreover, transportation opportunities are also generated from shipment of damaged submarines, transfer of used vessels between developed and developing countries and transport of other navy vessels for salvage purpose.

3.4 Port and Marine Equipments

The port and marine industry brings about a good deal of products for transportation. The typical special cargoes for shipment in this market are various types of

equipments for port and shipping operations, including container cranes, dry docks, dredging vessels, floating construction equipments, and so on and so forth. Among these, container cranes can be diversified into quayside container cranes, rubber-tyred gantry cranes, rail mounted gantry cranes, portal cranes, etc. It's also worthwhile to mention that there does exist a spot market in the port and marine industry. According to research from Dockwise, floating and non-floating construction equipments, including power and working barges, workboats, accommodation units, and river vessels shows great transportation opportunities and attraction⁶. All above-mentioned equipments are special in dimension with certain weight, thus lead to the demand for specialized vessels shipping business.

3.5 Vehicles and Yachts

With the globalization, a lot of vehicle companies, who takes cost saving into consideration, are running their plants in developing countries, concentrated mainly in Asia. The main vehicles requiring specialized vessels services range from automobile cars and railway equipments. Cars and trains, which have wheels on their own, are requested to be transported from the manufacturing sites to consuming countries and areas, by using RO/RO or LO/LO method. Besides, yacht is an important commodity for shipment. Yacht builders, yacht owners or yacht charter companies are all likely to have the yachts transported, taking various factors for consideration. Yacht owners may transport their yachts on the ground of lower fuel and other costs. In addition, if yachts are out of cruising range, owners will have the intention to choose direct transportation. In reality, yacht owners or operators are trying to expand yachts cruising range to benefit from two seasons in different areas within one year. As a result, yachts are often transported by specialized vessels, so that owners and

⁶ Annual Report 2009. From http://media.corporate-ir.net/media_files/irol/20/208652/11544_9002_JV.pdf

operators are able to save time and earn more profits. Moreover, yacht builders may employ specialized vessels for delivery of yachts to their customers.

Chapter 4 Supply Analysis of Special General Cargo Shipping Market

4.1 Types of Specialized Carrier

Special general cargo, which has been defined in Chapter 2, has special but strict requirements during its loading, shipping and discharging procedures because of its distinctiveness. In general, according to prescriptive safety handling standards as well as years of international maritime practices, the carrier deployed for the transportation of special cargo should have extra particulars, compared with common bulk carrier or traditional general cargo carrier. These cargos are generally carried and transported by specialized heavy lift carriers, whose stability and construction particulars allows them to carry special cargo as requested. The types of specialized vessels vary due to the difference in weight of the cargo carried. When confronted with the choices of vessel types, various shipping companies are possible to make different decisions. Some companies add new or converted semi-submersible vessels to their order books for the sake of extremely heavy and large cargo. Some companies select conventional heavy lift vessels for their fleet expansion purpose. Others choose to build or convert multipurpose vessel with heavy lift or roll-on/roll-off abilities.

4.1.1 Multipurpose (MPP) vessels

Multipurpose vessels are those dry cargo vessels designed to carry various kinds of cargoes, including containers, dry bulk cargoes, general cargoes, RO/RO cargoes and large and heavy cargoes. MPP ships emerge under the background of uncertainty in

both world trade and maritime transportation situation. They are designed to meet the requirements of flexibility, enabling to fit various routes and products with wide scope of use.

Compared with container ships, dry bulk carriers and other ships, MPP vessels have their own advantages. On the one hand, it's obvious that MPP vessels have a greater flexibility in cargo worthiness. As a result, its ability to carry different products ensures or facilitates a more economically and technically efficient transportation on routes where the cargo volume is insufficient under the circumstances that container ships, dry bulk carriers and other particular ships are all employed. On the other hand, large MPP vessels have large containers and bale capacity in holds, high handling capability of up to 80 tons, acceptable speed of sailing and relatively low building or purchasing price. However, the ships are comparatively less efficient in loading and discharging operations for above-mentioned goods.

Generally speaking, MPP vessels have distinct characteristics in ship design. Firstly, they have large hatches, which will expand the carrying capacity in holds. Secondly, dismountable tweendecks are installed on board for unpressurized cargoes or different kinds of commodities. Besides, for the heavy goods handling purpose, one or more rotating cranes or derricks are installed on the main deck with handling capacity of 40 to 50 tons or even more to hundreds of tons. What's more, combination of long holds with short holds is designed, enabling the vessel to carry and transport special general cargo.

4.1.2 Conventional Heavy lift

Heavy lift ships are that kind of ships designed to load and discharge special general cargos which are not be able to be handled by normally equipped ships, due to their handling capacity limitations. The term “heavy lift ships” has two classifications. One is semi-submersible ships, which will be described in detail in the following section 4.1.3. The other is conventional heavy lift vessels mentioned here, which manage to handle particular piece of special cargo by augmenting their loading and unloading facilities on board, especially under the circumstances of remote ports with inadequately equipped machinery or facilities.

For special cargoes, the movements between quay and ship are probably the most difficult part of operation. As a result, to meet the requirements of special cargoes, heavy lift vessels must be of high stability and constructional strength. Conventional heavy lift ships have cranes or lifts with over 100 tons capacity installed on board, enabling the ships to lift special general cargo on with super weight or length on and off the main deck. This type of vessels is better known as crane ships. The handling method adopted by conventional heavy lift vessels is named LO/LO method, by means of cranes with lifting capability of hundred of tons, from 150 tons to 500 tons, or even over 800 tons.

The conventional heavy lift ships are generally of a conventional appearance and look very much like MPP vessels from outside look. The holds on board are commonly of extreme length, width and height. These box-shaped holds can be adjusted into multiple decks. The main deck is suitable to carry extremely long special cargo up to 100 meters on it. Due to these features, this kind of ships is generally considered as the proper carrier for whole sets of equipments or project cargoes. That is to say, these vessels meet the increasing demand for modular or block shipments of fully

assembled plants or equipments. At present, a series of heavy lift ships in operation are capable of lifting around 600-tonne pieces of cargoes. A few ships are able to lift individual special general cargo units of up to 1,600 tons.

4.1.3 Semi-submersible Vessels

Semi-submersible vessel is one kind of merchant vessel which specializes in transporting extremely large and heavy but indivisible types of cargo with the weight of over 2,000 tons, e.g. offshore drilling rigs, production platforms, naval ships, submarines, heavy lift modules, container gantry cranes, floating cargoes (dredgers, barges, yachts, liftboats and other ships), large-scale seawater desalting equipments, etc. The special general cargos are commonly loaded by self-propelled trailers, skidding, lifting or floating them over the deck. In other words, the semi-submersible ships are able to support RO/RO, LO/LO, FLO/FLO ways of loading and discharging, but is more precisely known as FLO/FLO ships. The ship is able to submerge and raise its open deck by pumping in and out its ballast tanks in a process similar to floating dry-dock operation with a powerful ballasting system, allowing special cargo to be floated over, secured and landed on the deck.

Semi-submersible vessels have their characteristics in good stability and sea keeping quality. There is no fixed design, no special class notations or even no minimum standards for semi-submersible ships, although some of the ships share some similar particulars. Superficially, such ships are somewhat similar to bulk carriers or certain forms of oil tankers. Their ballast tanks have to be flooded to lower the main cargo deck below the water's surface before the special general cargo can be moved into proper position for loading. Then the ballast water in various tanks is pumped out, making the deck emerge from the water bearing the weight of the cargo.

Among the semi-submersible fleet, some are new buildings, while others are converted vessels, the majority of which take advantage of a tank with single hull as a basis. During 1980s, the industry had different copies, scale copies, variants, and conversions from tankers. However, conversion has its disadvantages in slow ballast capacity, reduced longitudinal strength, and limited powering propulsion. Different from the past, recent few years are witnessing the trend of semi-submersible vessels as larger vessels in terms of both beam and deck length, allowing the ship to carry lucrative larger goods. Some existing semi-submersible ships have been modified for years. For example, MV *Tai An Kou*, owned by COSCO Shipping, had its beam increased from 32.2 m to 36.0 m shortly after its delivery, for its deadweight capacity and stability improvements purpose. Another example is MV Blue Marlin, one of the largest semi-submersible vessels all over the world, which was jumboised in 2004 by widening its width to 63.0 m.

4.2 Fleet Number and Age Structure of World Specialized Vessel

4.2.1 Multipurpose Vessel

As is shown in Figure 8, the multipurpose vessel fleet was experiencing an increasing trend in the past 15 years. Especially since 2005 the increase has been significant, with a speed of over 2.5% each year. However, with the influential impacts from the global financial crisis, shipping companies tend to restructure their fleet, making the multipurpose fleet slightly decreased. In accordance with Drewry's analysis, since much of the project traffic is generated less susceptibly to a downturn in consumer demand, global financial crisis' impact on the MPP market is less forceful, compared with container and bulk shipping market. Therefore, the MPP fleet in 2009, constituted of 2931 vessels and 26,330,000 DWT in all, just lowered its development

speed to roughly 4.9% in number and 4.1 % in DWT, compared with respectively 5.6% and 5.0% growth in 2008.

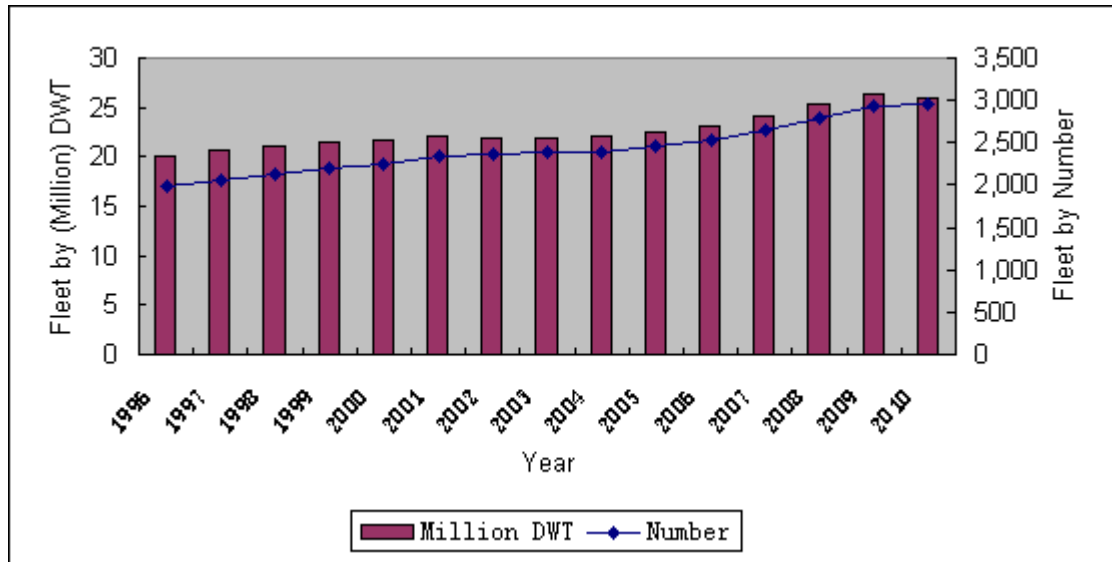


Figure 8 All MPP Fleet by Number and by DWT

Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010) based on Clarkson data.

The most significant impact on the MPP sector from the downturn of global economy is supposed to be demolition of MPP. Many of the older general cargo ships are likely to be and are actually scrapped. As is illustrated in Figure 9, the entire shipping industry demolished 109 multipurpose vessels in 2009, about 6 times more than that in the previous year, which had only 16 vessels demolished within the whole year. Although sharing more or less the same shipping market situation with 2009, the few years at the beginning of new century were witnessing a more peaceable attitude towards older ships. 55 MPP vessels were scrapped in 2000, while 49 in 2001, approximately half of that in 2009.

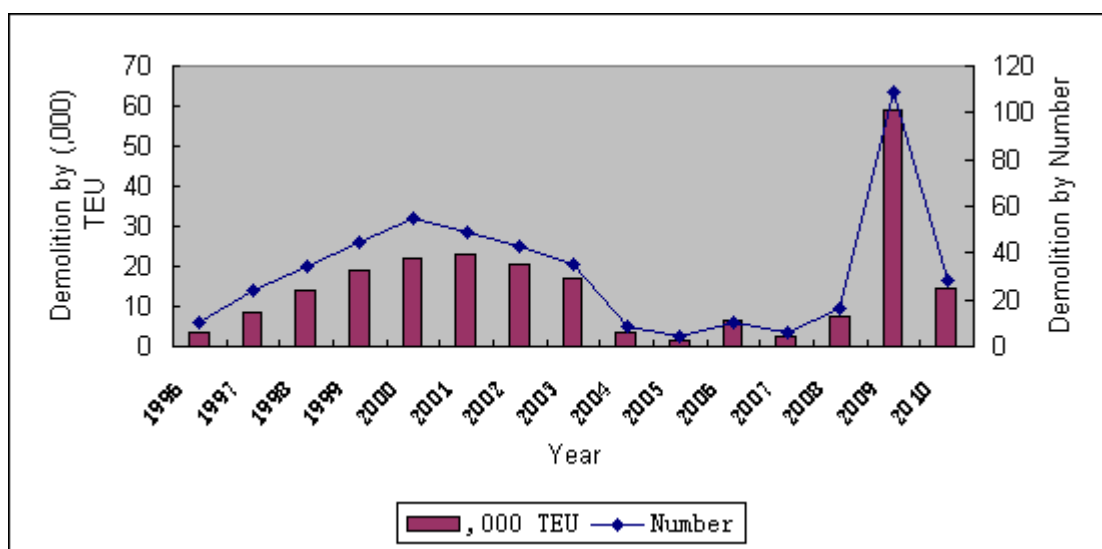


Figure 9 Total MPP Demolition by Number and DWT

Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010) based on Clarkson data.

The MPP vessels can be taken advantage of for special general cargo shipments are with over 10,000 DWT. Since 2006, 623 MPP vessels has been delivered and entered into the market, providing shipping capacity of altogether 5,578,498 DWT. One third of these vessels, exactly 208 units have been delivered, with the capability to transporting special general cargoes. The tonnage capacity accounts for over 50% of above-mentioned fleet.

Among all the MPP fleet, almost one third vessels are deployed for general cargo tramp shipping. Different with the all MPP fleet, the GCT fleet was going through a firstly increasing and later decreasing situation (See Figure 10). 2005 and its later few years are witnessing a steadily growing in the fleet size. This trend is positively proportional to the world economics and trading situation. It's obvious that 2008 was undergoing the fastest rising within the past 15 years, with an incredibly increasing rate of roughly 7.5% in both number and DWT sectors. The next two years after financial crisis is supposed to be a phase of adjustment, with a growing rate as much

as that in 2005, around 1%. On the basis of statistics from Clarkson, the total general cargo tramp fleet is of 799 units and 6,957,170 DWT in 2010.

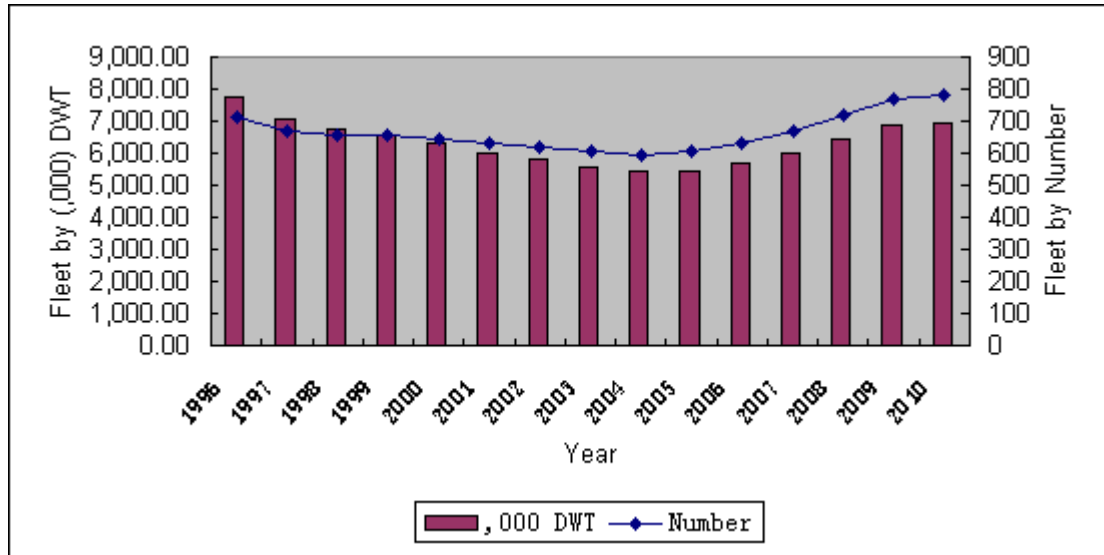


Figure 10 GCT Fleet by Number and by DWT

Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010) based on Clarkson data.

According to Clarkson data published in April 2010, in the near future, 134 general cargo tramp vessels will be delivered within 2010 to 2012. Nearly one third (32.8%) of the 134 vessels are above 10,000 DWT, with capacity of 553,300 DWT, 46.1% of total fleet capacity. In addition, only 35 general cargo tramp vessels were built in 2009, with a total capacity of 320, 379 DWT, which was a little more than 40% decrease compared with 60 vessels built in 2008, with totally 558,587 DWT in capacity. The number of newbuildings was even lower than that in 2005, which had 43 new general cargo tramp vessels with 377,466 DWT capacity built within one year. During the whole 2009, 11 units of vessels over 10,000 DWT was built, exactly half of that in 2008, falling back to the level of 2005. This phenomenon indicates that the majority of shipping companies have a negative or at least conservative anticipation over the future shipping market. Therefore, yearly new supply of multipurpose vessels

which is suitable for special general cargo transportation was reduced with the reductive demand caused by financial crisis.

From the demolition perspective (Figure 11), the trend is proved once again closely related to the economical situation. In 2009, the year right after the global financial crisis, there were 21 units of general cargo tramp vessels, altogether 253,110 DWT capacity demolished. This figure is 7 times of that in 2006, 2007 as well as 2008, falling back to the demolition amount at the beginning of the new century.

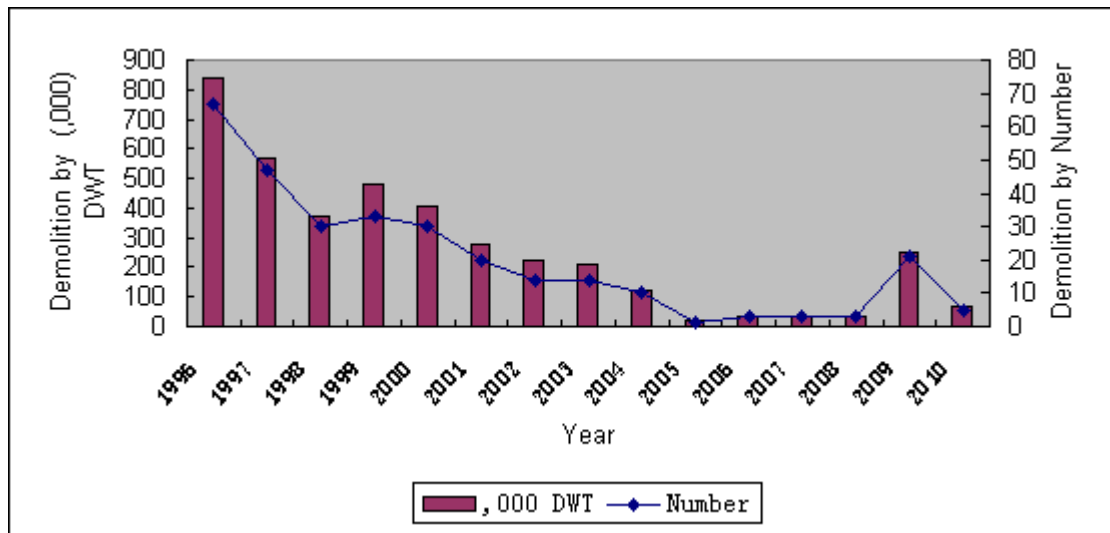


Figure 11 Total GCT Demolition by Number and DWT

Source: Drawn by the author ©Copyright Weng Xingyue 2010 WMU-SMU,(ITL 2010) based on Clarkson data.

To sum up, the MPP fleet structure is always changing with the economical situation with a little lag. A large amount of new vessels are continuously delivered even if the market is decreasing. It's estimated that the delivery amount will reach a peak in 2010. On the other hand, according to internal data from COSCO Shipping, older ships with over 25 years in service occupy 35% of the total MPP fleet. During market downturn or recovery period, the demand for vessels was limited. As a result, accelerated

demolition strategy of aging vessels was commonly adopted to release the pressure of delivery of newbuildings. On the whole, the delivery amount is a little bit higher than demolition amount, making the whole fleet sequentially developing.

4.2.2 Semi-submersible Vessel

Capital's demand for profit lures more independent investors and shipping companies to enter the semi-submersible shipping market. According to researches from Nobel Denton, by the end of 2009, 25% of the semi-submersible vessel fleet had been operated by new entrants. It is estimated that the percentage will be increased to 40% by 2013. The fleet size has almost doubled since 2006, caused by conversions from tankers or barges as well as new builds. On the one hand, the nine new ships added to the global semi-submersible fleet from 2009 will all be new buildings. On the other hand, since 2008, over ten converted semi-submersible vessels have been bought into operation. The market can anticipate 60% growth in the fleet size by 2013, compared with the situation in 2006. For the above-mentioned reasons, great changes occur in the market nature. The semi-submersible market is no longer a monopoly market, but a monopolistic competition market instead. In other words, the market is dominated by a few key operators, including Dockwise, OHL, COSCO, Fairstar with competition between them.

With respect to the current fleet size, Dockwise is considered to the leader shipping company in semi-submersible vessels. At present, the company operates a fleet of 20 semi-submersible vessels of different designs and concepts, which is absolutely the largest fleet of specialized vessels in the world. Other operators are new entrants in the new century, with limited vessels in procession. COSCO Shipping and Fairstar own 2 units of open-deck semi-submersible vessels respectively. Offshore Heavy

Transport (OHT) has 4 heavy lift vessels with closed decks, all of which are converted from tanker vessels. The current fleet size for above-mentioned operators is shown in Figure 12.

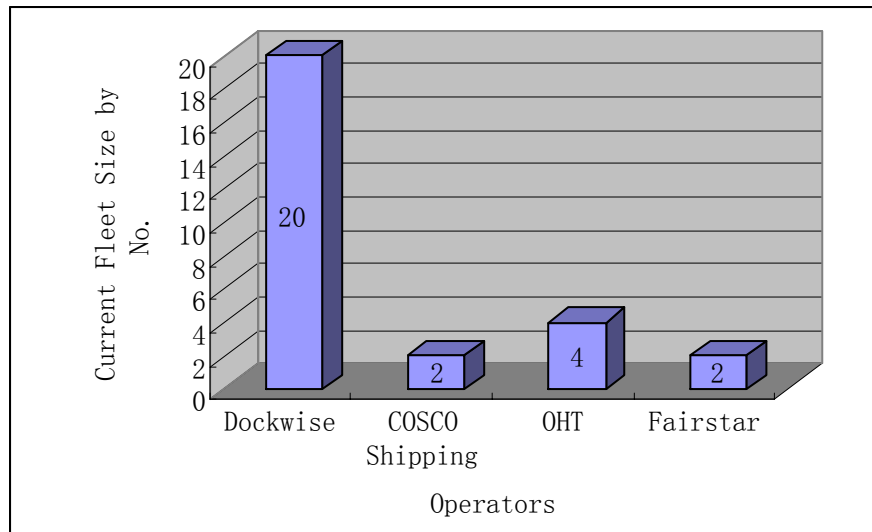


Figure 12 Current Fleet Size for Operators by No.

Source: Drawn by the author ©Copyright Weng Xingyue 2010 WMU-SMU,(ITL 2010) inspired by Semi-submersible Vessel Market and Competitors Analysis (2008)

Concerning the total fleet carrying capacity of each operator, the fleet of Dockwise includes 5 flat-deck, open-stern Heavy Marine Transportation (HMT) vessels, 10 traditional closed-stern HMT vessels, 2 dock-type vessels and 3 vessels exclusively dedicated to yachts transportation, total capacity of which is over 756,000 DWT. Among the 20 units, 6 ships are converted from tankers, with cargo capacity of 30,000-40,000 tonnes and 4 are HMT vessels with tanker capacity, with cargo capacity of 15,000-20,000 tonnes. The largest vessel of Dockwise can transport special general cargo up to 73,000 tonnes. With 2 semi-submersible vessels, COSCO Shipping has carrying capacity of 40,800 DWT in total. The carrying capacity of OHT's 4 units of fleet is 173,000 tonnes in total. One of the two vessels owned and operated by Fairstar is 24,500 DWT and the other is 19,300 DWT. (Figure 13)

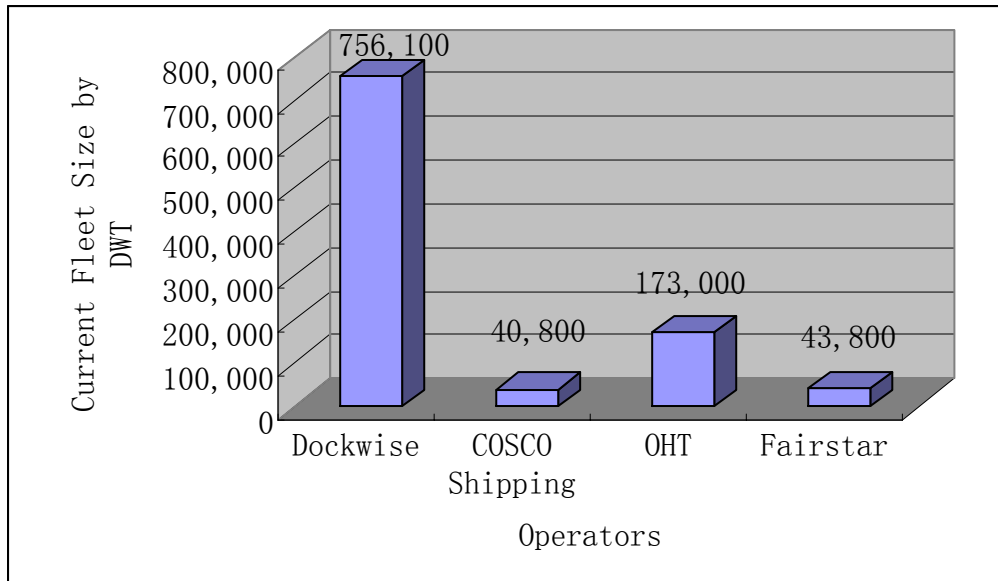


Figure 13 Current Fleet Size for Operators by DWT

Source: Drawn by the author ©Copyright Weng Xingyue 2010 WMU-SMU,(ITL 2010) inspired by Semi-submersible Vessel Market and Competitors Analysis (2008)

Average age of fleet operated by each operator varies, because some vessels are newbuildings while others are conversions (See Figure 14). In general, converted vessels are about 20 years or more. Dockwise fleet has the average age of approximately 23 years. Among these vessels, 12 are over 20 years old. Dockwise also try to extend the life of its fleet by undertaking special life extension programs for particular vessels periodically. Both COSCO Shipping and Fairstar have a comparatively young fleet with average age of, respectively, about 7.5 years and 10 years. All ships of OHT were former tankers originally built in the 1980s, thus make the average age of the fleet to about 23 years. However, the vessels are expected to have an operation life of at least 20 years since the conversion date.

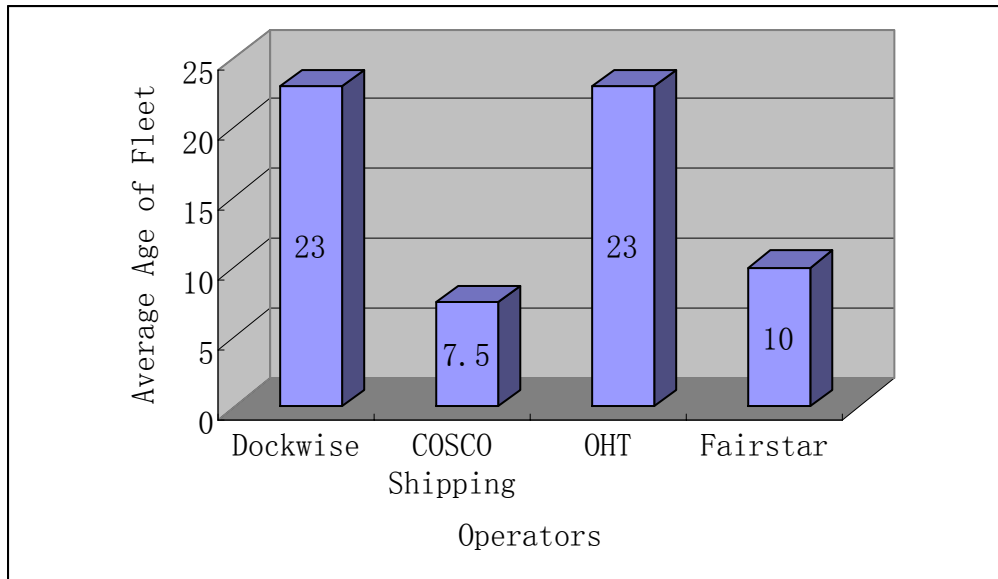


Figure 14 Average Age of Fleet for Operators

Source: Drawn by the author ©Copyright Weng Xingyue 2010 WMU-SMU,(ITL 2010) inspired by Semi-submersible Vessel Market and Competitors Analysis (2008)

Regard to the fleet trend or expansion plan for each operator, Mighty Servant 3 went back to the fleet after repairs in 2008. However, it is estimated that Mighty Servant 1 and Mighty Servant 3 will retire in 2013 and 2014 one by one. Four flat deck with tanker capacity vessels, namely Swan, Swift, Tern, and Teal, will retire since 2011, one ship one year. COSCO Shipping has ordered 2 brand-new 50,000 DWT semi-submersible vessels, which will be delivered within this year. Some companies are just planning to enter the specialized vessel market. SeaMetric will have 2 units of 35,000 DWT semi-submersible vessels delivered in 2010 and another 2 to 6 vessels built in 2012. The future fleet size will be expanded to 4 to 8 units. RollDock, another new entrant to the market, has a new build fleet of eight vessels. The company planned to build 2 or 3 semi-submersible vessels which will be delivered from 2010 one by one. Shown by Figure 15, it's obvious that Dockwise is adjusting its fleet structure, while other major operators are coincidentally taking measures to expand their fleet size more or less. Generally Speaking, the world fleet of semi-submersible

vessels was increasing dramatically in the past five years, from 2006 to 2010 and will remain steady in next half decade.

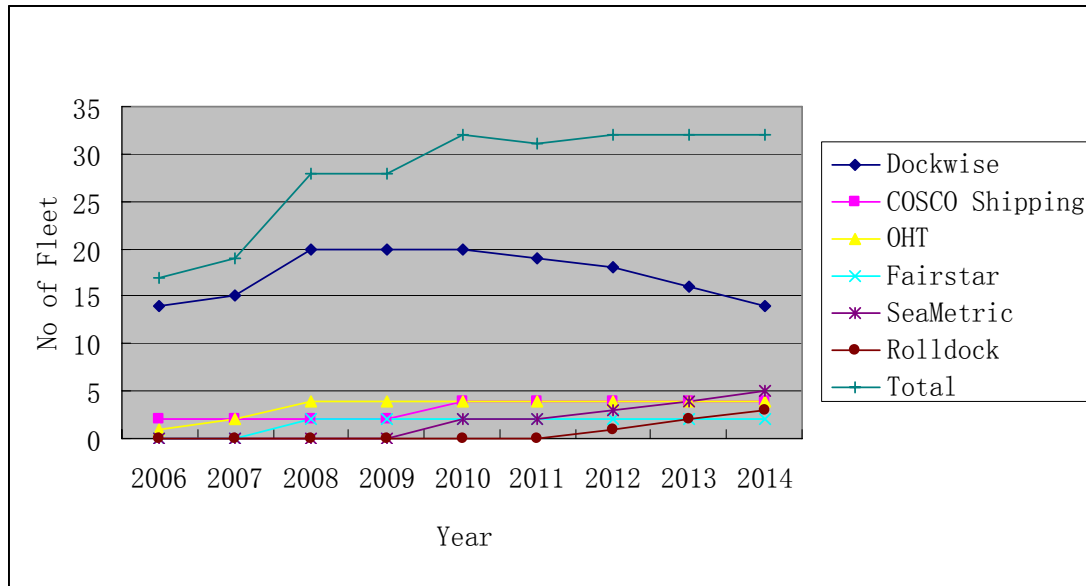


Figure 15 Future Fleet Expansion for Operators

Source: Drawn by the author ©Copyright Weng Xingyue 2010 WMU-SMU,(ITL 2010) inspired by Semi-submersible Vessel Market and Competitors Analysis (2008)

There is also another point worthwhile to be mentioned. Although Shanghai Zhenhua Heavy Industry (ZMPC) is a famous heavy-duty equipment manufacturer, whose core competence is cranes, heavy-duty steel structures and offshore heavy-duty products, it has its own shipping fleet to transport and deliver its products to all over the world. Among the fleet of 26 units of 60,000 to 100,000 DWT ships, two vessels are semi-submersible self-propelled ships. Up until 30 June 2009, the fleet of ZMPC had successfully transported 1355 quayside container cranes, 1598 rubber-tyred gantry cranes, 286 rail-mounted gantry cranes, 25 portal cranes, and 106 ship loaders since the middle of 2000⁷.

⁷ Transportation Records (2009). From <http://www.zpmc.com/www/51/2009-07/125.html>

4.3 Freight Rate of Special General Cargo Transportation

4.3.1 Current Situation of the Hire Rate

Compared with the three main shipping markets, namely dry bulk, containers, oil and tanker markets, the special general cargo shipping has the obvious features of relative independency of the market, less fluctuation, and comparatively lagging in the market trend. Even so, the special cargo market does not become a fortunate exception in the event that global financial crisis brought about strong impacts on economies, trade and other related or derived markets. Before the middle of 2008, the market was developing healthily, with stable cargo volume and freight rate. However, the situation turned reverse in the latter half of the year. Shrink of trade volumes of special general cargo and drop in the demand led to the significant slump in the freight and hire rate.

In the specialized vessels sector, there is no freight or hire index published by shipping consultant institutes for heavy lift vessels or semi-submersible vessels. Clarkson 17,000 DWT multipurpose vessel index is considered as the key barometer of multipurpose vessel shipping market or even specialized vessel shipping market. The multipurpose shipping market benefited from increasing freight and hire rates in 2007 and the first half year of 2008. It's mentioned in Drewry's report *Annual Multipurpose (MPP) Vessels Market Review & Forecast 2009* that the larger multipurpose vessels with over 20,000 DWT reached record rates during 2007, averaging a 44% increase on the previous year. Even the vessels within 10,000 to 15,000 DWT range achieved a healthy 25% increase in 2007.⁸ As is demonstrated in Figure 16, soon after the daily hire of 17,000 DWT multipurpose vessels historically

⁸ Brochure of Annual Multipurpose (MPP) Vessels Market Review and Forecast 2009, from http://www.drewry.co.uk/get_file.php?id=1175

reached the peak of 22,000 USD in the middle of 2008, the market plummeted. The hire rate stopped at 7,000 USD by the end of February in 2009. The average rate in 2009 was 7400 USD, 58% decline from the previous year.

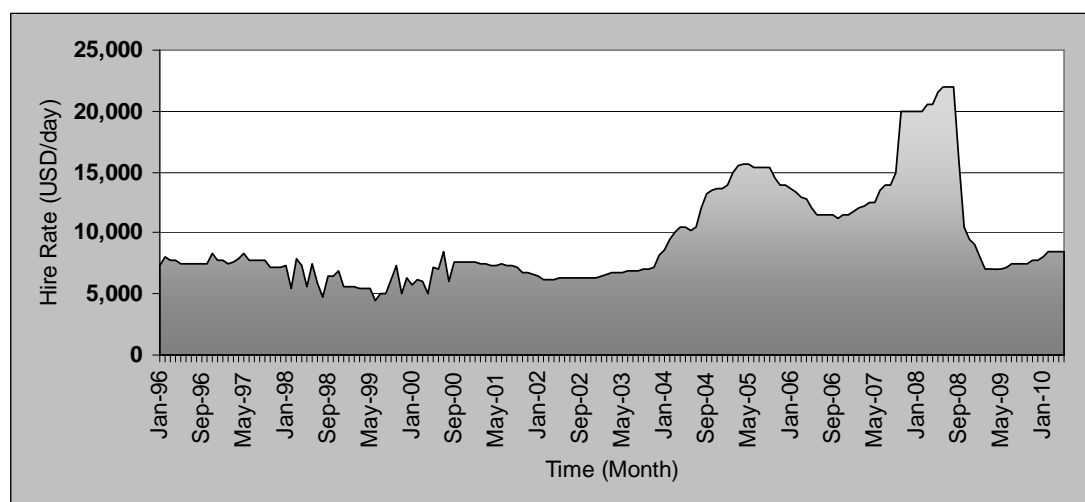


Figure 16 Trend of Hire Rate for 17,000 DWT Multipurpose Vessel
 Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010)
 based on Clarkson data.

It is a fact that each market will have market cycles with four stages, namely, trough, recovery, peak, and collapse. On the basis of the index in the past 15 years, the hire rate was fluctuating below 10,000 from 1996 to the beginning of 2004. As soon as March of 2004 started, the market began to climb up, and reached the first peak of 15,700 in April 2005. Then the market declined, with a trough of 11,250 by October in 2006. After that, the market was experiencing a rocketing recovery period and peaked once again with the prosperity of global economies. Unfortunately, with the breakout of global financial crisis, the multipurpose vessel market collapsed to bottom within exactly half a year. At present, the market is undergoing a slow but stable recovery.

4.3.2 Hire Rate Forecasting

As is represented in the trend within the recent 10 years, the market cycle is irregular. However, since the global economy is recovering slowly, we can positively anticipate a continuous recovery in the shipping market at least in the next two or three years. Forecasting can be made to support this point of view.

With respect to forecasting, there are several methods, such as Moving Average Method, Weight Moving Average Models, Exponential Smoothing Model, etc. Hereby the author would like to use Trend Prediction Model to forecast the future hire rate trend of the multipurpose vessels. Insert figure of X Y scatter into one spreadsheet and add different kinds of trend lines, such as linear, logarithmic, multinomial, power and exponent functions. The functions and respective values of R^2 are as follows:

$$\text{Liner Function: } y = 116.54x + 6681.3, R^2 = 0.9302$$

$$\text{Logarithmic Function: } y = 625.07\text{Ln}(x) + 6473.6, R^2 = 0.7351$$

$$\text{Multinomial Function: } y = 3.7202x^2 + 53.3x + 6871, R^2 = 0.9461$$

$$\text{Power Function: } y = 6543.1x^{0.0817}, R^2 = 0.753$$

$$\text{Exponent Function: } y = 6730e^{0.0151x}, R^2 = 0.9376$$

After comparing the values of R^2 in the above-mentioned five functions, we can easily conclude that the trend is more closely related to the multinomial function owing to the higher value of R^2 . The trend line is shown in Figure 17.

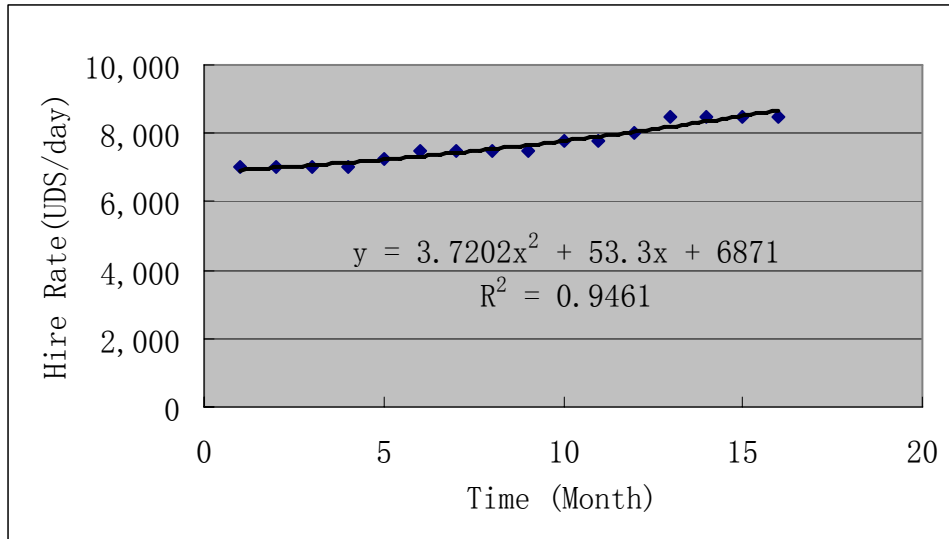


Figure 17 Trend Line: Relationship between Hire Rate and Month

Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010)

Note: The month 0 is counted from February of 2009.

On the basis of the formula $y = 3.7202x^2 + 53.3x + 6871$, at the current recovering speed, the hire rate will be back to 10,000 at the beginning of 2011 and climb up to 20,000 in June in 2013 if the world economy climate allows (Shown in Figure 18). Looking back to the situation before global financial crisis, the shipping market is surprisingly prosperous, which is deemed abnormal from the historical perspective. It's generally held by insiders that it is not likely for the shipping market to recover to the level before global financial crisis with little difficulty. Therefore, we do not expect the emergence of highest 22,000 point once again. However, it can not be denied that with the picking up of overall trend, we can at least anticipate the anabiosis of multipurpose vessel market in the next two or three years. What's more, as a result of regaining demand of special general cargo shipping as well as a popular trend to develop multipurpose vessels with sufficient tonnage and extra lift capability for special general cargo transportation, the special general cargo shipping market is supposed to go through a brand-new stage of prosperity.

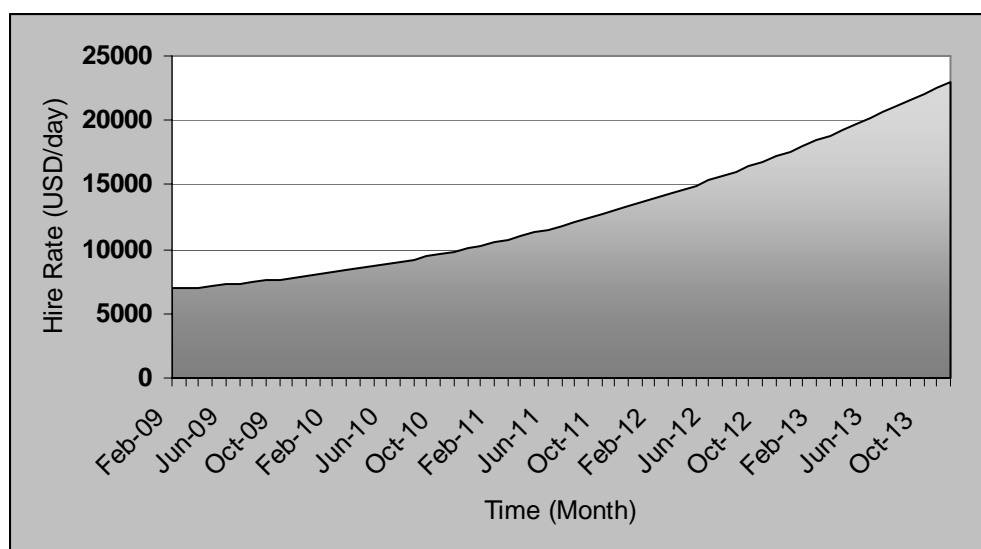


Figure 18 Forecast on the Future Hire Rate for Multipurpose Vessels

Source: Drawn by the author ©Copyright Weng Xingyue WMU-SMU,(ITL 2010)

Chapter 5 Implications for Special General Cargo Shipping Companies

5.1 To Develop Competitive Fleet

In real practice, a competitive fleet has several distinct features, which ensures the core competence of the shipping companies. Firstly, the fleet should be well organized with sufficient transportation capacity, which is able to meet the demand of the fluctuated market accordingly. Secondly, the vessels are required to have superior performance in cargo worthiness. In other words, a competitive fleet is able to carry as many types of cargo with different dimension, different weight and different shipping requirements as possible. Thirdly, a competitive fleet is often equipped with advanced machinery and equipments for navigation and handling procedures on board its vessels. In addition, for a competitive fleet, the costs of single vessel should be lowered as much as possible in terms of shipbuilding or financing. What's more, a competitive fleet also has the capability of adjusting its structure with the current

situation and future development trend of the market. Last but not least, a competitive fleet should be environmental friendly, complying with the relevant international maritime regulations on environment protection.

Involved in the special general cargo shipping business, a shipping company is probably confronted with the urgency and necessity of organizing its fleet in pursuit of its development and prosperity. Firstly and most importantly, shipping companies are supposed to have a clear self-positioning and version for future development. They have to answer the questions like: “What achievements we have made” “Where will the overall market go” “Is there any new demand or emerging markets to explore ” “What goal should we achieve in the future” before drawing a conclusion. In most cases, the strategy adopted for the fleet development is to lower the average age of fleet and to expand the scale of the fleet capacity.

By right of analysis discussed in Chapter 3 and 4, it is easily concluded that in the long term perspective, the demand for transportation of special general cargo is expecting to grow. Especially, recent years are witnessing the dramatically investment in offshore energy exploration, which generates higher standard for specialized vessels. However, in the supply side, the current fleet is aging and simplex. There is limited number of carriers who has diversified types of vessels such as multipurpose vessels, heavy lift vessels or semi-submersible vessels. Therefore, it is essential for carriers in this segmented market to optimize the fleet structure according to the market demand. Since we are going through the post global financial crisis era, the demand for special cargo transportation is recovering gradually, and the shipbuilding price is comparatively low. As a result, it is probably the right time for those powerful companies to restructure the fleet. In light of their own strength and capability, the

companies are likely to make measures to identify and follow the future development trend for specialized vessels, such as larger tonnage, higher lifting capability, increasingly advanced technology and precise instrument, etc. On the one hand, newbuilding ships with specific capabilities are ordered, following preferential policies or taking advantage of the lower price in the downturn. On the other hand, the carriers can select to scrap or sell some old vessels of limited tonnage and capacity due to the oversupply transportation capacity during market downturn. What's more, purchasing secondhand vessels with the capabilities requested at a competitive price can be another reasonable solution for traditional shipping companies.

5.2 To Organize Liner Services

At present, most containers and some general cargoes are transported in terms of liner shipping. In liner shipping sector, majority of general cargoes are break bulk cargoes. Theoretically speaking, some bulk or heavy lift cargoes can enjoy liner service as well. However, it is a fact that most special general cargoes are still shipped by means of tramp shipping currently. Consequently, it will be a worth-trying solution for traditional special general cargo shipping companies to open up new markets and provide regular liner services.

Liner shipping is one shipping method that the vessels are deployed by liner shipping companies to provide regular transportation services to various shippers or cargo owners, by calling at particular ports on particular routes, following the scheduled made before, and collecting freight on the basis of the rate on the freight tariff. In early stages, liner shipping was mainly used for general cargo transportation by sea. General cargo liner shipping has a lot of advantages for cargo owners. Firstly, they can expect their cargoes to be delivered at the port of destination timely and speedily.

Secondly, the liner shipping is able to satisfy the demand for sea transportation of general cargo with small scale. In addition, the shipping pattern is capable of ensuring the quality of cargoes after transport. Last but not least, shippers will benefit from the convenience of liner shipping in special cases, because the liner shipping companies are responsible for transshipment. By the later 1990s, the traditional general cargo liner shipping has been gradually taken place by container liner shipping. Container transport has its non-controversial merits of speedy delivery, convenient loading and discharging, efficient operations, easy for through transport, etc. Shippers will enjoy more benefits of higher quality and faster speed from container shipping, compared with from traditional general cargo liner shipping.

Except for shippers or cargo owners, the liner transportation is favorable for shipping companies as well. Due to the shortened transit time of cargoes, enhanced quality of transportation, and value-added door-to-door services, the shipping companies will be able to easily achieve customers' satisfaction and develop customers' loyalty accordingly. Besides, with reduced transit time in liner shipping, especially lowered time at port, a considerable sum of operation cost can be saved and shipping companies also have the opportunities to execute more voyages in a fixed period of time. Thus shipping companies will enjoy the advantages of cost-saving and efficiency. Moreover, by maintaining their competitive status on particular liner routes, shipping company will enhance their attraction to the new shippers in the surrounding areas along the routes, generating a huge agglomeration effect to the markets nearby. In a word, liner shipping is concluded to be an effective way for traditional special general cargo shipping companies to ensure stable cargo collection, heighten their popularity, and improve market competitiveness.

However, it is still worthwhile to mention that one of the preconditions for liner shipping is that there must be sufficient and stable commodities for shipment on routes. How to seize the commodities and maintain their competitive status in front of other competitors is one of the urgent questions confronted with shipping companies who have the intention to open up liner shipping market.

5.3 To Provide Project Logistics Services

Special general cargoes are those large and heavy cargoes which are not easily moved or transported. Shippers would like to enjoy as much convenience and added value as possible from the transportation services. It is a common practice of the majority of shippers to turn to logistics companies, which provide professional and personalized project logistics services for help. Logistics companies traditionally outsource the sea-leg transportation to shipping companies. Carriers only cover part of through transit in the whole logistics chain. Therefore, project logistics service has the potential to become a new profitable business for traditional special cargo shipping companies.

Project logistics is to plan, manage and undertake the transportation of specific logistics projects of any scale covering the whole journey from origin to destination by means of project management. Typical projects are infrastructure investment and construction projects, such as petrochemical industry, electric power, metallurgy industry, environmental protection engineering, etc. Compared with other logistics service, project logistics handles special general cargo with special characteristics. First, the cargoes handled are of various types and with great complexity. Second, the cargoes for shipment are of large scale or with heavy weight and oversized dimension. What's more, the equipments and materials of the projects are purchased from all over the world, in the relatively concentrated supply time and with large volume.

It is commonly believed that project logistics has undeniable advantages for the shippers of special general cargoes. Since the transportation cargoes have their own characteristics and personalities, project logistics is designed to provide personalized solutions for various types of goods on the basis of the features of the projects, to meet the requirements of different shippers and customers. By means of enjoying professional services in logistics, the project investors will receive the best security and convenience. Besides, the cost of project, especially the transportation cost will be significantly reduced. What's more, the speed of project construction will be accelerated and ensured.

Logistics providers create added value and earn profit from providing project logistics services to project investors and operators. Similarly, special general cargo shipping companies will benefit a lot from developing project logistics services. On the one hand, there is large room for improvement in market potential and development prospects in the project logistics sector. With the acceleration of global economical integration, engineering and projects are spread all over the world, providing a competition and cooperation platform for shipping companies providing logistics services as well as for logistics providers. On the other hand, focused on the shippers' demand and requirements and extending their service range from port-to-port to door-to-door, traditional shipping companies will achieve their core competence and bring about competitive advantages in the special general cargo shipping market. In addition to maintain high quality of their seaborne transportation service, the traditional shipping companies have to coordinate transportation, storage, handling, packaging, processing, distribution, management information processing and other basic procedures. As a project service provider, one specialized vessel shipping company will offer new services such as door-to-door consulting and solutions, end-

to-end cargo management and tracking, supervision of loading and discharging operations, inland transportation and scheduling, etc. In the event that one shipping company provides above-mentioned differentiated services which have no substitutable products from its competitors, project logistics services become one core competence of the carrier beyond doubt. Thus the shipping company earns profit.

In conventional practice, owing to the features of logistics project, namely, complex operation technologies, high risks in transit, and high requirements on quality, the qualified service providers have to achieve its competitive advantage in either transportation capacity, heavy-lift transportation, or freight forwarding. In the specialized vessel market, there are few competitors and nearly each competitive shipping carrier, who has its special cargo maritime transportation services, has the potential to become the project logistics service provider. To sum up, the author recommend developing project logistics services as a reasonable and promising solutions for specialized vessel shipping companies.

5.4 To Upgrade Management Quality

Special general cargo shipping market is a capital-intensive market with advanced technology and complex operation management. As a result, it is essential for traditional special general cargo shipping companies to upgrade their management quality. On the one hand, the companies have to strengthen their operation management. Firstly, make great efforts to reduce operation costs with scientific method. Secondly, reduce maintenance and repairing costs under the premise of ensuring routine daily operation. In addition, take advantage of advanced information system to raise the efficiency of enterprise management. Therefore, the rationalization of resource allocation will be fully accomplished.

On the other hand, it is more important to form a dependable talent group, for the reason that business competition is based on talent, and the quality of staff is the primary productive force. The qualified staff involved in specialized vessel shipping industry, are required to have professional knowledge and comprehensive understanding of fluctuant market situation in and abroad as well as various clients' demand. Besides, they have to possess years of experience on shipping operation, ship management or enterprise management. All these employees should be capable of keep the fleet under better operation state, and design personalized transportation scheme for particular customers. By satisfying clients' differentiated demand, the shipping companies will gain their competitive advantages in building up influential brand.

Chapter 6 Conclusion

Under the background of globalization and elaboration, the demand for special cargo seaborne transportation is growing significantly, thus creates a new special general cargo shipping market. However, as an emerging market, the special general cargo industry has not received enough attention in neither practical nor academic world, compared with container and dry bulk shipping business. That is why the author conducts this research paper- one purpose is to make up the research gap; the other aim is to give enlightenment to decision makers.

The author firstly conducts a bird's eye view of the special general cargo shipping market, introducing main handling methods of special cargo, as well as features and current situation of the market. After massive information collection, analysis and research, the author examines the market through both demand and supply point of

view. In demand sector, the commodities with special requirements for loading, shipping, and discharging are classified. Meanwhile, the demand from oil and gas industry is analyzed in detail by volumes and regions. On the other hand, in supply sector, different types of specialized vessels, including multipurpose vessels, traditional heavy lift vessels and semi-submersible vessels, and their fleet size are carefully discussed. What's more, a forecast of the hire rate of multipurpose vessels in the next 2 or 3 years is made in the thesis, on the basis of 17,000 DWT multipurpose vessel indexes, with one forecasting method named trend prediction model. It is essential to mention that global financial crisis has been taken into consideration in this dissertation. Although the special general cargo shipping market can not be an exception from the impacts of global financial crisis, it is still proved as a very promising market with tremendous development potential.

Traditional shipping companies who are involved in special general cargo shipping market, have great room for improvement. Firstly and most significantly, to seek and maintain their core competence, they have to take measures to develop a competitive fleet. Secondly, they can try to enlighten their popularity and enhance their market competitiveness among customers by organizing liner shipping services. What's more, the carriers or operators should offer project logistics services to meet the requirements of cost-saving, convenience and efficiency from shippers or cargo owners. Last but not least, the shipping companies have to strengthen their operational management and talent group building to realize rationalization of resource allocation and build up influential brand.

As the proverb goes, every bean has its black. This dissertation can not be perfect, due to unavailability or inaccessibility of certain information, such as hire rate or freight

rate of heavy lift or semi-submersible vessels, seaborne volumes of infrastructure construction equipments and machinery, etc. However, by introducing plain information of the special general cargo shipping market and coming up with immature suggestions for shipping companies involved, this humble dissertation is only supposed to serve as a modest spur to induce other valuable contributions. The author hopes that with the development and flourish of the special cargo market, the study in this field can be more profound and far-reaching.

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