8-23-2014

Study on Panamax fleet operating strategy of Sinotrans Shipping

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Study on Panamax Fleet Operating Strategy of Sinotrans Shipping

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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

2014

Declaration

I certify that all the material in this research paper 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 research paper reflect my own personal views, and are not necessarily endorsed by the University.

Li Bochang

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Supervised by

Professor Shi Xin

Shanghai Maritime University

Acknowledgement

My deepest gratitude goes first and foremost to Professor Ma Shuo, who gave me an offer for postgraduate learning in last 2 years, as a representative of World Maritime University. I am also greatly indebted to all the professors and teachers in this program who have instructed and helped me a lot in the past two years.

Second, I would like to express my heartfelt gratitude to Professor Shi Xin, my supervisor, for his constant encouragement and guidance. He has walked me through all the stages of the writing of this thesis. Without his consistent and illuminating instruction, this thesis could not have reached its present form.

Last my thanks would go to my beloved family for their loving considerations and great confidence in me all through these years. I also owe my sincere gratitude to my friends and my fellow classmates who gave me their help and time in listening to me and helping me work out my problems during the difficult course of the thesis.

Abstract

Title of research paper: **Study on Panamax Fleet Operating Strategy of Sinotrans Shipping**

Degree: **Master of Science in International Transport and Logistics**

In 2008, the global financial crisis came unexpectedly with effects spreading all over the world, and caused serious impact to the international financial system. Till now, many countries have not got rid of its deep influences, and the shipping industry which developing based on the international trade is one of the worst-hit industries. Since shipping industry is faced with the overcapacity problem, the freight rate declines dramatically. For this reason, part of the shipping companies went bankrupt due to the lack of fund, and the rest shipping companies are still struggling in the operation.

Panamax dry bulk carriers play an important role in the international dry bulk shipping market. How to recognize market trends in Post-crisis era and hoe to determine the future development direction have become the most concern of shipping companies while operating Panamax fleet.

In this thesis, the author will stand at the shipping company's perspective, to make research of the Panamax fleet operating strategy of through the combination of qualitative method and quantitative method. Firstly, the author will analyze the current situation of the Panamax fleet under Sinotrans Shipping Limited (here in after referred to as "Sinotrans Shipping"), sum up the main problems existed in the process of its operations, and then conclude accurate judgments of the internal and external environment of the company. Secondly, the author will analyze the present

situation of the world Panamax fleet and make reviews on dry bulk shipping market. Thirdly, the author will make forecast about the shipping volume of the major cargos (such as coal, grain, iron ore) carried by Panamax through applying the Combination Forecast Method and about the supply and demand situation of these cargos. Furthermore, based on the afore-mentioned, the author will further advance operating strategies and advices for the Panamax fleet operation. And in the final, the author will make summary the full thesis.

Key Words: Panamax Dry Bulk Carrier; Fleet Operating; Combined Forecasting; Operating Strategy

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List of Abbreviation

BDI	Baltic Dry Index
DWT	Deadweight Ton
FFA	Foreign Freight Agent
RPC	the People's Republic of China
ISM	International Safety Management
IMO	International Maritime Organization
PSC	Port State Control
WTO	World Trade Organization
CIS	Commonwealth of Independent States
ISPS	International Ship and Port Facility Security
IACS	International Association of Classification Societies
GPS	Global Positioning System
MPP	Multi-Purpose Vessel
LNG	Liquefied Natural Gas
BPI	Baltic Panamax Index
MSE	Mean Squared Error
COA	Contract of Affreightment

Chapter 1 Introduction

1.1 Background

The international dry bulk shipping market, as a significant component of the whole shipping market, is undergoing a dramatic fluctuation due to the influence of the international economy, politics, laws, environment and other factors. Especially since 2008, the market has experienced drastic ups and downs, and has dropped from the top and hit the bottom. In the post-financial crisis, the market doesn't perform well, and the current condition is so severe. Especially in the first half year of 2012, the BDI is even lower than 1,000, which is the most depressed period not only since the launch of BDI but also since the financial crisis.

In the post-financial crisis era, the dry bulk market is full of volatility and unpredictability, which have influences on both demand and supply. It has been a hard time for the whole shipping industry and the ship owners suffered a lot because the freight is still wandering at a low level. However, rising signals have been sent by the digestion of overwhelming tonnages and mitigation of conflict between demand and supply. At this critical moment, the traditional European ship owners become so crazy about ordering dry bulkers, especially those Greeks. The new building market is on a way up under the driver of such craziness. Recently, Chinese central government intends to motivate the dominance of Chinese shipping groups, depending on the fact that Chinese-owned tonnages have seized the top five in the world. Due to the lately issuance of scrapping policy, those main Chinese shipping groups who are still have financial troubles placed a large amount of new building orders, in regardless of the overcapacity problem world widely.

Figuring out how to keep the same pace with market change, how to have a proper insight in where the market is going, and make corresponding strategy adjustment, will greatly contribute to perfecting the shipping company with a Panamax fleet for largest profits.

With regard to the above basis, this thesis aims to combine current situation and future trend of shipping market, along with Sinotrans Shipping's operating of Panamax fleet, in order to analyze the general environment and condition face by Panamax. And the author will make analysis and shipping volume forecast of major cargos carried by Panamax. Afterwards, relevant operating suggestions for Panamax fleet on will be proposed given for valuable purposes.

1.2 Literature Review

Dry bulk shipping industry is an important part of the world shipping industry. The international dry bulk shipping market has already been studied deeply. There are many famous international shipping agencies, professional colleges and universities are engaged in dry bulk shipping market research, such as ISL, Drewery and Clarkson, and these institutions systematically analyze supply and demand situation for dry bulk shipping market, make forecasting of the future development trend through combining qualitative and quantitative methods, and published their study result in the form of the statistical data report. The studies on the development of international dry bulk shipping market play a positive role, and are significant researching the management strategies of dry bulk shipping enterprise companies.

In China, a comprehensive monthly publication named Maritime China, which is administrated by the Ministry of Communications of PRC and sponsored by China

Ocean Shipping Companies Group (COSCO Group), makes regular review and trend forecast with regard to the international dry bulk shipping market, and the content also includes a large number of research reports about dry bulk shipping. In addition, there are many other journals publish similar reports.

Yu Hongtan makes a qualitative prediction of the medium and long term dry bulk market development prospect through the analysis of the affecting factors of international dry bulk market movements, and puts forward the corresponding strategies.

Miao Fenglai using time series model of econometrics and the general model of time series to forecast seaborne volume of the world dry bulk market compare the prediction results, and puts forward bulk fleet development suggestions according to the international dry bulk fleet structure analysis.

Sun Jun makes preliminary analysis for dry bulk fleet and vessel development tendency and uses time series model to make relevant quantitative analysis and forecasting.

Chen Yougu analyzes the current operation status of the dry bulk carriers and Studies the constraints and influencing factors existed during the dry bulk carriers' business development.

Chen Shiguang, Zhao Xiaoyan，comprehensively analyze the international dry bulk shipping market, including the analysis of the current supply and demand for four major cargos, and analysis of the dry bulk fleet scale and ship age structure.

Yu Hua, studies on the operating strategies of the dry bulk fleet owned by Far-East Holding Group. Including firstly making statement on the current situation of the dry bulk shipping industry and the Far-East Holding Group, and secondly analyzing the internal and external environment， especially the existed issues, and finally proposing practical countermeasures and suggestions in accordance with the status of the shipping market in which the Far-East Holding Group lies.

You Xuehai, analyzes the shipping market of the Handysize carrier and forecasts its development tendency mainly from three aspects, including the transport demand， transport cost and freight rate.

Yang Limei, holds the opinion that the shipping enterprises must enhance the strength from technology to talent, information to management, quality to services, so that they can work against the external challenge.

The afore-mentioned studies have significant referential meaning for the study of this thesis, and this thesis is completed on basis of the previous research results to make analysis and research on the Panamax fleet operating strategy of Sinotrans Shipping.

1.3 Research Purpose and Methodology

In this thesis, the author combines the qualitative method with the quantitative method, and uses the theories on shipping management, enterprise management, forecast and decision-making and other related disciplines, with appropriate mathematical model and suitable forecasting and analysis method, in order to make forecast on Panamax, and to study on and make comprehensive analysis of the operating strategy of the Panamax fleet of a state-owned enterprise.

The first chapter is the introduction, mainly introduces the significance and the background of the selected topic and introduces the research status in domestic and abroad.

In the second chapter，the author will analyze the operation situation of the Panamax carrier of a state-owned enterprise---Sinotrans Shipping，including the current fleet scale and ship age structure，and sum up existed problems of unreasonable ship age structure and ship type structure during the development，and make in-depth analysis of the internal and external environment that the enterprise would face during the development.

The third chapter mainly analyzes the current situation of Panamax dry bulk shipping market, and makes introductions from several aspects, including the carried cargos, supply and demand, shipping capacity and market overviews.

In the fourth chapter, the author will focus on forecasting. Trend line, Exponential Smoothing, Grey Model and Combination forecasting Model will be applied for quantity forecast. Since Panamax carries different cargos in different quantities, the data will be helpful for management if available.

In the fifth chapter, the Panamax fleet operating strategy of Sinotrans Shipping will be emphasized from systematical side, and some practical proposals will be put forward by the author.

The sixth chapter is the summary part.

Chapter 2 Analysis on Sinotrans Shipping's Operation of Panamax Fleet and on the Environment of Sinotrans Shipping with Panamax

As the principle part of the international shipping activities, the international shipping companies are providing a wide range of shipping services for the shippers, which is significant for satisfying the customers' requirements and promoting the national economic development. At the same time, the operation strategies of the international shipping companies would leave direct influences to the development and expansion of the company [1]. In this chapter, the author is going to make analysis towards the Panamax fleet of Sinotrans Shipping, and summarize the problems existed in the company to lay the foundation for proposing corresponding operating strategies.

2.1 Current Situation of Sinotrans Shipping

Sinotrans Shipping LTD is one of China's largest shipping companies in terms of self-owned dry bulk fleet. It owns, manages and operates modern dry bulk fleet and container fleet on a worldwide scale. As at 31 December 2013, company owned a fleet of 52 vessels with an aggregate capacity of 3.72 million DWT and an average age of approximately 9.4 years old. Its Group's fleet comprised 46 dry bulk vessels with an aggregate capacity of approximately 3.34 million DWT, 1 oil tanker with capacity of approximately 310,000 DWT, and 5 container vessels with an aggregate capacity of 4,437 TEU.

Dry bulk shipping is the core business of Sinotrans Shipping LTD. The company

owned a fleet of 46 dry bulk vessels, including 2 multi-purpose vessels, 10 Handysize dry bulk vessels, 9 Handymax dry bulk vessels, 19 Panamax dry bulk vessels and 6 Capesize dry bulk vessels for transportation of dry bulk cargoes such as iron ore, coal, grain, steel and other commodities along major trading routes in the world.

By leveraging the over 50 years of experience in the shipping industry of Sinotrans & CSC Group Company, its Parent, it has established long-standing relationships with several of key customers and suppliers. Such long-standing relationships can be attributed to reliable services and integrity in conducting business, both of which are the essence of enterprise culture. The customers they owned base comprises both domestic and multi-national charterers, including large ship operators and shipping companies [2].

2.2 Analysis on Current Operation of Panamax Fleet by Sinotrans Shipping

The Panamax fleet is an indispensible part of the shipping company and holds an important status among all types of fleet held by the shipping company. In this section, the author will make analysis in connection with the current operation situation of the Panamax fleet of Sinotrans Shipping.

2.2.1 Analysis on Fleet Scale

At present, the company fleet has 44 ships in total, including the Panamax, the Capesize, the Handymax and the Handysize, as shown in Tab2.2 and Figure 2.1.

Fleet	Handysize	Handymax	Panamax	Capesize
Number	10	9	19	6
DWT	281102	436738	1393085	1073383
Average DWT	28110	48526	73320	178879

Source: http://sinotranship.sinotrans-csc.com/

Tab.2.1 Fleet Profile of the Company

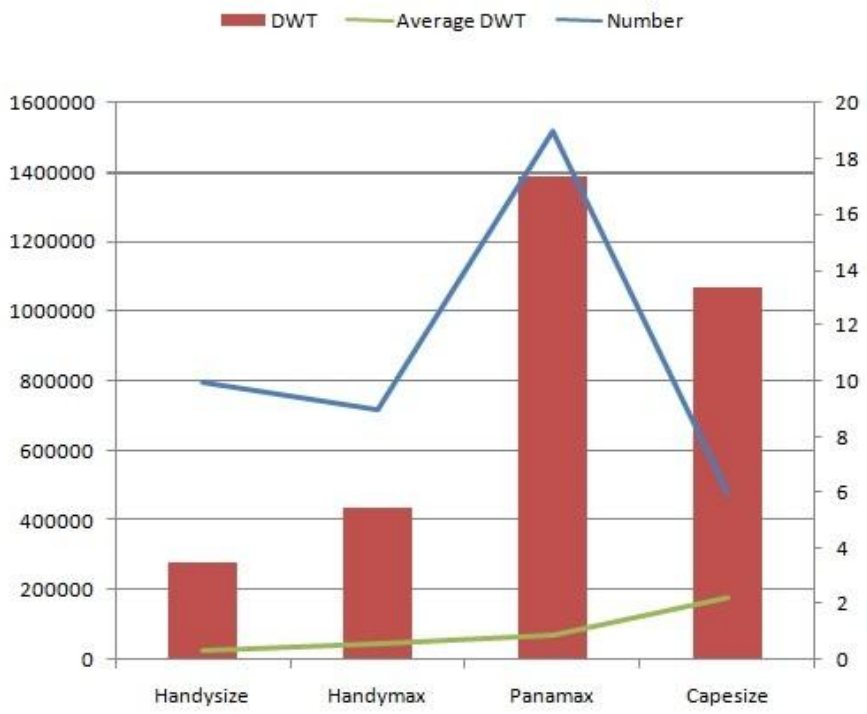

Fig.2.1Fleet Profile of the Company

As shown in the figure, the company owns 19 Panamax ships, with a total capacity of 1.393 million DWT, which is more than the other three ship types, and the average DWT of one Panamax is 73320. The Panamax fleet's shipping capacity accounts for the biggest proportion of the total shipping capacity of the company fleet, which

reaches 43.76%, and is 10% higher than the proportion took by Capesize, and is higher than Handymax and Handysize, as shown in Figure 2.2. Therefore, considering no matter the tonnage or the quantity, the Panamax fleet occupies an important place in the dry bulk fleet of the company, and its operating strategy and development pace will directly influence the development and expansion of the shipping company.

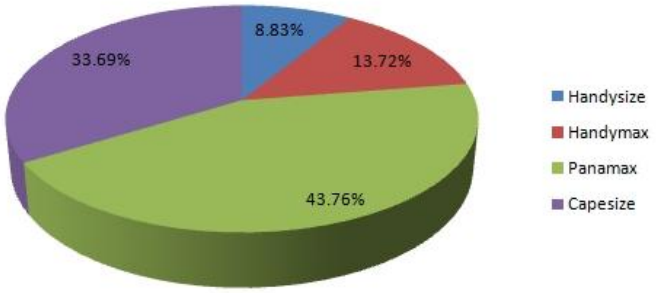

Fig.2.2 Proportion of the Four Major Bulk Carriers

The Panamax fleet of the company is responsible for the transportation of coal, coke, grain, fertilizer, iron ore and other bulk cargos. In 2013, the shipping volumes of coal, grain and iron ore are 229487 tons, 307250 tons and 148599 tons respectively. The shipping routes of the Panamax fleet cover all over the world, including from the Far-East areas (such as China, Australian and Southeast Asia) to Europe, Mediterranean, and South America. The relevant information is shown in Table 2.2.

Name of ship	Date	DWT	Port of Shipment	Port of Discharge	Cargo Type	Cargo Volume
GREAT BLESS	2012/12/13	73,251	SOHAR,OMAN	NEW ORLEANS,USA	UREA	50000 MTS
GREAT LUCK	2013/1/24	71,399	PITTSBURG,USA	LONGKOU	PET COKE	67123.236MTS
GREAT MIND	2012/12/10	75,570	TOTORALILLO, CHILE	BEILUN	IRON ORE FINES	73797MTS
GREAT LUCK	2012/10/11	71,399	NEW ORLEANS	DALIAN	SOYBEAN	58165.962 MTS
GREAT PROSPERITY	2013/4/12	73,679	PARANAGUA	KUNSAN,KOREA	SOYBEAN	63098.409MTS
GREAT MIND	2013/2/28	75,570	LONG BEACH,USA	NINGBO	PET COKE	65999.85MTS
GREAT JADE	2013/3/22	73,192	KALAMA, USA	TRIESTE, ITALY	WHEAT	58110MTS
GREAT LUCK	2013/4/25	71399	VANCOUVER	BEILUN	COAL	69804MTS
GREAT BLESS	2013/4/24	73251	SANTOS, BRAZIL	BEILUN	SOYBEAN	62077.17MTS
POS COURAGE	2013/6/10	76801	SANTOS, BRAZIL	CHINA	SOYBEAN	65800MTS
GREAT TALENT	2013/8/13	76773	MEXICO	CHINA	IRON ORE	74802.670MTS
ROSCO CYPRESS	2013/8/23	76,801	COLOMBIA	ITALY	COAL	71500 MTS
GREAT GLEN	2013/11/1	93252	AUSTRALIA	CHINA	COAL	88183MTS

Source: Sinotrans Shipping Annual Report 2013

Tab.2.2 Cargo Volume and Routes of Panamax of the Company

2.2.2 Analysis of Ship Age Structure

At present, as for the Panamax fleet of Sinotrans Shipping, there're 9 vessels under 10 years old, and 5 vessels over 15 years old, according to which the average age of the Panamax fleet is 12.77 years old. The specific information is shown in Table 2.3. And the amount of vessels under each age sections is shown in Figure 2.3.

Ship age	0-5 years	6-10 years	11-15 years	16-20 years
Number	8	1	5	5

Source: Sinotrans Shipping Annual Report 2013

Tab.2.3 Age Profile of Panamax of Sinotrans Shipping

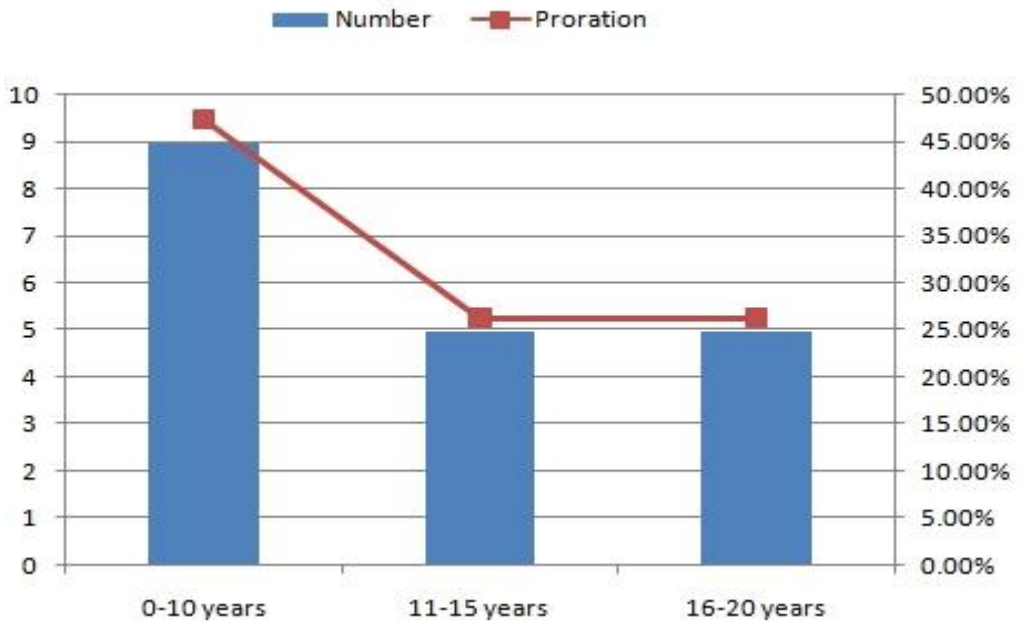

Fig.2.3Age Profile of Panamax of Sinatrans Shipping

In accordance with Table 2.3 and Figure 2.3 above, it is shown that Panamax vessels between 0-5 years old account for 42.11% of the total vessels, which takes the biggest proportion. Panamax vessels between 11-15 years old and between 16-20 years old both account for 26.32%. Taken all together, the vessels are facing serious aging problem, vessels between 11-20 years old almost account for half of the fleet. However, among all the vessels under 10, there is only 1 vessel being 9 years old, the others are all under 5 years old, which reflects the younger tendency of the fleet.

2.3 Problems on Sinotrans Shipping's Management of Panamax Fleet

Based on the above analysis, the author hereby summarizes the problems existed in the operation of the Panamax fleet.

(1) Aging Problem

With respect to the dry bulk fleet of different countries, considering that the shipping cost, the ship renovation and the sustainable development of the fleet are decided by ship age structure, the younger tendency of the fleet has become a trend for the developed countries to develop fleet and raise the competitiveness. Table 2.4 shows the age ship structure of Panamax in the world.

Age Profile (years) Dwt Range	'20+	'15-19	'10-14	'5-9	'0-4	'-4-0	Total
'60000-69999	131	63		2	4	1	201
'70000-79999	58	226	299	290	346	5	1224
'80000-89999	7	5	13	123	521	13	682
'90000-99999	12	6	10	22	243	2	295
Total	208	300	322	437	1114	21	2402

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Tab.2.4 Age Profile of World Panamax Fleet

Analyzing from the Panamax fleet of Sinotrans Shipping, the fleet is aged. According to Table 2.4, we can see that there are huge differences between the age profile of World Panamax Fleet and the age structure of Sinotrans Shipping's Panamax fleet. Although ships under 5 years old positively accounted for 42.1% of total, but 5 of 19 self-owned ship have been beyond the 15 years old, and there are 5 more will be over 15 years old within 1 year, which means that after 2015 there will be half of the ships become aged.

From the above, we can see that the aging problem of the fleet becomes serious. Actually, the ships more than 15 years old are unable to meet the demands in many charter parties or of some demanding ports, which brings adverse factors to the company development, and thus the competitiveness of the company will be weakened.

(2) Imbalance of Ship Age

From the perspective of ship age, the problem of imbalance is quite serious. The company owns8 ships below 5 years old, 10 ships more than ten years old, and 5 ships more than fifteen years old. Compared with the ideal ship age structure, the proportional distribution is unreasonable. During 2003-2007, there is only 1 new Panamax fleet being launched, and the company was obviously lack of ships between 6 to 10 years old, which led to the disconnect problem of ship age and heavy financial burden, and further restricted the expansion and growth of the fleet.

(3) Low Level of Modernization

Improving the service quality and lowering the operating cost are the targets of each shipping company in fierce market competition [3]. Therefore, we need to build the fleet with reasonable ship type distribution and excellent technical performance. However, currently the modernization level of Panamax fleet is still in a low level.

With the tendency of large-sized ships, the currently popular Panamax ship type is Kamsarmax with 82000 DWT, which can go through the Panama Canal; however, the company hasn't got such ship.

In addition, considering the draught requirements of different port and draught restrictions of berth with respect to the carried cargo (such as grain and coal), the current major Panamax ship are Sanoyas and Imabari built in Japan, with 76000 DWT and have draught of 14-14.1 meters.

After the comparison, the ships of the company before 2000 are mostly Halla, Sumitomo and Sasebo, which were designed and built by non-Chinese shipyard. But since the deliveries of those ship types started from relatively old time, therefore, the ship age are elder, and the ship types were not that good, and also have the problems of large consumption, deep drawing and small capacity. From the above, the modernization level of the fleet still needs to be improved.

(4) Disproportion between Time Charter and Voyage Charter of Self-Owned Ships

The shipping market has the characteristic of periodicity with high volatility. Meanwhile, the shipping industry is capital-intensive---the investment at the initial order of new vessels and the cost of maintenance of vessels are very high. Therefore,

a reasonable proportion between the time chartered and voyage chartered for the self-owned ships play a key role in decreasing the operating cost and reducing the financial balance of the company.

As the dry bulk vessel owners, Sinotrans Shipping has applied the conventional business strategy over a long period. Because the company considers that the time charter is simple and low-risk, so the time charter takes a large proportion of the business of the company and the voyage charter taking relatively a smaller proportion.

And by keeping such business mode, the bad consequences came one and after another, including but not limited to the reduction of the customer resources, unfamiliarity of port, limited routes planning, weak cargo supply and the amount of fuel oil bunkered are not high enough, which means that the preferential procurement in worldwide cannot be realized. These factors will create a vicious circle and further lead to less proportion of voyage charter.

The problem of the company is that, although the business of time charter can ensure the income in the long-term, the chances to catch the boom of the market are lost. In the first half of 2013, the market was in downturn, and the company increased the business of voyage charter. Through the transitional period of leading in voyage charter, the company caught the boom of the market in the fourth quarter of last year, and kept a lot of high-priced and long-term time charter.

Reviewing the past, the Panamax fleet mainly took voyage charter business in the first half of 2013, but it is just for the purpose of transition. Actually, for the fleet, the controlling of goods supply for the forward market is still weak, which reflects the

insufficiency on the cargo canvassing part of the company.

(5) Unbalance between Self-Owned Ships and Chartered Ships

After 2008, the shipping industry faced the recession like entering a cold winter, and the capital depreciation and maintenance costs of the vessel are higher than the charter income of the vessel. Especially for those company who purchased Panamax with the highest shipbuilding prices. Such high prices become a heavy burden for the business operation of the company

Faced with the ups and downs of the market, there are limited options for company to adjust it capacity structure through off-hire, short-term time charter or voyage charter especially with 70% of the self-owned ships among the whole fleet. Due to be above-mentioned, the company not only has to maintain fleet competitiveness through normal ship maintenance, but also has to face competitions of low freight rate from other small and medium-sized ship owner companies.

At the same time, with the pass of time, the aging of the ship directly caused the higher maintenance costs, however, the demolishing of aged ships is not ready. Therefore, the company can only rely on aged ships to compete with new capacity in the market. Under the circumstances of overcapacity, the company does not have evident competitive advantages.

By adjusting the operation mode and the fleet structure and by reducing the proportion of free capacity and chartered capacity, the company can improve its flexibility while facing the market uncertainties and keep the activity of chartering department, so as to increase the direct control of supply of goods.

2.4 Analysis of the Environment of Sinotrans Shipping with Panamax

In the above chapter, the author has made detailed analysis on the present operation situation and the existing problems of Panamax fleet of Sinotrans Shipping. In the future, with the gradual recovery of the global economy and trade, and with good momentum of the shipping industry development, Panamax fleet will encounter with both opportunities and challenges. Therefore, to grasp the opportunities in the internal and external macro environment for the fleet, and to determine its market position in the right way, are significant for the further development of the company.

2.4.1 Internal Environment

(1) Enterprise financial capability analysis

	2008	**2009**	**2010**	**2011**	**2012**	**2013**
	US$'000	**US$'000**	**US$'000**	**US$'000**	**US$'000**	**US$'000**
Results						
Revenues	455,972	229,106	278,496	281,435	222,178	194,950
Profit attributable to equity holders of the Company	347,134	106,394	127,541	91,724	20,121	4,317
Net profit margin	76.1%	46.4%	45.8%	32.6%	9.1%	2.2%
Basic and diluted earnings per share	US8.7 cents	US2.66 cents	US3.19 cents	US2.30 cents	US0.50 cents	US0.11 cents

Dividends	112,763	35,891	40,986	20,717	5118	-------
Financial Position						
Total assets	2,148,823	2,075,461	2,163,486	2,216,030	2,213,736	2,215,907
Total liabilities	149,912	41,732	37,943	39,823	37,862	40,962
Shareholders' equity	1,998,911	2,033,729	2,125,543	2,176,207	2,175,874	2,174,945
Total cash and bank balances	1,369,812	1,153,058	1,007,523	892,137	916,832	886,057

Source: Sinotrans Shipping Annual Report 2008-2013

Tab.2.5 Sinotrans Shipping financial situation from 2008-2013[4]

Benefit from the prosperity of the shipping market during 2004 to 2008, the profitability of the existing fleet under the shipping companies has been substantially improved. Although the shipping market was impacted by the financial crisis since the second half of 2008, the shipping companies still maintained profitable of dry bulk carriers fleet, by signing long-term contracts for part of the ships with the charterers of good reputation and strong capacity, and by negotiating the hire rates for spot vessels rely on the good reputation of the company. For these two years, since the shipping market was in downturn, the company has to take the strategy of combining both short-term charter party and long-term charter party according to the market condition, so as to maintain the profitable momentum of the fleet.

In 2008, the company has achieved a gross profit of 456 million dollars, and has respectively achieved gross profit of 229 million dollars in 2009 and 279 million dollars in 2010 after the outbreak of the financial crisis.

In 2011 and in 2012, due to the slump of the shipping market, the company has only achieved gross profit of 281 million dollars and 222 million dollars respectively. In the virtue of successive years of profitability, the company has accumulated a lot of capital. By the end of June 2013, the company has held cash of 920 million dollars, which lay a good foundation for the future development of the fleet.

(2) Range of Business Analysis

The operation of dry bulk fleet of the company is a comprehensive business, which involves the port agency, freight forwarding, the crewing, the customs and many other aspects. The Sinotrans Shipping focuses on shipping business, and is committed to provide high-quality shipping services for global customers. Meanwhile, the company owns more than 20 exclusively-invested companies and joint ventures, and provides shipping agency, freight forwarding, ship management, seafarer labor and other services related with shipping business for the customers, and has formed a unique and comprehensive service system.

(3) Team Work Analysis

Sinotrans Shipping owns a strong management team, which performs excellent in comprehensive professional ability, international business ability, analysis and prediction ability, and execution ability. With the tonnage expansion as well as the further development of business, the company shall have synchronized plans on human resources management, so as to provide a strong talent guarantee and intellectual support for the future development.

By working out the floating personnel demand plan, expanding recruitment channels, enhancing the internal training, the company will make efforts to develop talents for ship management and operation, and will also attach great importance to the training of its senior crew. The company will focus on developing senior seafarer, and meanwhile develop high-quality crews as the supplements, so as to build a well-qualified team to adapt the demands of the fleet development. All the time, the efficient and strong work team of the company has provided solid support for the business development and operational benefits of Panamax fleet.

(4) Scientific and Efficient Management

The level of the fleet management directly influences the operating performance and benefits of the whole fleet. Sinotrans Shipping has established a strict management system of environment protection and safety, and has also established, implemented and maintained the systems complying with the ISM code and ISO9001:2000 Quality Management Systems. At the same time, during the process of the operation, the company has all along maintained the highest safety standards so as to provide the highest level of security for customers and employees, and has been committed to a harmonious development of safety, quality and environment.

Over the years, the company has always adhered to strengthening the basic management and advanced management innovation. With the help of the concept, skill and method of refined management, and with the scientific optimization of work process in business operation, decision-making, management, service, innovation and other core business, the company has improved the cooperative work ability, and has gradually made the transformation from function management to

process management. In addition, the company also has shifted the perspectives from managers to customers. And the aforementioned improvements contribute to the obvious progress of the company's comprehensive management level. It is the above scientific and efficient management that provides a strong guarantee for the rapid development and stable security situation of Panamax fleet.

2.4.2 External Environment

(1) Political Factor

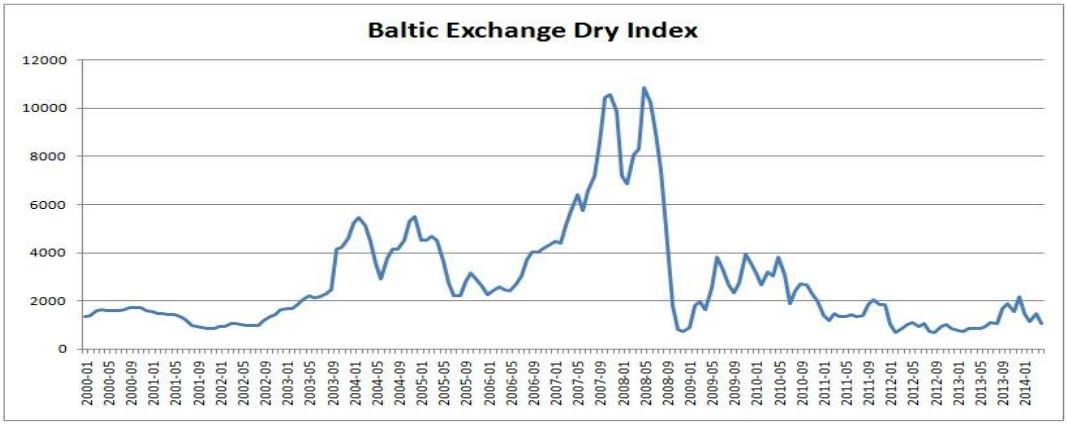
Sinotrans Shipping headquartered in Hong Kong and listed in Hong Kong, it is mainly regulated by Hong Kong's political and legal environment. Since July 1, 1997, Hong Kong becomes the special administrative region of the People's Republic of China. The Hong Kong government pursues a positive non-interventionism, no foreign exchange control or restrictions on capital flows, and the investors can use foreign currency to trade directly. Its political stability is based on a complete legal system, sound financial and economic system and the free trade policy, which providing a good investment environment for investing activities and attracting many foreign investors to do business or investment in Hong Kong.

On the other hand, the International Maritime Organization (IMO) in 1994 by the 《SOLAS 1974》 and (MARPOL73/78)to International Safety Management (ISM) and Port State Control (PSC) have put forward new requirements. The International Ship and Port Facility Security Code (ISPS) increased the operation difficulty and cost of shipping company.

(2) Economic Environment

Globally, the international financial crisis has almost passed. In the next few years, the global economy will gradually recover. The World Trade Organization (WTO) predicts that the global trade volumes will grow by 9.5% in 2014, the developed economies trade will increase by 7.5%, and the number of developing economies, Commonwealth of Independent States (CIS) countries will increase by about 11% [5]. In the post-crisis era, the import and export trade volume will continue to rise, the shipping market will gradually recover, and the shipping volume of coal, grain and other cargo will achieve significant growth, which would inject new vitality for the company development and Panamax fleet expansion.

Shipping market has gradually stabilized, and the market gradually returns to rational from the madness. BDI began to rebound, and is gradually stable as shown in Figure 2.4. With the international economic integration process, the technology and industrial structure of developed countries will be transferred to the less developed and developing countries, which will greatly promote the development of international shipping. Since Panamax ships is part of the world dry bulk fleet, its operating will be inevitably affected by the international dry bulk shipping market. Thus, the shipping market tends to be positive, with the shipping demand growing again.



Source: Clarkson

Fig2.4 The Change Tendency of BDI from 2000 to 2014

(3) Social Environment

As the center of Asia-Pacific region and with advantageous time zone, Hong Kong has a favorable geographical location. When New York and London, as two important international financial centers, are at rest, the market of Hong Kong was still up and running, which contributes its position of international financial center.

Hong Kong is a free and open, society that the citizens there value personal rights and freedom based on the rule of laws. It is because that Hong Kong has developed these rights and freedoms into the center of international business, finance, trade, transportation, telecommunications and tourism. One of the most important factors of the success of Hong Kong is the freedom of information. In Hong Kong, the information can rapidly spread, the media industry is flourishing and related system is perfect. Hong Kong also has a level playing field, which means that all sectors can use their capacities under fair competition. In addition, the city treats foreign companies and local companies equally without discrimination, and there is no limit

to the property ownership.

(4)Technology Factor

In virtue of the development of modern shipbuilding technology, shipbuilding has entered into a new period. The tendency of large-sized ship is one of the most obvious characteristics during the ship development, and it is also the main direction of innovation. Owing to the constant improvement and perfection of the ship design technology, power and propulsion, in recent years the navigational speed of the major ship types shows a trend of increase; and driven by variable market demands and progressive design technology, almost all ship types are undertaking continuous optimization and innovation.

Since IMO, IACS and other international organizations and major classification societies has emphasized the requirements on maritime safety and environmental protection, ships are built to be more safe and environment-friendly. The development of satellite communication technology can help the shipping company reduce monthly communication costs, and the GPS system can help the ship pilot to work out an economic route, so as to avoid unnecessary fuel consumption and time waste caused by deviation [6].

The informatization of the port and the logistics system has been enhanced. From the afore-mentioned, we can see that the development of navigation technology and information technology have promoted the tendency of large-sized and high-speed ships, and have pointed out a new direction for the future development and for raising competitiveness of Panamax ships ship.

2.5 Analysis on Competitors

1. China Ocean Shipping (Group) Company

Through 40 years of arduous work by the past generations, China Ocean Shipping (Group) Company (hereinafter referred to as "COSCO"), found in April 27th, 1961, has made a successful transformation. It has developed from a simple shipping company which owns only 4 ships with 22 thousand DWT into a comprehensive and trans-national group which owns more than 800 modern ships with around 56 million DWT, over 400 million tons of cargo annually.

Nowadays, COSCO owns nearly a thousand of affiliated companies and more than 80 thousand staff around the world. The fleet scale of COSCO ranks first in China and the second of the world. Its dry bulk fleet is the largest in the world. COSCO's fleets of general cargo carriers, MPP, and special cargo vessel also ranks among top of the world; and its tanker fleet is one of the super tanker fleets in the world.

According to the listing announcement of COSCO, in the middle of 2013, the company has suffered a loss of 990 million RMB. The dry bulker market is the main reason of such loss with profit margin of-15.8%, which ranks the last in the listed shipping companies. Due to the long-term slump of the dry bulker market, COSCO has begun to moderate the enlargement of dry bulker fleet, and has begun to make long-term capacity assignment. On the one hand, the company stops the renewal of the expired charter parties, and has off-hired dozens of charter-in vessels in the second half of 2012 and in 2013. On the other hand, the company slows down the pace of the expansion of self-owned fleet, and in the first half of 2012, it has no new building orders. In the meantime, COSCO adheres to the strategy of lowering cost,

and continues to control the expenses effectively.

In addition, COSCO will turn losses into gains as soon as possible by several methods, such as union with strong cargo owners, involvement in energy industry, integration of dry bulker business and so forth. Meanwhile, in order to avoid further losses in 2013, COSCO Shipping suspended the process of listing, and successively awarded its 100% equities of COSCO Logistics to its mother company COSCO Group, and then indirectly sold its 100% equities of COSCO Line to COSCO Group. Through these measures, the company achieved nearly 3 billion RMB, and in the middle of 2013, realized the reduction of 80% of loss compared with the same period of 2012.

2. China Shipping (Group) Company

As a trans-regional and trans-national large-scale shipping company, China Shipping (Group) Company ("China Shipping") is mainly engaged in cargo transportation (of coastal areas, oceangoing and Yangtze River), and chartering and freight forwarding. And it is one of the biggest shipping companies in the Far-East area which owns the most large-scale oil tanker fleet and dry bulk fleet. In 2013, the mid-term performance of China Shipping shows that the company's net deficit is 950 million RMB, and the net deficit of the same period in 2012 is 495 million RMB. And the mid-term performance also shows that the turnover during that period is 5.229 billion RMB, dropping 7.5%year-on-year, and the operating cost reduced by 6.5% to 5.469 billion RMB.

With the deliveries of Very Large Ore Carrier (VLOC) in succession, China shipping has built a VLOC fleet with 8230000 DWT VLOC and VLOC with 6300000 DWT.

In the first half of 2013, the company has achieved a total income regarding dry bulk business of 2.586 billion RMB, including the 897 million RMB achieved by 14 VLOC, and the gross margin is close to 20.9%, which becomes a highlight in dry bulk segment.

In the Semiannual Report of China Shipping this year, China Shipping hasn't placed any new dry bulk carrier orders in the first half years, and in the next few years, the company will steadily carry forward the improvement of fleet structure. With the deliveries of new vessels, China Shipping will continuously dispose old and relatively smaller vessels with high fuel consumption, and poor competitiveness, and will further optimize fleet structure, in order to improve overall competitiveness of the fleet. China Shipping also plans to double the tonnages of the dry bulk carriers before 2015, which will rise from the current 11 million DWT to more than 20 million DWT. But the report has not clarified whether the tonnage expand will be achieved by building new ships or by second-hand purchases.

In addition, China Shipping has spent 1.51 billion dollars to build 6174000 m3 LNG carrier, and has advanced the LNG management, and strengthened cooperation with large shippers, in order to looking for new profitable growth.

Compared with the afore-mentioned two rivals, under the condition that most of the shipping companies are facing losses, Sinotrans Shipping still achieved more than 1.5 million dollars profit in 2013. Such success is inextricably linked with its low-cost and high-quality fleet. Considering that in the next two or three years, the problem of overcapacity is still hard to be solved, therefore, keeping a lower-age, high-quality and competitive fleet will be an important method to win in the future competition.

Sinotrans Shipping also needs to refer to the operating strategies of its major competitors duly dispose old vessels, and increase proportion of its fuel-efficient carriers, so as to achieve the targets of expansion, optimization, and comprehension of fleet structure. The future course of Sinotrans Shipping may not be smooth all the way, challenges from all sides requires the management of the company to formulate the business strategy very carefully, so as to polish Sinotrans Shipping to be the best in the shipping field.

Chapter 3 Analysis of Current Situation and Market Review on Panamax Dry Bulk Fleet

The analysis of current situation and development trend of world Panamax is of great significance for developing operating strategy of Panamax fleet of the shipping companies. In this chapter, the author will firstly start from the perspective of the international dry bulk shipping market, to make basic analysis on the cargo, transport capacity of the international dry bulk shipping market. And on the basis of the above analysis, the author will make further specialized research on the Panamax fleet, and then make conclusions and reviews from the perspectives of cargo, capacity supply and shipping market situation.

3.1 Basic Analysis of Dry Bulk Shipping Market

Dry bulk shipping market is a completely competitive market, and any shipping companies can be freely in and out the market. Many owners of cargo and ship owners can also freely choose the ships and cargos for their beneficial through the competitions, and both parties will constrain their respective obligations and behaviors by signing the transportation contract.

3.1.1 Analysis of Different Type of Cargos in Dry Bulk Shipping Market

The dry bulk cargo in the international dry bulk shipping is refers to the dry bulk cargo with huge transport volume in unit distance, which is transported by sea so as to reach the goal of lowering unit costs. And the major dry bulk cargos are iron ore, coal, grain, bauxite, rock phosphate, and agricultural products, lumber, cement, sugar

and some other primary products.

Iron ore, coal, grain, bauxite and phosphate rock, known as the" Big Five" dry bulk cargos, are the major supply in international dry bulk shipping. Since the shipping volumes of these five cargos are especially large, they are regarded as the decisive powers that would influence the dry bulk shipping market development.

Most of the afore-mentioned five dry bulk cargos are the raw materials of the industrial production, and are the foundations of the world economy development. For example, iron ore and coal are the raw materials of iron and steel manufacturing; coal is the major raw material of energy industry; grain is the necessities of human life; bauxite is the raw materials of aluminum industry; phosphate rock is an important fertilizer raw material of crop production [7]. From the above, we can see that the international dry bulk shipping plays an important role in the development of world economy.

The shipping volume of dry bulk cargos accounts for a great proportion in the international shipping volume, and the proportion is more than one third. Overall, the dry bulk shipping volume is on the rise. The global dry bulk shipping volume increased from 1.923 billion tons in 1990 to 4.859 billion tons in 2013, with an average annual growth rate of 3.6%, as shown in Table 3.1.

Year	Major dry bulk cargo					Minor bulk	Total	Total of major dry	Percentage of major dry
	Iron Ore	Coal	Grain	Alumina	Phosphate Rock				

								bulk cargo	bulk cargo
1990	347	329	216	55	37	610	1923	984	51.17%
1991	358	352	217	53	31	601	1964	1011	51.48%
1992	337	356	224	48	30	620	1971	995	50.48%
1993	352	357	222	51	27	630	1996	1009	50.55%
1994	380	371	204	49	29	667	2071	1033	49.88%
1995	402	398	216	52	30	701	2197	1098	49.98%
1996	392	421	218	54	31	704	2241	1116	49.80%
1997	427	448	228	55	32	719	2357	1190	50.49%
1998	425	448	227	55	32	719	2357	1190	50.40%
1999	401	457	245	54	33	727	2374	1190	50.13%
2000	447	516	262	54	33	749	2574	1309	50.85%
2001	450	550	260	52	31	765	2685	1343	50.53%

2002	480	573	269	55	30	776	2756	1407	51.05%
2003	516	619	265	60	29	815	2923	1489	50.94%
2004	587	660	273	68	31	873	3152	1619	51.36%
2005	658	668	273	68	31	900	3316	1728	52.11%
2006	721	729	290	79	30	952	3530	1849	52.38%
2007	781	772	303	84	32	987	3731	1972	52.85%
2008	840	800	323	66	31	988	3862	2080	53.86%
2009	907	792	313	66	19	876	3765	2097	55.70%
2010	991	900	343	96	23	1240	4144	2353	56.78%
2011	1053	946	345	113	29	1342	4377	2486	56.80%
2012	1110	1062	372	107	30	1410	4637	2681	57.82%
2013	1189	1111	382	139	28	1470	4859	2849	58.63%

Source: Clarkson

Tab3.1 International Dry Bulk Shipping Volume

Unit: Million Tons

As for the “Big Five” dry bulk cargos, the proportions they account for in the international dry bulk shipping volume in 2013 are shown in Figure 3.1.

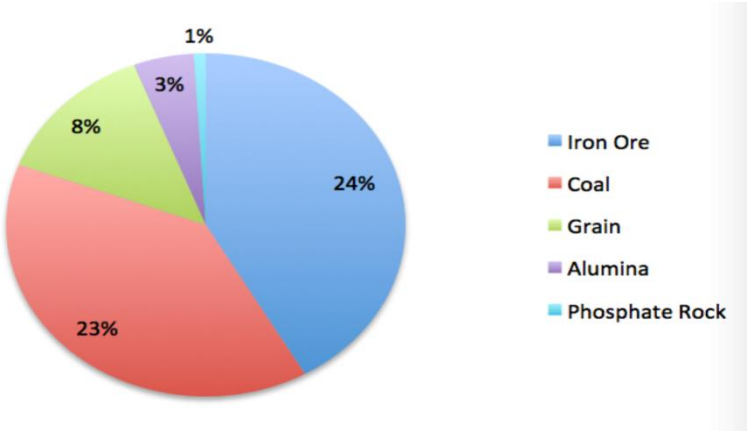


Fig3.1 the Proportions of International Dry Bulk Volume In 2013

It is easy to see that iron ore plays the most important role among the major dry bulk cargos, and its shipping volume largely depends on the distribution of the steel works and the distance to the origin place of the raw materials. Before the 1970s, the steel works were mainly built at the location that close to the raw material origin place, but after the 1970s, due to the tendency of large-sized ships and the rapid development of modern shipping technology, the supply and demand of iron ore has changed dramatically.

Especially after 1980s, Japan, Europe and other countries became the most important iron ore importers in the world in order to support the development of their capital construction, automobile and shipbuilding [8]. Since the 1980s, due to the lack of raw materials, China gradually became one of the important iron ore importers. At present, the imports of iron ore are mainly from Australia, America to Europe and the Far-East areas.

Coal is the second important dry bulk cargo, and its shipping volume is only second to iron ore. Because that the coal industry and the iron and steel industry are strongly related to each other, the development tendency and shipping direction of coal are quite the same with iron ore. And the shipping directions are mainly from Australia, North America and South Africa to the Far-East areas, Europe, Mediterranean and other areas.

Grain has certain differences compared with iron ore and coal. Grain, including wheat, corn, soybeans and so forth, belongs to agricultural commodities, and is mainly used for food and consumption for human and animals. Therefore, grain presents the characteristic of instability and seasonal regarding the shipping line and flow. The major grain export countries are the United States, Canada, South America and Australia; and the major import areas are Africa, India, Japan and the Far-East area.

Bauxite and phosphate rock account for a relatively small proportion among the “Big Five” dry bulk cargos. The shipping form of the bauxite is quite similar to iron ore, which is mainly from Australia, Africa, and Jamaica to Europe and North America. However, the phosphate rock is quite different, it is the major raw material of producing the compound fertilizer, and its major export regions are Morocco, the United States, the Near-East areas, and the Red Sea, and the import regions are mainly in East Asia, Western Europe and America.

3.1.2 The Constitution of World Dry Bulk Fleet

In the international maritime fleets, the dry bulk fleet, which mainly transports iron

ore, coal, grain and other large-volume dry bulk cargos, ranks only second to the oil tanker fleet. The dry bulk ship type can be divided into four categories that are Handysize, Handymax, Panamax, Capesize. The tonnage and amount change tendency are shown as follow.

	Handysize		Handymax		Panamax’		Capesize		Total		Aver age DW T
	Num ber	D WT	Num ber	D WT	Num ber	D WT	Num ber	D WT	Num ber	D WT	
19 99	2972	78. 5	988	45. 0	903	62. 8	485	77. 7	5348	264 .0	493 64
20 00	2901	76. 8	995	45. 3	938	65. 4	490	79. 4	5324	266 .9	501 37
20 01	2844	75. 4	1017	46. 3	994	69. 8	512	83. 4	5367	274 .8	512 04
20 02	2768	73. 3	1101	50. 6	1074	76. 0	532	87. 1	5475	286 .9	524 000
20 03	2716	71. 9	1179	54. 5	1108	78. 8	542	89. 4	5545	294 .7	531 43
20 04	2681	71. 0	1231	57. 3	1123	80. 1	564	93. 6	5599	301 .9	539 24
20 05	2722	72. 4	1308	61. 3	1205	86. 4	610	102 .3	5845	322 .3	551 48
20 06	2755	73. 4	1410	66. 8	1299	93. 7	657	111 .0	6121	344 .9	563 44
20	2766	73.	1501	71.	1399	101	713	121	6379	368	577

07		7		7		.7		.1		.3	30
2008	2835	75.5	1598	77.0	1479	108.2	768	131.5	6680	392.2	58708
2009	2885	76.9	1708	83.0	1558	114.7	822	143.3	6973	417.9	59935
2010	2872	76.5	1877	92.8	1617	120.3	957	170.2	7232	459.8	63579
2011	3067	82.8	2198	111.1	1787	134.7	1165	209.5	8217	538.1	65486
2012	3134	86.4	2543	130.9	1977	151.8	1366	249.5	9020	618.6	68581
2013	3133	87.7	2808	146.9	2175	170.0	1508	279.5	9624	684.0	71072

Source: Clarkson

Tab.3.2 Bulk Carrier Fleet from 1999 to 2009

Unit: Million Dwt

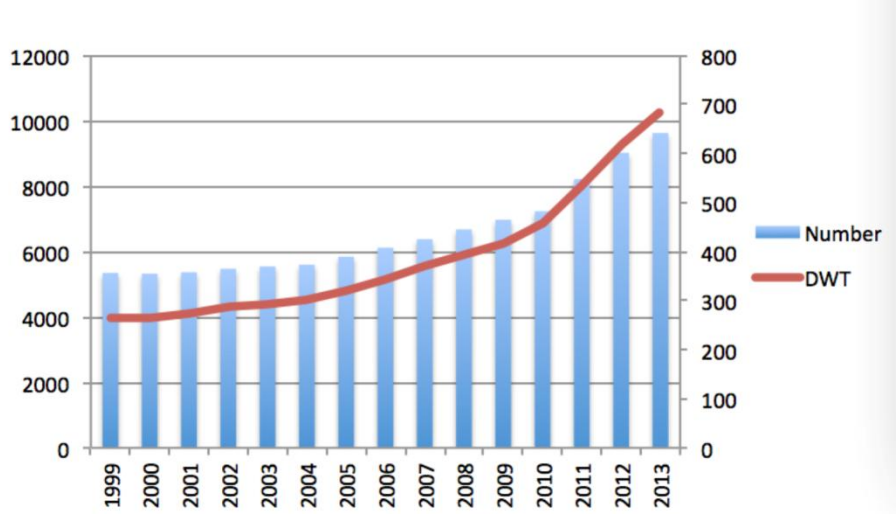


Fig3.2 The Change Tendency of Dry Bulk Carrier Fleet

As shown in the above Figure, the general trend of dry bulk fleet is that the quantity of the ship is increasing, and the aggregate tonnage is also on the rise. From 1999 to 2013, the ship quantity grows from 5348 ships with 2.64 million DWT to 9624 ships with 6.84 million DWT, which shows the average annual growth rate is at 4.7%.

The average DWT grows from 49364 DWT/ship to 71072 DWT/ship, with the average growth rate of 2%. Among the four major ship types, the Handymax and the Panamax are getting more popular in recent years, and account for a larger proportion in dry bulk fleet. The Panamax has obvious competitive advantages in the dry bulk market in particular, and has developed rapidly in recent years.

3.2 Analysis of Supply and Demand of Major Cargos of Panamax

As mentioned above, among all kinds of dry bulk ships, Panamax is regarded as the most representative ship types, and is an indispensable part of dry bulk fleet. The author hereby will mainly analyze the major cargos carried by Panamax and the supply and demand of major cargos carried by Panamax.

3.2.1 Summary of the Cargos Carried by Panamax

The rise of China pulls the rapid development of other emerging countries since 2003, and the global dry bulk shipping volume has increased dramatically. In the transportation of iron ore, coal, grain, bauxite and phosphate rock, Panamax is mainly engaged in coal and grain transportation, and is also engaged in some iron ore transportation. In recent years, the proportion of coal and grain carried by Panamax almost remain unchanged, which is at about 40% of the total dry bulk shipping

volume, and the transportation of iron ore accounts for more than 20%[9]. The relevant information is as shown in Table 3.3.

Ship type	Cargo type				
	Iron ore	Coal	Grain	Alumina	Phosphate Rock
Capesize	70%	45%	7%	—	—
Panamax	22%	40%	43%	45%	20%
Handysize	8%	15%	50%	55%	80%

Source: Clarkson

Tab.3.3 Cargoes Proportions Carried by Different Types of Dry-Bulk Carriers

First of all, the Panamax owns a certain advantage in the transportation of coal. In recent years, China and India have witnessed a high-speed development of iron and steel industry and a surge of demand for coal. And the shipping demand of coal is mainly from China, India, European Union, Japan, South Korea, Taiwan and other countries and regions. China's coal export to Japan, Korea, and Taiwan is also an important business of Panamax. The coal export of the Black Sea regions (such as Russia/Ukraine and other countries) and the coal export of the Far-East areas of Russian to Japanese and Korean are mainly rely on Panamax since the nautical miles are not far.

Secondly, grain transportation is quite an exclusive shipping business for Panamax. Although the capacity of Capesize is larger, it cannot pass the Panama Canal and make transportation to the East Asia area. The only way for Capesize to East Asia is to make a detour to the Cape of Good Hope, and the freight cost will be higher then, and the ship will be restricted by the berth and draught limitation. And the capacity

of Handysize is relatively small, and is hard to compete with Panamax in terms of the unit freight costs. At present, about 85% of the shipping volume of grain in the world is taken by Panamax.

Furthermore, the import of iron ore is mainly from Australia and Brazil. Since the distances to these two countries are longer, generally Capesize will be used for transportation of iron ore by some countries, such as Japan and the European Union. But for China, India, Australia and Germany, Sweden, Netherlands and other countries of the European Union, among the current total berths, the berths for Panamax (and the ship type below Panamax) still account for the most. Therefore, Panamax is still an important ship type for iron ore transportation, and its shipping volume account for more than 20%.

In addition, China is the largest iron ore importer, and is also a major grain importer. Meanwhile, for these years, the steel industry of our country has rapidly developed, thus the demand for coal is on the rise. And the coal import and export are mainly relying on Panamax. Therefore, the afore-mentioned factors determine that Panamax is of special significance to the dry bulk shipping trade of our country.

3.2.2 Analysis of Supply and Demand of Major Cargos of Panamax

In this thesis, the author will analyze supply and demand of the major cargos carried by Panamax, including coal, grain and iron ore.

(1) Analysis of Coal Supply and Demand

Coal can be divided into steaming coal and coking coal. The shipping demand of

steaming coal mainly comes from the energy consumption and electric power generation. And the shipping demand of coking coal mainly comes from steel production. The import and export situation of steaming coal and coking coal of different countries and regions in 2010 are as shown in Table 3.4 and Table 3.5[10].

Import country	Import volume	Change rate to 2012	Percentage of total imports	Export country	Export volume	Change rate to 2012	Percentage of total exports
Japan	56.2	2%	21.13%	Australia	166.1	6%	62.44%
EU15	41.4	1%	15.56%	Canada	34.5	4%	12.97%
India	35.6	6%	13.38%	US	57.4	-5%	21.58%
S. Korea	26.5	3%	9.96%	China	1.2	-17%	0.45%
Total imports	266	13%		Total exports	266	5%	

Source: Clarkson Dry Bulk Trade Outlook

Tab.3.4 Cooking Coal Imports by Different Countries/Areas

Unit: Million Tons

Import country	Import volume	Change rate to 2012	Percentage of total imports	Export country	Export volume	Change rate to 2012	Percentage of total exports
EU15	135.0	1%	15.90%	Indonesia	380.2	5%	44.78%
Japan	126.9	2%	14.95%	Australia	184.4	6%	21.72%

India	142.6	11%	16.80%	S. Africa	70.6	5%	8.32%
China	149.4	5%	17.60%	Russia	72.0	1%	8.48%
US	6.6	-17%	0.78%	China	3.9	-8%	0.46%
Total imports	849	3%		Total exports	849	4%	

Source: Clarkson Dry Bulk Trade Outlook

Tab.3.5 Steaming Coal Imported by Different Countries/Area

Unit: Million Tons

Based on the above analysis, the major coal exporting volume of the world are concentrated in 8 countries, and the exporting volume of these 8 countries account for more than 97% of the total coal export of the world. Australia is the world's largest coal exporter, with the export volume of 350 million tons in 2013, which accounts for about 35% of the world's total coal export.

The United States, Canada, Indonesia, Colombia, South Africa and other countries and regions are also the major coal exporters. About one-third of the coal production in South Africa is for export. In addition, with China's rapid economic growth, there is an increasing demand of domestic coal consumption, and the coal export is rapidly reducing.

The major importing countries and regions of coal in the world are relatively concentrated, and Japan and India are the major importing countries of coal in the world. Japan is the world's largest coal importer; and its import volume is 182 million tons in 2013, increasing by 2% compared with 2012, and accounts for more

than 15% of total import.

In addition, Eastern Europe and some other Asian countries and regions also need a certain amount of coal. It is worth mentioning that with the world economic integration and the transfer of the traditional industry, the import volume of some developing countries are increasing year by year, and has the tendency of catching up with and surpassing Japan.

(2) Analysis of Grain Supply and Demand

Grain is the most basic means of livelihood, and is the major concentrated feed of animal husbandry development, and is also the raw materials of light industry. Grain has wide varieties, including wheat, rice and corn, which are the staple food of human beings and the concentrated feed of animal husbandry. Wheat, rice and corn account for about 70% of the harvested areas of the world's food crops, and account for 80% of the total grain output. The import and export volume of grain of different countries and regions in 2012 and in 2013 are as shown in Table 3.6.

Import country	Import volume	Change rate to 2011/ 2012	Percentage of total imports	Export country	Export volume	Change rate to 2011/2012	Percentage of total exports
Japan	23.8	1%	9.12%	Argentina	31.6	-10%	12.11%
S.America	25.3	5%	9.69%	Australia	25.2	1%	9.66%
N/C.	29.5	4%	11.30%	Canada	23.0	9%	8.81%

America							
FSU/ Europe	26.9	-19%	10.31%	EU	26.4	16%	10.11%
Africa	52.8	6%	20.23%	USA	52.0	28%	19.92%
Mid. East	45.9	3%	17.59%	Ukraine	22.0	29%	8.43%
Total imports	261	6%		Total exports	261	6%	

Source: Clarkson Dry Bulk Trade Outlook

Tab.3.6 Grain Imported by Different Countries/Areas during 2012-2013

Unit: Million Tons

Through the above analysis, the United States is the major grain exporting country in the world. Its export volume during 2012 to 2013 is 76.7 million tons, increasing very little compared with the export volume during 2011 to 2012, and accounting for more than 30% of total grain export in the world.

The grain export volume of Australia, Canada, Argentina and the European Union are quite equal, and the market share they account for are quite the same, at about 10% of the total grain exports. Australia, Canada and the European Union mainly export wheat, especially Australia and Canada. China's grain export volume remains stable wave and faces a downward trend, and the market share China accounts for is quite small. The major export grain of China is coarse food.

(3) Analysis of Iron Ore Supply and Demand

The shipping flow of iron ore is mainly affected by the steel industry development of the industrial powers, and the world steel industry is the most direct and fundamental factor which would influence the production quantity and trade volume of the iron ore. The import and export volume of iron ore by different countries and areas in 2013 are shown as in Table 3.7.

Import country	Import volume	Change rate to 2012	Percentage of total imports	Export country	Export volume	Change rate to 2012	Percentage of total exports
China	794.8	9%	68.05%	Brazil	336.6	10%	26.50%
Japan	135.5	1%	11.60%	Australia	643.8	3%	50.69%
EU27	111.4	2%	9.54%	Canada	35.4	3%	2.79%
S.Korea	62.8	2%	5.38%	India	17.9	21%	1.41%
TaiWan	22.1	10%	1.89%	South Africa	63.9	2%	5.03%
Mid.East	23.0	9%	1.97%	Sweden	23.1	2%	1.82%
Total imports	1168	7%		Total exports	1270	7%	

Source: Clarkson Dry Bulk Trade Outlook

Tab.3.7 Iron Ore Imported by Different Countries/Areas in 2012

Unit: Million Tons

As shown above, at present, Australia and Brazil are the major exporting countries of iron ore in the world. In 2013, the export volume of iron ore in these two countries reached 980 million tons, which accounts for more than 75% of the total export. The export volume of Australia is 630 million tons, which accounts for 51% of the total

export, increasing by 3% compared with 2012. The export volume of Brazil is 340 million tons, which accounts for 27% of the total export, increasing by 10% compared with 2012. The export volume of South Africa, India, and Sweden follow closely to Australia and Brazil.

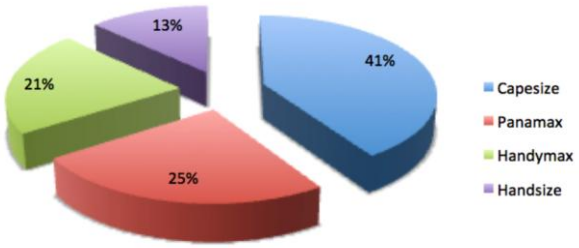
China, Japan, the European Union, South Korea, Taiwan are the major importing countries and regions of iron ore. China is the world's biggest iron ore importer, with the import volume of 790 million tons in 2013, which accounts for 68% of the total import. It is worth mentioning that Taiwan imports more than 220 million tons iron ore in 2013, increasing 10% compared with 2012.

3.3 Analysis of Capacity Supply of Panamax Fleet

On the basis of analyzing the shipping demand of Panamax, in this section, the author will mainly introduce its capacity supply condition, and make analysis from three perspectives, including the capacity distribution, new ship orders and ship age structure.

3.3.1 Analysis of Capacity Supply of Panamax

According to Clarkson statistics, by the end of 2013, the world dry bulk fleet owns 9624 ships, with a total tonnage of 684 million DWT. As for the whole fleet, the amount of Handysize is 3133, with 87.71 million DWT; the amount of Handymax is 2808, with 146.87 million DWT; the amount of Panamax is 2175, with 169.96 DWT; and amount of Capesize is 1508, with 279.52 million DWT. Based on the afore-mentioned, it is apparent that Panamax takes an important place in the world dry bulk fleet either in quantity or in tonnage. The relevant data is as shown in Figure 3.3.

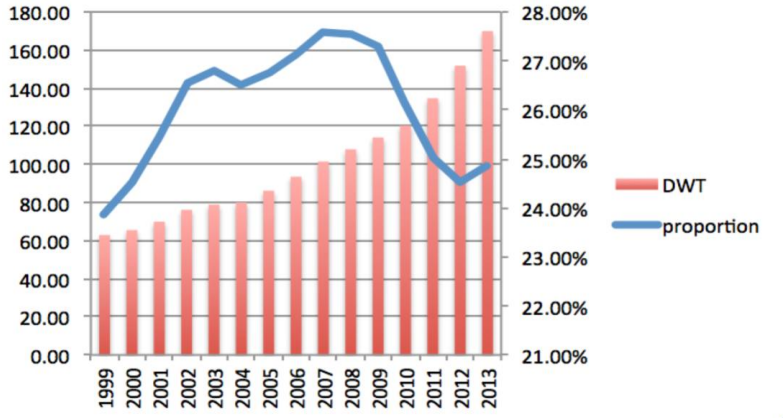


Source: Clarkson

Fig.3.3 Tonnage Proration for Dry Bulk Carriers

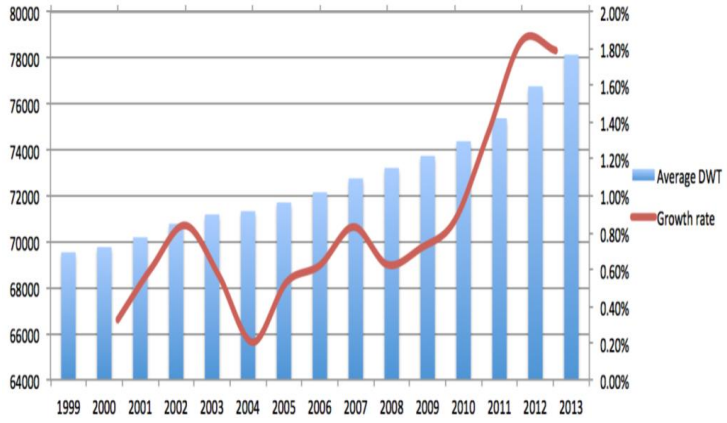
The capacity of Panamax this rose from 62.8 million DWT in 1999 to 169.69 million DWT in 2007, and the proportion Panamax accounts for among the total dry bulk fleet capacity rose from 23.78% in 1999 to 24.85% in 2013 as shown in Figure 3.4.

At the same time, the tendency of large-sized ships of Panamax tends to be obvious, and the average DWT of Panamax increases year by year, growing from 69535 DWT/ship in 1999 to 78143 DWT/ship in 2013, with average annual growth rate at 0.84%. The data is as shown in Figure 3.5.



Source: Clarkson

Fig.3.4 The Change Tendency of Tonnage for Panamax



Source: Clarkson

Fig.3.5 The Change Tendency of Average DWT for Panamax

Up to May 2014, the capacity of Capesize has increased by 13.3 million DWT, and its capacity accounts for 51.90% as the largest proportion followed by Handymax. And the new ship orders capacity of Handymax accounts for 27.18% of the total dry bulk capacity. Under the comparison, the Panamax and the Handysize took relatively small proportions as shown in Figure 3.6.

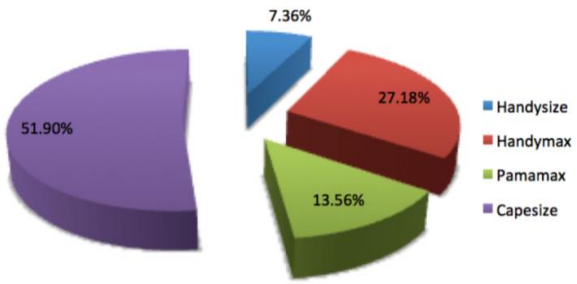
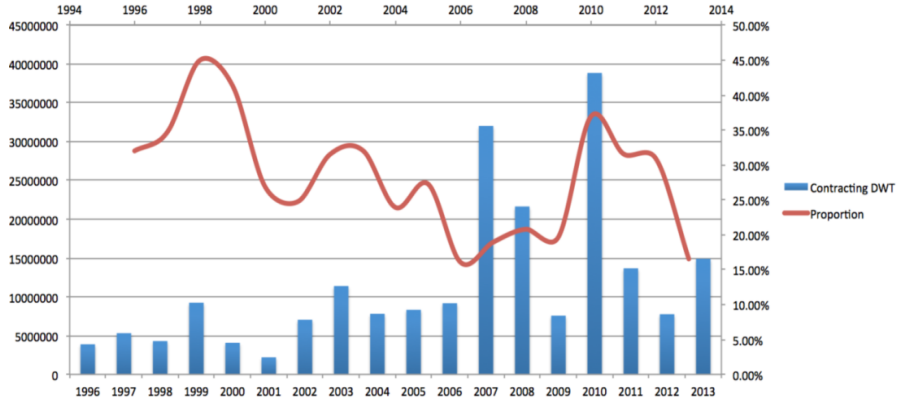


Fig.3.6 Order Book Proportion for Four Major Bulk Carriers

With respect to Panamax, from 1996 to 2006, the capacity of new ship orders has showed a trend of steady wave, and generally the annual capacity is below 20 million DWT. From 2007 to 2010, the new ship orders capacity rose rapidly. However, due

to the financial crisis in 2009, the new ship orders declined substantially. But in 2010 the market rebound to the top, and the capacity of new ship orders of that year reached 66.18 million DWT.

Meanwhile, the proportion the new Panamax orders capacity accounts for remained steady during 2007 to 2009 among the new dry bulk carrier orders capacity, and are basically over 20%. And during 2009 to 2012, the capacity proportion took by new Panamax orders reached the summit, and then fell sharply in 2013. The data is as shown in Figure 3.7.



Source: Clarkson

Fig.3.7 Order Book of Panamax and Proportion

3.3.2 Analysis of Ship Age Structure of Panamax

Up to June 2014, the total amount of ships in world dry bulk fleet is 9917, among which the amount of ships between 0-4 years old is 4765, accounting for 48.0% of the total; the amount of ships between 5-9 years old is 1584, accounting for 16.0%; the ships between 10-14 years old is 1077, accounting for 10.9% of the total; the amount of ships between 15-19 years old is 1199, accounting for 12.1% of the total; and the amount of ships more than 20 years old is 1292, accounting for 13.0% of the

total. The ship under 10 years old and the ship more than 20 years old account for the largest proportion. And most of the vessels more than 20 years old are Handysize, which account for 50% of the total. The afore-mentioned data shows that most old ships in the international dry bulk fleet are Handysize. The relevant data is shown in Figure 3.8.

	20+	15-19	10-14	5-9	0-4	Total
Handysize	706	368	282	402	1261	3019
Handymax	254	362	337	498	1524	2975
Panamax	212	300	321	436	1089	2358
Capesize	120	169	137	248	891	1565
Total	1292	1199	1077	1584	4765	9917
Proportion	13.0%	12.1%	10.9%	16.0%	48.0%	100%

Source: Clarkson

Tab.3.8 Age Profile of Dry Bulk Carriers

Analyzing from the ship age structure of Panamax, till June 2014, the amount of ship over 20 years old is 212; the amount of ships between 15 to 19 years old is 300; the amount of ships between 10 to 14 years old is 321; between 5 to 9 years old is 436; and amount of ships between 0 to 4 years old is 1089. The age profile of Panamax is as shown in Figure 3.8.

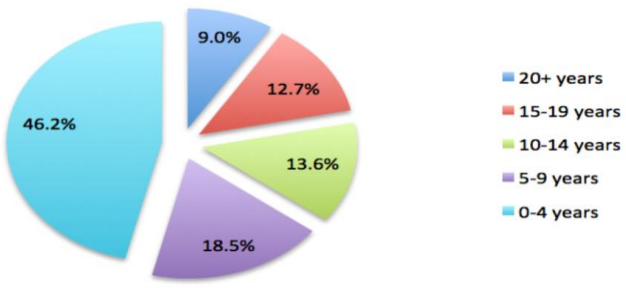
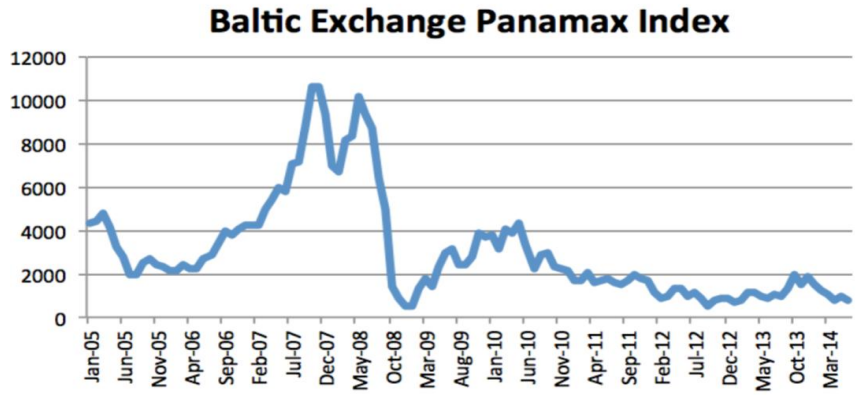


Fig.3.8 Age Profile of Panamax

3.4 Analysis of Panamax Shipping Market

Since the international dry bulk shipping market possesses the characteristics of fully competitive market and it is under a complex world economy and international trade environment, the market is influenced by many factors, including the cost, supply and demand, fundamental needs and other random factors such as political and military factors [11].

As an important component of international dry bulk shipping market, the Panamax ship freight rate is also affected by the above factors. The BPI is an authoritative index to reflect the market freight rates, and is like a barometer that could represent the shipping market tendency [12]. The BPI tendency since July 2005 is as shown in Figure 3.9.



Source: Clarkson

Fig.3.9 Change Tendency of BPI from 2005.1.1 to 2014.6.1

From the analysis of the Figure, We can see that the BPI has fluctuated for several times since July 2005, and has endured four period, including the rebound in volatility period, the high shock period, the sharp decline period and the remain low

period. From July 2005 to October 2007, due to the capacity restrains, the BPI rose rapidly, increased by 2341 points to 9467 points; From October 2007 to May 2008, the stable shipping demand helped Panamax dry bulk shipping market to boom and flourish. On October 30, 2007, the BPI hit the highest point in history---11713 points, and then undergone a small fluctuations, but on May 20, 2008 it passed the 11400 points again.

However, from May 2008 to January 2009, due to the financial crisis, the quantum of international trade and shipping volume decreased sharply, which lead to the almost collapse of the international shipping market and the rapid fall of BPI. On December 12 the BPI fell to 440 points. From May 2009 till now, as the countries carried out some market rescue measures, the shipping market gradually has tend towards stability, and the BPI rebounded after hit the bottom and wandered in the adjustment status. On March 22, 2010, the BPI rose to 4356 points in the volatility, and then remained in the state of fluctuation.

The future trend of the dry bulk shipping market largely depends on the stability of the international economic environment and the market recovery in the field of trade, finance and so forth. But for now, the international dry bulk shipping market is still faced with many uncertainties that are uncontrollable and unpredictable, and the supply and demand situation of the shipping market is also changeable.

Therefore, for the shipping companies running a Panamax fleet, it is necessary to comply with the development of the market, grasp the future development trend, and change the operating strategy accordingly, so as to finally realize the profit maximization.

Chapter 4 Shipping Volume Forecast of the Major Cargos Carried by Panamax

On the basis of analyzing the present situation of Panamax shipping market and shipping companies, in this chapter, the author will make quantitative forecast of the shipping volume of coal, grain, iron ore carried by Panamax according to the shipping volume change tendency of these three cargos of the calendar year, in order to make clear the major future demand of Panamax.

4.1 Influencing Factors of Shipping Demand and Forecast Feasibility Analysis

As an important part of international dry bulk fleet, the shipping demand of cargos carried by Panamax is influenced by the following factors.

4.1.1 Analysis on the Variables of Dry Bulk Shipping Demand

Analysis of the characteristics of the dry bulk shipping demand will help us form a comprehensive understanding on such demand. In particular, we should be more concerned about the key factors that would influence the dry bulk shipping demand.

(l) The Development of World Economy

The world economy is an important factor that would influence the dry bulk shipping demand. While analyzing the influences by the world economy, we cannot only focus on its direct or simple effects on the shipping demand. We should analyze from another aspect, such as the effects of different degrees made by some unexpected

events in the economy field and made by the changes of traded goods structure during the post-industrial period and business cycle [13].

In the long run, the development of world economic integration and the construction of the multilateral trading system with the global trade liberalization, will definitely promote continuous development of dry bulk shipping market.

(2) The Average Shipment Distance

Dry bulk shipping demand greatly depends on the shipment distance of the cargo. It is because in terms of the dry bulk cargos with the same tonnage, the longer the shipment distance is, the greater the shipping demands will be.

The change of the average shipment distance will completely change the supply and demand balance of dry bulk shipping market, and further lead to the fluctuations of freight rates. According to the statistics, from 1970 to 2013, the average shipment distance of world's dry bulk cargos basically showed a stable rise trend, rising from 4680 tons/nm in 1970 to 6230 ton/nm in 2013, which shows that the world dry bulk shipping is carried out within a wider range, and the shipping demand also rises accordingly.

Except for the afore-mentioned factors, the political events and science technology development, such as the tendency of large-sized ships, would also have important influences on shipping demand.

4.1.2 The Analysis on the Feasibility of Quantitative Forecast of Shipping Demand

The forecast of shipping demand mentioned in this chapter refers to forecasting the changing tendency of the shipping volume of coal, grain and iron ore, especially in the near future, and it is a tendency forecast but not the forecast of particular shipping volume. It is hard to predict the shipping demand at specific location and for a specific time. In practical work, we can only make directive forecast.

Analyzing the rules of shipping demand development and the future tendency, and then formulating scientific operation development strategy, are of significance to realize the profit maximization of shipping companies. It shall be noticed that, it is feasible to make forecast on the general development and tendency of the shipping demand through appropriate mathematical methods and models, on the basis of the research on the influencing factors of shipping demand, the analysis of the inner connections of these factors and their mutual interactions. No matter how many influencing factors are existed, and how complex the interactions are, the development always follows certain regulations [14].

4.2 Forecast Methods Selection and Model Building

The forecast method should be selected according to the performance of predictive object, people's understanding of the influencing factors and the possible change of these influencing factors. There are many quantitative forecast methods, including Time Series Forecast Model and Grey Forecast Model, etc.

In this section, the author will select the Trend Line Method, the Exponential Smoothing Method and the Grey Forecast Model to make forecasting, and based on these three methods to work out the final forecasting results.

4.2.1 Trend Line Forecast Method

The Trend Line Method is a forecasting technique that uses statistical method (such as exponential smoothing or moving averages) to project the future pattern of a time series data. It attempts to extend know data points to regions beyond the timeframe of know data points, almost always in an attempt to predict future values with some degree of probability [15].

When the forecast object shows a trend to rise or fall with the changes in time and we can find an appropriate function curve to reflect this trend, time t can be use as independent variable, and time series values y can be used as dependent variable, to establish the trend model. The formula shows as Y=f (t).

In the Excel chart, the trend line is a visual forecast analysis tool. We can easily obtain data directly from the known information. The major types of the Trend Line Method are linear, logarithmic, polynomial, exponential and power trend line, etc. Choosing the right trend line type is the key to improve the fitting degree, improve the accuracy of forecasting analysis. In the process of Excel computing will generate the trend line formula. In the formula, the smaller of MSE（Mean Squared Error）, more reliable the trend line is.

4.2.2 Brown Single Parameter Exponential Smoothing Method

The Exponential Smoothing Method is a common method in the production forecasting, and also in the trend forecasting of short-term economic development. Among all of the forecasting methods, the Exponential Smoothing Method is the

most used one. The simple whole period average method uses all of the past the time series data equally.

The Exponential Smoothing Method is compatible with the characters between the whole period average and the moving average; it does not abandon the past data, and gives the past data diminishing weight. That is, with the data far away, it gives the weights that gradually converge to zero. In other words, the Exponential Smoothing Method is a time series analysis and forecasting method developing from the moving average method. It calculates the exponential smoothing value, with some sort of time series forecasting model to forecast the future phenomena. Its principle is that the exponential smoothing values of any time are the weighted average of the actual observed values at current time and the exponential smoothing value at the last period [16].

The basic formula of Exponential Smoothing Method is: $S_t = \boldsymbol{a} \cdot y_t + (1-\boldsymbol{a}) S_{t-1}$

Where S_t is the smoothed value of time t, y_t is the actual value of the time t; S_{t-1} is the smoothed values of time t-1 and a is a smoothing constant, its value interval is [0, 1].

Double exponential smoothing formula is: $S_t^{(2)} = \boldsymbol{a} S_t^{(1)} + (1-\boldsymbol{a}) S_{t-1}^{(2)}$

Where $S_t^{(2)}, S_{t-1}^{(2)}$ are t term and $t-1$ term respectively of the double exponential smoothing value $\boldsymbol{a}$ is smoothing coefficient. When $S_t^{(1)}$ and $S_t^{(2)}$ are known, the forecasting model of the double Exponential Smoothing Method is as follows: $a_t = 2S_t^{(1)} - S_t^{(2)}$

$$b_t = \frac{a}{1-a}(S_t^{(1)} - S_t^{(2)})$$

4.2.3 Grey Forecast Model

The Grey Forecast Theory is the important component of grey system theory, and the establishment of Grey Dynamic model (GM model) is the core of Grey Forecast Theory, and GM (1, 1) model is the basic model. GM (1, 1) model does generating (cumulative) processing to the raw data in discrete state by using grey generating or sequence operators to dilute the impact of random error. And then we can establish a model in differential equation with high accuracy. Finally, through the reduction of the value of model (generated inverse), predicted values can be obtained [17].

The modeling process of GM (1, 1) is:

Let the non-negative original sequence $X^{(0)}$ be $X^{(0)} = (x^{(0)}(1), x^{(0)}(2), \ldots\ldots, x^{(0)}(n))$. Doing a cumulating to $X^{(0)}$, that is $X^{(1)}(k) = \sum_{i=1}^{k} x^{(0)}(i)$, k=1, 2…, n, then 1-AGO sequence is obtained:

$$X^{(1)} = (x^{(1)}(1), x^{(1)}(2), \ldots . x^{(1)}(n)).$$

Let $z^{(1)}(k) = 0.5x^{(1)}(k) + 0.5x^{(1)}(k-1), k = 2, \ldots, n,$ we can get a mean generation sequence of $X^{(1)}$ that is:

$$z^{(1)} = z^{(1)}(2), z^{(1)}(3), \ldots z^{(1)}(n)).$$

Establishing grey differential equation:

$$x^{(0)}(k) + az^{(1)}(k) = b, \qquad (1)$$

And call it as GM (1, 1) model, where, $x^{(0)}(k)$ is a grey derivative, a is a development coefficient, $z^{(1)}(k)$ is an albino background value, and b is a grey action.

Let $u = (a, b)^T$, then to estimate the parameters by least squares, and we can get that

$$\hat{u} = (B^T B)^{-1} B^T Y \tag{2}$$

Where $Y = (x^{(0)}(2), x^{(0)}(3), \dots x^{(0)}(n))^T$, and

$$B = \begin{pmatrix} -z^{(1)}(2) & 1 \\ -z^{(1)}(3) & 1 \\ \vdots & \vdots \\ -z^{(1)}(n) & 1 \end{pmatrix}$$

Establishing an albino equation (shadow equation) of the grey differential equation (1) to$X^{(1)}$, that is:

$$\frac{dx^{(1)}(k)}{dt} + ax^{(1)}(k) = b \tag{3}$$

Solving the equation (2.5), we can obtain the solution of the albino equation, that is, the time response function, which is:

$$\hat{x}^{(1)}(t) = \left[x^{(0)}(1) - b/a\right]e^{-ak} + b/a$$

Then the time response function corresponding to the equation (2.3) is:

$$\hat{x}^{(1)}(k+1) = \left[x^{(0)}(1) - b/a\right]e^{-ak} + b/a, \qquad k = 1,2 \dots, n.$$

Thus, the fitted value of the original sequence data is:

$$\hat{x}^{(1)}(k) = \left[\hat{x}^{(1)}(k) - \hat{x}^{(1)}(k-1)\right], \qquad k = 1,2, \dots n.$$

Finally, it needs test the forecasting model by posterior difference test, and after

inspection the model can be used to forecast the actual problem.

4.2.4 Combined Forecasting

The basic principle of Combined Forecasting is to give the proper weight combination into a single composite model from the results of each single forecasting model. Therefore, in the process of combination, each single model's advantages strengthened, and disadvantages weaken. Combined forecasting model has higher accuracy and reliability by integrating useful information of each single model losing in the each single forecasting model [18].

How to extract combination weight is the most essential question. Standard deviation method will be used to confirm the combination weight in this thesis. The standard deviation of forecast error in the Trend Extrapolation Method, the Exponential Smoothing Forecasting Method and the Grey System Forecasting Model set σ_1, σ_2, σ_3 weight of combined forecasting model can be calculated through the formulas as follows,

$$\sigma = \sum_{i=1}^{m} \sigma_i (i = 1,2,3)$$

$$\omega_i = \frac{\sigma - \sigma_i}{\sigma} \cdot \frac{1}{m-1} \quad (i = 1,2,3)$$

Where m is the number of model.

Then Combined Forecasting formula is as follows,

$$y = \omega_1 y_1 + \omega_2 y_2 + \omega_3 y_3$$

4.3 Shipping Volume Forecast of Major Cargos of Panamax

As mentioned above, coal, iron ore and grain are the major cargos carried by Panamax. And the author will use the Combined Forecasting Model based on the Trend Line Method, the Exponential Smoothing Method and the Grey Forecast Model to make quantitative forecast and make analysis of the forecasting results.

4.3.1 Shipping Volume Forecast and Analysis of Iron Ore

As shown in Table 4.1 and Figure 4.1, since 1990, the shipping volume of iron ore shows a stable rising tendency, rising from 330 million tons in 1990 to 1.19 billion tons in 2013, with average annual growth of 5%.

Year	1990	1991	1992	1993	1994	1995
Iron Ore	347	358	337	352	380	402
Year	1996	1997	1998	1999	2000	2001
Iron Ore	392	427	425	401	450	452
Year	2002	2003	2004	2005	2006	2007
Iron Ore	480	516	593	662	713	777
Year	2008	2009	2010	2011	2012	2013
Iron Ore	841	898	991	1053	1110	1189

Source: Clarkson

Tab.4.1 Global Iron Ore Shipping Volume from 1990 to 2013

Unit: Million Tons

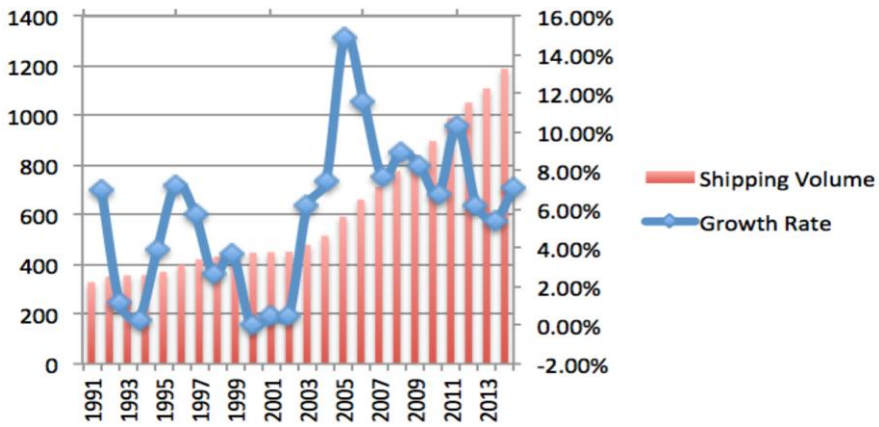


Fig.4.1Change Tendency of Global Iron Ore Shipping Volume from l990 to 2013

(1) Trend Line Method

Type global iron ore shipping volume from 1990 to 2013 in the Excel, and forecast them in order to get 4 figures. In terms of the data, the MSE of exponential trend line is the smallest, so it should be taken as the forecasting trend. From selected, exponential trend line is the most accurate one, as is shown in Fig.4.2.

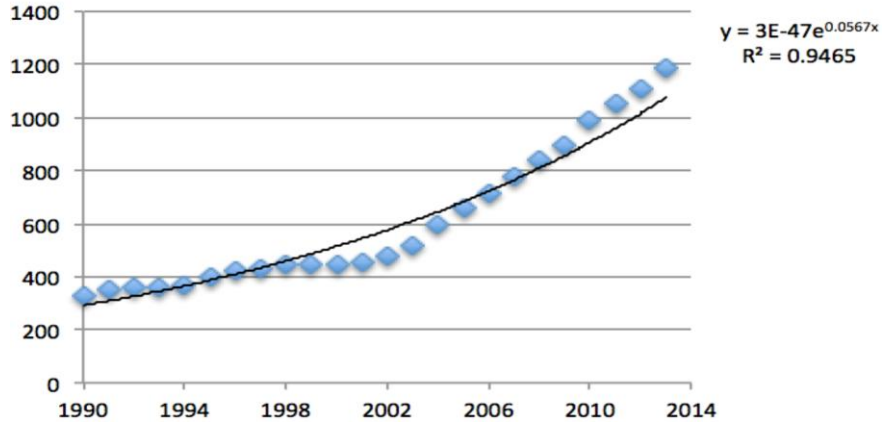


Fig.4.2 Shipping Volume in Exponential Trend Line

To sum up, the forecasting result by using Trend Line Method is as shown in

Table 4.2.

Year	2014	2015
Iron ore	1177	1246

Tab.4.2 Trend Line Forecasting Result

Unit: Million Tons

(2) Brown Single Parameter Exponential Smoothing Method

By using the Excel linear programming to calculate, while the parameter "a" equals to 0.6219, the absolute error is the smallest, and the calculation process is as shown in Table 4.3. It can be seen from Figure 4.3 that the fitting effect of this method is good.

Year	Iro Ore	Single Exponential	Double Exponential	a	b	a+bm	Absoult Error
1990	329.00	329.00	329	-----	-----	-----	-----
1991	352.00	346.1488	343.6450752	348.653	14.6451	----	----
1992	356.00	353.4938547	352.0559329	354.932	8.41086	363.78	7.78
1993	357.00	356.1080366	355.5164295	356.7	3.4605	366.73	9.73
1994	371.00	367.2114845	365.5040065	368.919	9.98758	380.15	9.15
1995	398.00	390.1674017	386.566546	393.768	21.0625	408.48	10.48
1996	421.00	413.156187	409.2740994	417.038	22.7076	425.23	4.23
1997	432.00	427.206134	424.5880569	429.824	15.314	447.32	15.32
1998	448.00	442.7100405	440.0642309	445.356	15.4762	459.56	11.56
1999	448.00	446.6542343	445.6920938	447.616	5.62786	452.22	4.22
2000	450.00	449.1488372	448.6441527	449.654	2.95206	460.73	10.73
2001	452.00	451.2746642	450.8906095	451.659	2.24646	460.56	8.56
2002	480.00	472.6922746	469.5092315	475.875	18.6186	489.96	9.96
2003	516.00	504.9825147	499.8034153	510.162	30.2942	526.48	10.48
2004	593.00	570.6083517	560.270831	580.946	60.4674	597.43	4.43
2005	662.00	638.7499647	627.2920112	650.208	67.0212	671.29	9.29
2006	713.00	694.110791	684.3552492	703.866	57.0632	728.58	15.58
2007	777.00	755.9129852	745.4655558	766.36	61.1103	794.12	17.12
2008	841.00	819.3538634	808.5661705	830.142	63.1006	853.14	12.14
2009	898.00	877.9924229	867.85619	888.129	59.29	903.91	5.91
2010	991.00	962.2508724	948.4692488	976.032	80.6131	995.32	4.32
2011	1053.00	1029.913422	1018.022573	1041.8	69.5533	1071.41	18.41
2012	1110.00	1089.625975	1079.171878	1100.08	61.1493	1116.11	6.11
2013	1189.00	1163.719248	1151.375332	1176.06	72.2035	1202.12	13.12

Tab.4.3 Brown Single Parameter Exponential Smoothing Method Fitting Effect

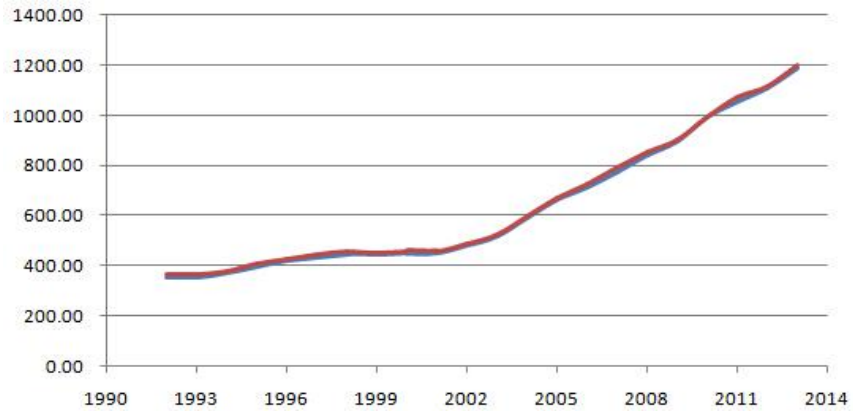


Fig.4.3 Brown Single Parameter Exponential Smoothing Method Fitting Effect

The forecasting result by using Brown Single Parameter Exponential Smoothing Method is as shown in Table 4.4.

Year	2014	2015
Iron Ore	1273	1355

Tab.4.4 Brown Single Parameter Exponential Smoothing Method Forecasting Result

Unit: Million Tons

(3) Grey Forecast

With the help of Excel VB programming and using Grey Forecast GM (1, 1) model, the formula generated by accumulating sequence is:

$$x^{(1)}(k+1) = 4725.88 \times e^{0.048338\,k} - 4468.88 \quad k = 0,1,2,\ldots.n$$

Forecast Formula:

$$x^{(0)}(k+1) = x^{(1)}(k+1) - x^{(1)}(k)$$

Model test:

① Residual test:

Absolute error series:

{0,71.95,75.36,53.19,48.42,57.02,63.96,34.2,29.70,7.56,9.62,0.47,3.67,26.05,11.76,35.49,82.29,60.23,82.35,78.72,70.39,28.43,12.09,43.10,69.53,93.29,123.31}

Relative error series:

{0%,2.35%,2.35%,1.71%,1.528%,1.67%,1.77%,9.85%,8.29%,2.24%,2.73%,0.124%,0.91%,6.64%,2.75%,8.35%,9.58%,3.47%,8.30%,6.39%,3.64%,4.84%,1.83%,5.98%,8.90%,9.11%,7.59%}

The relative error is under 10%, which can meet the requirements of the forecast.

② Correlation test:

The correlation coefficient is more than 0.6, which can prove the model is satisfied.

r=0.6216757>0.6, so when $\rho = 0.5$, r>0.6 can be proved.

③ Posterior difference test:

The standard deviation of the original series S_1 is 174.8351.The standard deviation of the absolute error series S_2 is 32.58777. So the variance ratio is $C = \frac{S^2}{S^1} = 0.1863915;\ S_0 = 117.9263$

$$P = p\{e_k < s_0\} = 1 > 0.95$$

Because C<0.35, P>0.95, the model pass the posterior difference test.

In summary, the Grey Forecast Model passed the above three tests, which means that the model can be used for forecast. And the final forecasting result is as shown in Table 4.5.

Year	2014	2015
Iron ore	1196	1288

Tab.4.5 Grey Forecast Model Result of Iron Ore Shipping Volume

Unit: Million Tons

(4) Combined Forecasting

After get weight of each forecast method, the forecasting results of the Combined Forecasting are as shown in Table 4.6 and Figure 4.4. According to the forecasting results, in 2014 and in 2015, the shipping volume of iron ore will steadily increase, and the forecasting results are consistent with the actual development tendency.

Iron Ore	Trend	Brown	Grey	Combined Forecasting
Weight	0.063985694	0.84209435	0.12180487	
2014	1177	1273	1196	1279
2015	1246	1355	1288	1365

Tab.4.6 Combined Forecasting Result of Iron Ore Shipping Volume

Unit: Million tons

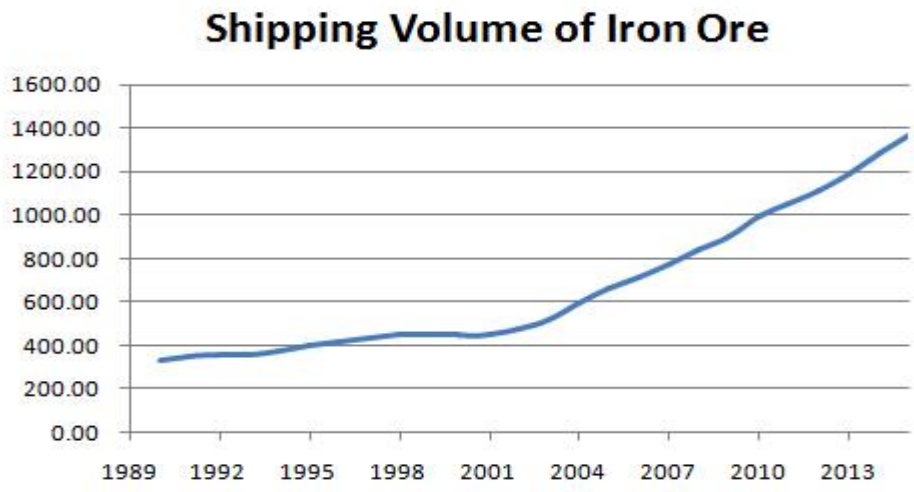


Fig.4.4 Iron Ore Shipping Volume Development Tendency

4.3.2 Shipping Volume Forecast and Analysis of Grain

It can be seen from Table 4.7 and Figure 4.5, since 1990, the global shipping volume of grain is on the rise, but the growth rate is small, and by 2013, the average annual growth is 1.8%.

Year	1990	1991	1992	1993	1994	1995
Grain	216	217	224	222	204	216
Year	1996	1997	1998	1999	2000	2001
Grain	218	228	227	245	262	264
Year	2002	2003	2004	2005	2006	2007
Grain	269	272	273	275	292	306
Year	2008	2009	2010	2011	2012	2013
Grain	319	321	343	345	372	384

Source: Clarkson

Tab.4.7 Global Grain Shipping Volume

Unit: Million Tons

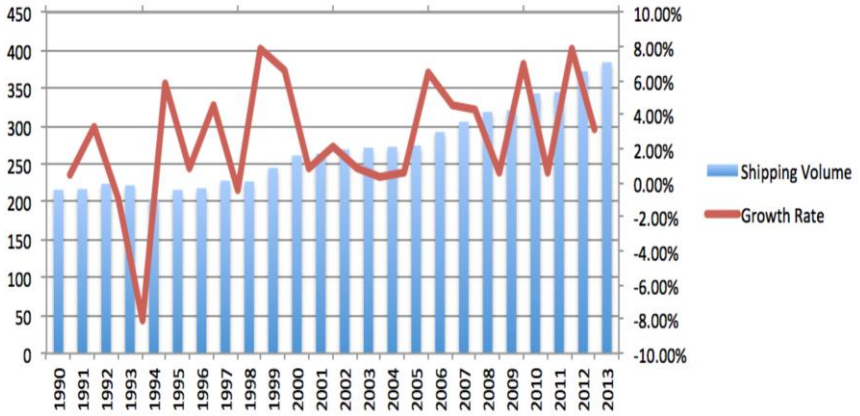


Fig.4.5 Change Tendency of Global Grain Shipping Volume from 1990 to 2013

(1) Trend Line Method

Specific methods are as follows:

Type global grain shipping volume from 1990 to 2013 in the Excel, and forecast them in order to get 5 figures.

Through the calculation of Excel, the MSE of power trend line is the smallest, so it should be taken as the forecasting trend as shown in Fig.4.6.

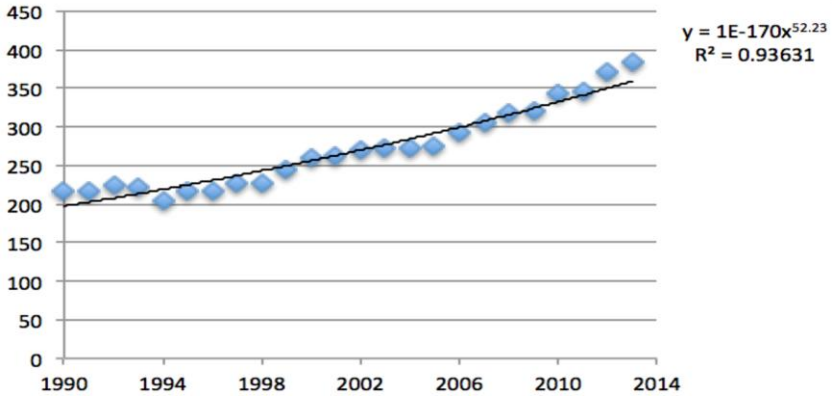


Fig.4.6 Shipping Volume in Power Trend Line

To sum up, the forecasting result by using Trend Line Method is as shown in Table 4.8.

Year	2014	2015
Grain	372	382

Tab.4.8 Trend Line Forecasting Result

Unit: Million Tons

(2) Brown Single Parameter Exponential Smoothing Method

By using the Excel linear programming to calculate, while the parameter "a" equals to 0.5321, the absolute error is the smallest, and the calculation process is as shown in Table 4.9. It can be seen from Figure 4.7 that the fitting effect of this method is good.

Year	Grain	Single Exponential	Double Exponential	a	b	a+bm	Absoult Error
1990	216	216	216	-----	-----	-----	-----
1991	217	216.5321	216.3890715	216.675	0.38907	-----	-----
1992	224	220.5057696	219.3992011	221.612	3.01013	204.543	12.4573
1993	222	221.3008496	220.7896865	221.812	1.39049	214.6	9.4
1994	204	212.0950675	214.4321811	209.758	-6.3575	219.569	2.431
1995	216	214.1728821	214.2425817	214.103	-0.1896	200.853	3.147
1996	218	216.2092915	215.6806399	216.738	1.43806	208.55	7.45
1997	228	222.4831275	220.6546188	224.312	4.97398	214.139	3.861
1998	227	224.8865554	223.7490108	226.024	3.09439	218.1	9.9
1999	245	235.5889193	232.4063519	238.771	8.65734	216.1	10.9
2000	261	249.2591433	244.729113	253.789	12.3228	231.33	13.67
2001	264	256.9111972	253.6366529	260.186	8.90754	259.145	2.135
2002	269	263.4819952	260.8355672	266.128	7.19891	252.068	11.572
2003	272	267.8388325	265.9563548	269.721	5.12079	265.966	3.294
2004	273	270.4414227	269.2358365	271.647	3.27948	266.06	5.61
2005	275	272.6009917	271.696438	273.506	2.4606	265.325	7.405
2006	292	283.141365	280.0649686	286.218	8.36853	265.19	9.31
2007	306	295.2033457	291.1341499	299.273	11.0692	276.09	16.32
2008	319	307.7644464	303.2942227	312.235	12.1601	290.48	15.33
2009	321	314.7538745	311.6735201	317.834	8.3793	316.12	2.69
2010	343	329.8900579	324.9934525	334.787	13.3199	319.52	1.38
2011	345	338.0417991	334.5344035	341.549	9.54095	334.28	8.92
2012	372	356.3450818	350.4823715	362.208	15.948	342.906	2.304
2013	384	371.1879678	365.6223035	376.754	15.1399	370.742	1.698

Tab.4.9 Brown Single Parameter Exponential Smoothing Method Fitting Effect

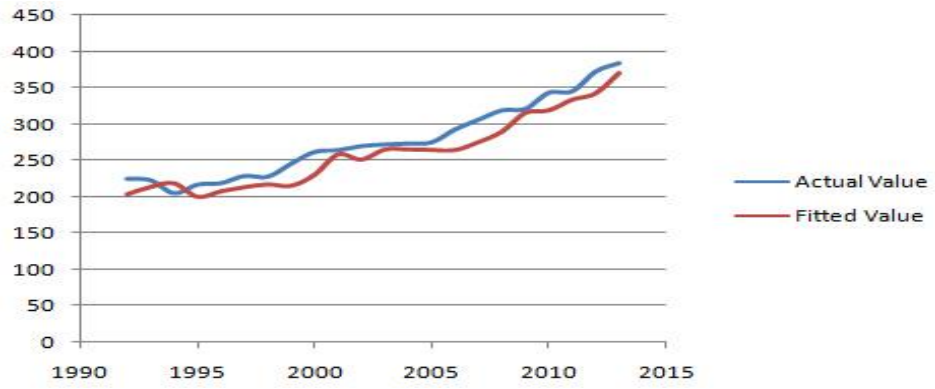


Fig.4.7 Brown Single Parameter Exponential Smoothing Method Fitting Effect

The forecasting result by using Brown Single Parameter Exponential Smoothing Method is as shown in Table 4.10.

Year	2014	2015
Grain	386	401

Tab.4.10 Brown Single Parameter Exponential Smoothing Method Forecasting Result

Unit: Million Tons

(3) Grey Forecast

With the help of Excel VB programming and using Grey Forecast GM (1, 1) model, the formula generated by accumulating sequence is:

$$x^{(1)}(\mathrm{k}+1) = 9861.34 \times e^{0.01898k} - 9662.34 k = 0,1,2,\ldots.\mathrm{n}$$

Forecast Formula:

$$x^{(0)}(\mathrm{k}+1) = x^{(1)}(\mathrm{k}+1) - x^{(1)}(\mathrm{k})$$

① Residual test:
Absolute error series:

{0,16.95,20.33,9.36,10.87,12.04,12.13,4.14,1.08,3.94,2.28,24.58,16.96,19.43,13.98,19.62,6.34,5.84,1.07,2.92,6.18,3.38,8.68,2.92,10.42,24.81,9.10}

Relative error series:

{0%,8.23%,9.54%,5.01%,5.15%,5.57%,5.51%,1.92%,0.50%,1.76%,1.03%,12.05%,7.85%,8.91%,6.13%,8.64%,2.59%,2.22%,0.41%,1.09%,2.33%,1.24%,3.18%,1.01%,3.44%,7.68%,2.91%}

The relative error is under 10%, which can meet the requirements of the forecast.

② Correlation test:

The correlation coefficient is more than 0.6, which can prove the model is satisfied. r=0.6216757>0.6, so when $p = 0.5$, r>0.6 can be proved.

③ Posterior difference test:

The standard deviation of the original series s_1 is 37.09198. The standard deviation of the absolute error series s_2 is 7.401691.So the variance ratio is $c = \frac{s_2}{s_1} = 0.1995497$; $s_0 = 25.01854$

$$P = p\{e_k < s_0\} = 1 > 0.95$$

Because C<0.35, P>0.95, the model pass the posterior difference test.

In summary, the Grey Forecast Model passed the above three tests, which means that the model can be used for forecast. And the final forecast result is as shown in Table 4.11.

Year	2014	2015
Grain	384	391

Tab.4.11 Grey Forecast Model Result of Grain Shipping Volume

Unit: Million Tons

(4) Combined Forecasting

After get the weight of each forecast method, the forecast result of the Combined Forecasting is as shown in Table 4.12 and Figure 4.8.

Grain	Trend	Brown	Grey	Combined Forecasting
Weight	0.251242	0.415513	0.333245	
2014	372	386	384	383
2015	382	401	391	394

Tab.4.12 Combined Forecasting Result of Grain Shipping Volume

Unit: Million tons

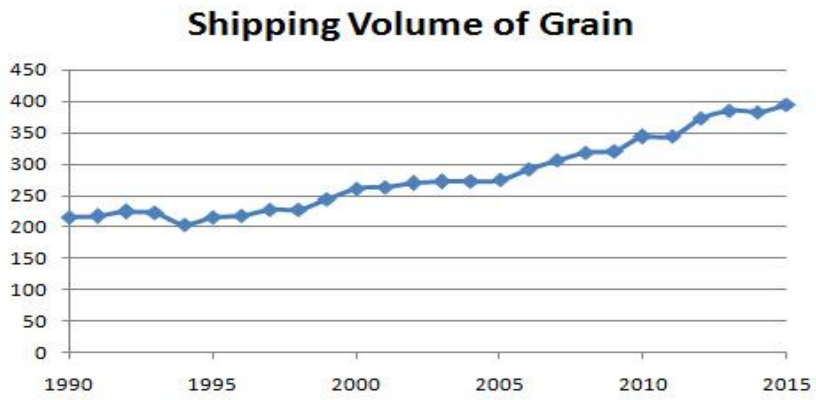


Fig.4.8 Grain Shipping Volume Development Tendency

4.3.3 Shipping Volume Forecast and Analysis of Coal

As shown in Table 4.13 and Figure 4.9, since 1990, the shipping volume of coal is on the rise steadily, rising from 330 million tons in 1990 to 1.18 billion tons in 2013, with the average annual growth of 5.5%.

Year	1990	1991	1992	1993	1994	1995
Coal	329	352	356	357	371	398
Year	1996	1997	1998	1999	2000	2001
Coal	421	448	448	457	516	546
Year	2002	2003	2004	2005	2006	2007
Coal	557	600	643	673	711	768
Year	2008	2009	2010	2011	2012	2013
Coal	793	807	930	1000	1122	1179

Source: Clarkson

Tab.4.13 Global Coal Shipping Volume from 1990 to 2013

Unit: Million Tons

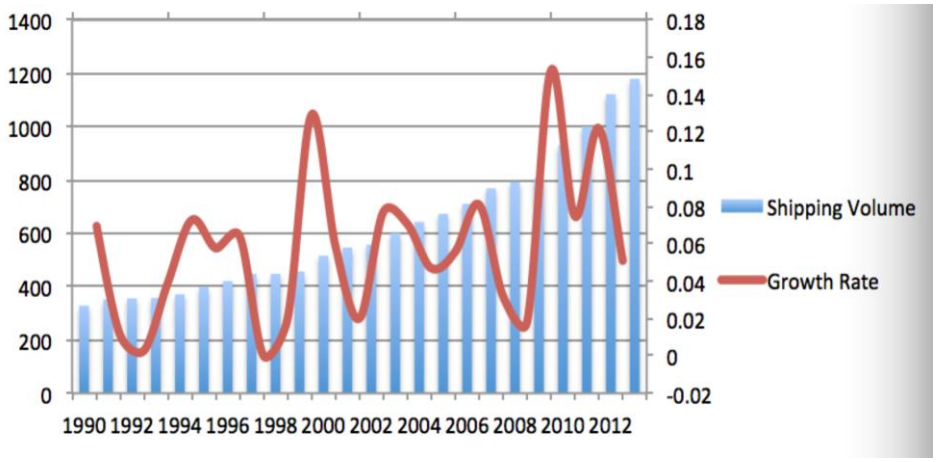


Fig.4.9 Change Tendency of Global Coal Shipping Volume from l990 to 2013

(1) Trend Line Method

Specific methods are as follows:

Type global coal shipping volume from 1990 to 2013 in the Excel, and forecast them in order to get 4 figures.

Through the calculation of Excel, the MSE of linear trend line is the smallest, so it should be taken as the forecasting trend. Show as fig.4.10.

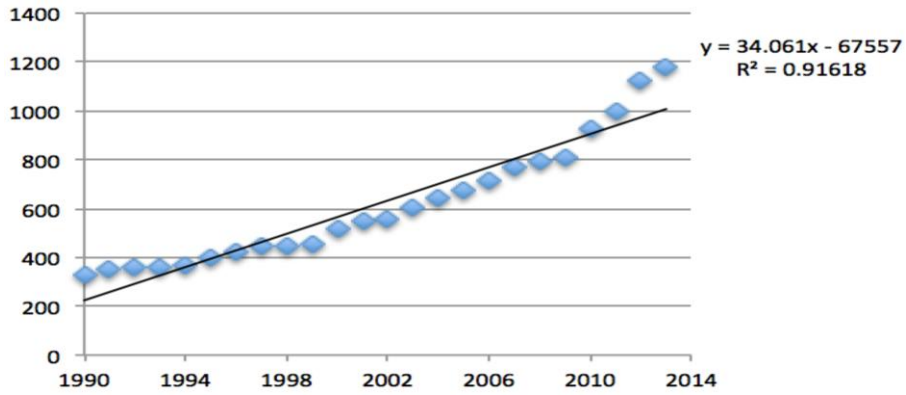


Fig.4.10 Shipping Volume in Linear Trend Line

To sum up, the forecasting result by using Trend Line Method is as shown in Table 4.14.

Year	2014	2015
Coal	1040	1074

Tab.4.14 Grey Forecast Model Result of Coal Shipping Volume

Unit: Million Tons

(2) Brown Single Parameter Exponential Smoothing Method

By using the Excel linear programming to calculate, while the parameter "a" equals to 0.4193, the absolute error is the smallest, and the calculation process is as shown in Table 4.15. It can be seen from Figure 4.11 that the fitting effect of this method is good.

Year	Grain	Single Exponential	Double Exponential	a	b	a+bm	Absoult Error
1990	329	329	329	-----	-----	-----	-----
1991	352	338.8141	335.3310759	342.297	6.33108	-----	-----
1992	356	346.1473235	342.3086372	349.986	6.97756	309.7	46.3
1993	357	350.7781606	347.7723267	353.784	5.46369	356.6	0.4
1994	371	359.4068195	355.277738	363.536	7.50541	355.9	15.1
1995	398	375.8745296	368.5647283	383.184	13.287	391.4	6.6
1996	421	395.1295678	385.7017063	404.557	17.137	418.8	2.2
1997	448	417.6893812	406.3369554	429.042	20.6352	440.8	7.2
1998	448	430.6229223	422.0038326	439.242	15.6669	459.5	11.5
1999	457	441.8780213	434.8246718	448.931	12.8208	465.5	8.5
2000	516	473.5058696	459.7779125	487.234	24.9532	530.6	14.6
2001	546	504.6140621	488.7017126	520.526	28.9238	549.91	3.5
2002	557	527.1548898	513.5078572	540.802	24.8061	545	12.2
2003	600	558.4043113	542.4705597	574.338	28.9627	560	40.4
2004	643	594.4458207	575.9998006	612.892	33.5292	637	5.7
2005	673	628.024627	609.5610161	646.488	33.5612	673	0
2006	711	663.2808737	644.2156962	682.346	34.6547	721	10.4
2007	768	708.0413309	685.3896131	730.693	41.1739	775	7.2
2008	793	744.195054	723.325003	765.065	37.9354	808	15.5
2009	807	771.0237934	754.0954927	787.952	30.7705	809	2.2
2010	930	839.0509558	808.9002619	869.202	54.8048	912	18.9
2011	1000	907.800452	872.7007745	942.9	63.8005	992	7.8
2012	1122	999.1951321	954.3022846	1044.09	81.6015	1111	10.9
2013	1179	1076.050146	1032.84183	1119.26	78.5395	1209	17.8

Tab.4.15 Brown Single Parameter Exponential Smoothing Method Fitting Effect

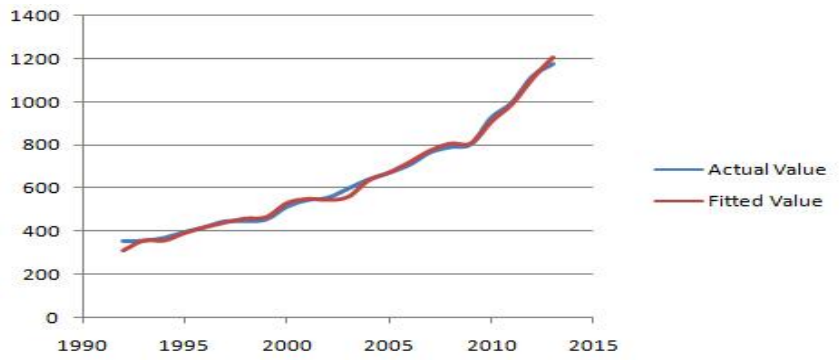


Fig.4.11 Brown Single Parameter Exponential Smoothing Method Fitting Effect

The forecasting result by using Brown Single Parameter Exponential Smoothing is as shown in Table 4.16.

Year	2014	2015
Coal	1294	1381

Tab.4.16 Brown Single Parameter Exponential Smoothing Method Forecasting Result

Unit: Million Tons

(3) Grey Forecast

With the help of Excel VB programming and using Grey Forecast GM (1, 1) model, the formula generated by accumulating sequence is:

$$x^{(1)}(k+1) = 4571.71 \times e^{0.050114k} - 4374.71 k = 0,1,2,\ldots.n$$

Forecast Formula:

$$x^{(0)}(k+1) = x^{(1)}(k+1) - x^{(1)}(k)$$

①Residual test:

Absolute error series:

{0,1.06,28.98,15.29,1.94,11.91,6.16,11.64,18.34,5.19,11.84,16.8,9.72,7.68,2.71,25.87,41.22,7.83,0.75,6.05,10.19,19.91,15.01,21.43,2806,17.83,30.36}

Relative error series:

{O%,0.45%,10.50%,5.56%,0.71%,3.98%,2%,3.54%,5.21%,1.46%,3.32%,4.53%,2.44%,1.82%,0.60%,5.77%,9.02%,1.52%,0.14%,1.06%,1.65%,3.02%,2.18%,2.94%,3.64%,2.3%,3.83%}

The relative error is under 10%, which can meet the requirements of the forecast.

② Correlation test:

The correlation coefficient is more than 0.6, which can prove the model is satisfied.

r=0.6216757>0.6, so when $p = 0.5$, r>0.6 can be proved.

③Posterior difference test:

The standard deviation of the original series s_1 is 183.0362. The standard deviation of the absolute error series $s_2$is 10.46105.So the variance ratio is $c = \frac{s_2}{s_1} = 0.0572$; $s_0 = 123.4579$

$$P = p\{e_k < s_0\} = 1 > 0.95$$

Because C<0.35, P>0.95, the model pass the posterior difference test.

In summary, the Grey Forecast Model passed the above three tests, which means that the model can be used for forecast. And the final forecast result is shown in Table 4.17.

Year	2014	2015
Coal	1213	1291

Tab.4.17 Grey Forecast Model Result of Coal Shipping Volume

Unit: Million Tons

(4) Combined Forecast

After get the weight of each forecast method, the forecast results of the Combined Forecasting are as shown in Table 4.18 and Figure 4.12. According to the forecast results, the shipping volume of coal will steadily increase in the future.

Coal	Trend	Brown	Grey	Combined Forecasting
Weight	0.095623	0.418553	0.485826	
2014	1040	1294	1213	1256
2015	1074	1381	1291	1444

Tab.4.18 Combined Forecasting Result of Coal Shipping Volume

Unit: Million Tons

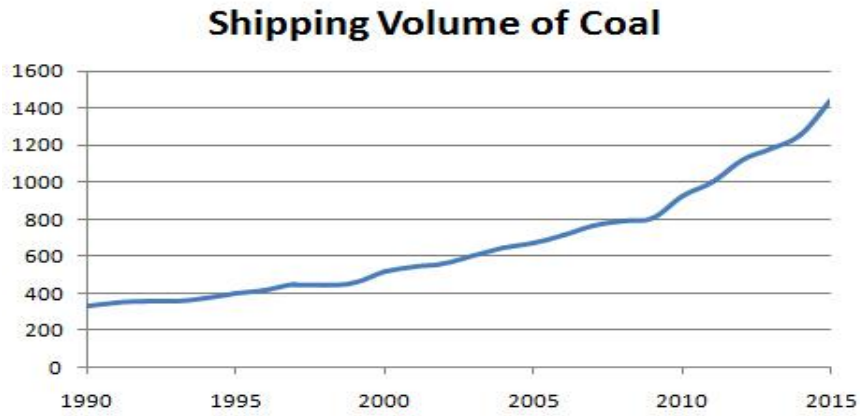


Fig.4.12 Coal Shipping Volume Develop Tendency

Based on the shipping volume forecast results of coal, grain and iron ore, it can be seen that in the future two years, the shipping volume of coal and iron ore will increase rapidly, and the shipping volume of grain will increase steadily and slightly, and the increase pace will be slow.

Chapter 5 Strategies towards Panamax Fleet Operation of Sinotrans Shipping

Dry bulk transportation is a tramp market. Since the standard of entering the shipping market is quite low, any shipping companies, regardless of the company scale or shipping capacity, can access to or withdraw from the market with freedom [19].

If the Panamax fleet wants to gain the foothold in the competition, it is necessary to develop scientific operation strategies and constantly improve the management and competitiveness. In this chapter, the author will propose the operating strategies with rationality, timeliness and operability considering the present situation and future development trend of Panamax fleet.

5.1 Fleet Structure Adjustment Strategy

In accordance with the present operating situation and existed problems of the Panamax fleet, in order to improve the competitiveness of the fleet, it needs to adjust the fleet structure based on the change tendency of the shipping market and the current fleet scale and operation. The company cannot utterly rely on the capacity of self-owned ships, by which the fleet cannot change according to the market situation, and the capital turnover pressure will be increased; and the fleet cannot overly rely on the chartering, by which the management cost and labor cost would increase.

As mentioned above, in future the shipping volume of coal, grain, iron ore of Panamax will be increased, therefore, the company should adjust the fleet scale and structure rapidly through combination of capital operation and chartering, so as to

achieve the purpose of adapting the market changes in a flexible way and the target of sustainable development.

5.1.1 Building New Ships and Assets Management to Adjust the Fleet Structure

At present, the aging problem of Panamax fleet is relatively serious, and there is a disconnection problem among the ships of differently ages. In the future, the company should adjust the fleet structure by the combination of building new ships and assets management. Therefore, the company should choose an appropriate innovation time according to the shipping market, the financial market and the new building market, and according to their own capital operation situation [20].

At present, due to the introduction of new technology, the shipbuilding cycle has been shortened, but the problem of overcapacity will continue to exist. At present, although the shipping market is in the recovery period, the shipbuilding prices remain at a fairly low level. The companies can seize this opportunity to make new orders of ships with good performance at a preferential price, so as to enhance the competitiveness of the company and to save the cost of investment. After the new ships being launched, the disconnection problem of ship age will be lessened, which would make the fleet to develop younger in age, and would make the fleet maintain an ideal structure and a good technical condition.

5.1.2 Adjusting Fleet Structure through Bareboat Charter and Time Charter

Although the shipbuilding cycle is shortened and the new technology is constantly introduced, building a new ship still needs huge investment and the asset-liability ratio is still high. Therefore, adjusting the fleet structure only through building new

ships is unreasonable. Because while building new ships, there might be time limitation and financing restrictions, thus the good opportunities will probably be missed. The best way to adjust the structure is to promote time charter and bareboat charter by using company's self-owned fleet. By this way, the huge investment can be saved and the efficient capital operation can be ensured. And after the fleet structure adjustment, the fleet can quickly adapt to market changes and meet the demands of cargo transportation [21].

5.1.3 Improving Fleet Structure through Controlling the Proportion of Self-owned Ships and Chartered Ships

Through the analysis, the structure adjustment of Panamax fleet shall be conducted through reasonable utilization of self-owned ships and chartered ships, and the proportion of the ship distribution is a key factor for promoting the development of Panamax fleet. Shipping industry is a capital-intensive and technology-intensive industry, which needs huge investment and large group of crew. Excessive self-owned ships will definitely lead to inefficient capital operation and high asset-liability ratio, and will restrict the company development [22]. In order to expand business scale and improve the fleet structure, most of the shipping companies in the world shall take the measure of controlling the proportion of self-owned ships and chartered ships.

Shipping Company	Self-Owned Ships	Chartered Ships	Proportion of Chartered Ships
NYK	200	310	61%
MOL	120	122	50%

Oldendorff	24	48	67%
Odfjell	22	82	79%
Allied Maritime	3	130	98%

Source: Clarkson

Tab.5.1 Proportion of Self-Owned and Chartered Ships in World Famous Shipping Companies

As shown in the above table, the proportion of chartered ships in NYK, MOL and Oldendorff respectively accounts for 50% to 70% of the total ships, the proportion of chartered ships in Odfjell accounts for 79%, and the proportion of chartered ships in Allied Maritime accounts for 98%.

It is obvious that the afore-mentioned companies all rely on the basis of stable supply of goods to adjust the fleet structure by charter-in ships, and to expand or downsize the operation scale according to the market changes. In accordance with the statistics and company research, the proportion of the self-owned ships to be set at 30% to 50% is more appropriate [23].

By taking the advanced experiences for reference, the Panamax fleet can make capacity replacement according to the transportation demands of the cargos, such as coal, grain, iron ore and so forth. And by setting the proportion of self-owned ships at 30% to 50% can help the fleet to increase the shipping volume and improve the fleet structure to meet the demands, and finally reach a win-win situation.

5.2 Ship Type Improvement Strategy

With the tendency of large-sized ships, the modernization of ship type needs to be

improved. In the future, the Panamax fleet should implement the ship type improvement strategy to meet the transportation requirements.

5.2.1 Enlarging the Tonnage to Adapt the Tendency of Large-sized Ships

At present, the average capacity of a single Panamax of Sinotrans Shipping is 73320 DWT. From the perspective of shipping routes, the routes for iron ore transportation in China are mainly from Mexican to China, Australia to China and United States to China. The distance of these routes are 8000 nm, 3000 nm, 7500 nm respectively. Considering the economy of shipping transportation, the tendency of large-sized Panamax is of great significance to improve the efficiency of transportation and the management profits, and to lower the operating costs.

In terms of the grain transportation in China, in the future, China will continue to increase the grain imports from the United States, and the grain carried by Panamax fleet will also increase. For the cargo transportation, the company shall be prepared in advance to ensure sufficient capacity and consider about the tendency of large-sized ships in the process of chartering and building new ships; and shall ensure the tonnage of single ships maintain growth while expanding capacity, so as to adapt to the new tendency and to enlarge its market shares.

5.2.2 Accelerating the Modernization of Ship

With the trend of ship automation, shipping intelligentization tendency becomes more obvious. In order to save variable costs during the operations, the shipping companies shall actively build a Panamax fleet with reasonable structure and good performance. The kamsarmax ship with 82000 DWT will be a good choice. To be the

winner in the market, the company can choose some modern ship types while ordering new Panamax, and can also continuously look for opportunities to hire modern ships with competitive advantages and can be easily sold to others, and seek for opportunities to charter out self-owned ships with high-price. In this way the situation of Panamax fleet will be improved and the modernization process will be accelerated.

5.3 The Market Competition Strategy

For Panamax fleet, the supply of goods, services and management are three key parts. If the company wants to gain a favorable market position, it needs to provide high-quality services, to strengthen scientific management, so as to achieve the goal of sustainable development.

5.3.1 Enhancing the Capability of Canvassing

The supply of goods is the survival basis of shipping companies, and is also the necessity for increasing the fleet scale. At present, the major source of goods for Panamax fleet comes from the following two parts: the first resource is getting goods directly from the large owners of domestic; the second recourse is getting the spot goods from the international market or COA.

In order to avoid the risks, the company operated the Panamax fleet basically by time charter in 2013, which lead to only 685336 tons of dry bulk shipping volume of that year. Such low shipping volume reflected that the market is at a low-ebb, and also reflected the weak of the Cargo Canvassing Department of the company.

With the goods supply as the backing and no longer expecting for the market booming to make profits, the company should seek stable earnings with the balance between cargos and vessels.

To ensure the supply of goods, the company should enhance the capability of canvassing. The canvassing should be aimed at the cargo in the forward market, and before making the final decision of the cargo canvassing, the company should consider about whether the market price is reasonable, and should also take the company's goods supply distribution and overall planning into consideration. The company should continuously expand the market to strengthen the cooperation with existing international and domestic owners, to achieve the benefit sharing, and to improve its market share.

On this basis, the company should apply new technologies to set up a global marketing network, and further increase the overseas canvassing spots, including Europe, Australia, America, etc. The company should also strengthen the management and training of the sales staff, and intensify the publicity to expand its influence. And through giving full play to these overseas canvass spots so as to compete for more return cargo, the operating costs can be finally reduced, and there will be more favorable conditions for developing new routes [24].

In addition, under the current market conditions, exploring new markets and paying more attention to the domestic market share, and also serving for the national foreign trade transportation, can help ensure the operational efficiency and reduce operating risks.

5.3.2 Providing High-Quality Services

Low freight rates and high commissions are adverse to the development of the shipping company, and they are regarded as "chronic suicide", which would lead to an unfair competition environment of the shipping market. And the high-quality service shall be the core of the competition strategy and the standpoint [25]. While entering long-term transportation agreement with many domestic and foreign shippers, the service quality will directly affect the economic benefits of the company, and it will also influence not only the immediate revenues but also the future interests.

To provide the high-quality service, the Panamax fleet should establish the information management system, carry out multimodal transport service, and build up highly refined data processing software. The fleet should contact regularly with the owners, command the reasons and links of the blocked transportation, so as to avoid the situations that the cargos are ready but the ships are not available or vice versa.

In addition, before the transportation, it is necessary to seek advices of the owners; during the transport, it is necessary to provide tracking service for the owner so that the owners can be informed of the situation of their goods; after the transport, if there are any claims, the claims be handled in a timely manner in order to keep friendly business contact with the owners.

Furthermore, it is important to consolidate the joint collaboration relationship and provide all-round services. Using the public network and the media power to increase business and to ensure the quality of services can help the company to establish a good profile, in order to lay a good foundation for obtaining stable supply

of goods in the future. Through carrying out the company research and holding seminars, the company should widely take the views of the cargo owners and ship-owning companies. There is also one thing to remember, always put service in the first place.

5.3.3 Strengthening Scientific Management

The level of scientific management will directly affect the economic benefits and social profile of the company. In recent years, the standardization and the procedure organization of the company have been improved, but for achieving the profit maximization, the company should take the methods that conform to their own situation and also conform to the international practice standard [26].

(l) Adhere to the Basic Management.

Emphasizing the standardized management as the main line of the work, and improving the ISO 9002 system and other systems with creative modifications, so as to raise the work efficiency and improve the level of scientific management of the company and the fleet.

(2) Strengthen the Ship Management.

Building up a coordination platform for chartering, dispatching, maintenance, shipping service, crew management and so forth, in order to realize the information sharing and to make each voyage to be organized and then every staff can know the situation of the ship at any time. Through holding regular meetings and irregular communication and cooperation to exchange information, work together, so as to take the advantages of communication and coordination.

(3) Strengthen the Cost Control.

Fleet operation cost is mainly focused on the voyage cost, fuel cost, disbursement cost and management cost [27]. Arouse the enthusiasm of the crew by rewards, ensure the sailing schedule, and reduce non-productive berthing time. Enhance the refuel planning and make voyage fuel arrangement according to the market changes in order to reduce fuel costs.

Controlling the material price and appointing specialized personnel to track each vessel to ensure the reduction of disbursement cost; using the technology to realize the ship-to-shore data transmission and to speed up the transfer time; using the advanced management software to highly realize the process management and information sharing to reduce the management costs.

On such basis, the shipping company also needs to improve the decision-making system including buying and selling decisions, etc. Through taking the afore-mentioned measures, the shipping company can improve efficiency and reduce the costs and risks through scientific management, and can promote rapid and healthy development of the Panamax fleet so as to gain an invincible position in the market competition.

Chapter 6 Conclusion

After the financial crisis, the international dry bulk shipping market is facing a lot of uncertainties that are hard to control and to forecast. Since the competitions between shipping companies are quite fierce, it is necessary to formulate a scientific and operable strategy for the future development. Panamax fleet has been an important part of the dry bulk fleet, and is representative in the market operation.

Based on the above-mentioned background, this thesis has analyzed the current operation situation of Sinotrans Shipping's Panamax fleet on the basis of in-depth understanding of the current Panamax market situation, and has summarized the current existed problems, mainly including: aging problem, unbalanced ship age structure, inferior modernization level, unbalance between self-owned ships and chartered ships, disproportion between time charter and voyage charter, etc.

On the basis of the in depth understanding of the current situation of Sinotrans Shipping, include the internal environment and the external environment, the author has adopted the combination of qualitative method and quantitative method, and has accurately forecast the future development and the trend of Panamax fleet.

By using the Combined Forecasting Method on the basis of Trend Line Method, Exponential Smoothing Method and Grey Forecast Model, the author has made reasonable forecast on the shipping volume of coal, grain, iron ore carried by Panamax, and the forecast results shows that the shipping volume of these three cargos will reach 1256 million tons, 383 million tons and 1279 million tons respectively in 2014, and by 2015, the shipping volume will reach 1444 million tons,

394 million tons and 1365 million tons respectively.

Through analyzing the current situation of the shipping company, summarizing the existing problems in the development of the fleet, identifying the future development trend, in the final of the thesis, the author has put forward practical management strategies for the Panamax fleet, including the fleet structure adjustment strategy, ship type improvement strategy and market competition strategy, which are of great significance for the Panamax fleet to improve its market competitiveness.

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