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Analysis of methods for Z company to deal with single hull VLCC

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Analysis of Methods for Z Company to Deal with Single Hull VLCC

By

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MASTER OF SCIENCE

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DECLARATION

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

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

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ABASTRACT

Title of Dissertation: **Analysis of Methods for Z Company to Deal with Single Hull VLCC**

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

Abstract: Petroleum is one of the most important resources for a country. Since majority of the oil is transferred by sea then this feature made national owned tanker fleet is very important to a country for both economic and safety considerations. In 2005, IMO issued the new MARPOL amendments which require all the single hull tankers must out of market before 2015. Since single hull tankers fleet account for more than 50 percent of total Chinese national tanker fleet capacity then how to deal with single hull tanker and quickly replace the loss capacity is a question all Chinese tanker companies can't avoid especially in a circumstance that Chinese government want to enlarge its national fleet capacity.

This dissertation focus on Z Company, one of the biggest and oldest tanker companies in china which will be influenced by this amendment a lot, to see which methods they should adopt to minimize the influence in economic aspect.

It consists 5 chapters. Chapter one introduce the object and background of this dissertation, also it review related research result. Chapter two, three and four are the main body of this dissertation. Chapter two introduces the new IMO amendments and the direct result after it works. Chapter three discusses solutions to deal with single hull tanker and also analyses future market of both tanker market and dry market to see if those methods are economic. By using the result conducted in chapter three, in chapter four the author shows the economic result of different methods, in this chapter it will also give some recommendation to deal with the potential risks. Chapter five shows the conclusion and suggestion to all the company which interested in the

methods deal with single hull tanker.

KEYWORDS: Single hull tanker, updating, conversion, FPSO, gray model

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LIST OF ABBREVIATIONS

BCI	Baltic Capesize Index
BDI	Baltic Exchange Dry Index
BDTI	Baltic Dirty Tanker Index
CAS	Condition Assessment Scheme
CNOOC	China National Offshore Oil Corporation
COA	Contact of Affreightment
COSCO	China Ocean Shipping Corporation
DWT	Deadweight
FPSO	Floating production storage and offloading
HOSCO	Hebei ocean shipping company
IMO	International maritime organization
IRR	Internal rate of return
M	Million
MARPOL	The international convention for the prevention of pollution from sea
MDWT	Millions deadweight tons
MV	Motor Vessel
OECD	Organization for Economic CO-operation and Development
RMB	Ren Min Bi
USD	United States Dollar
VLCC	Very large crude carrier
VLOC	Very large ore carriers

CHAPTER 1 INTRODUCTION

1.1 Background of this dissertation

Petroleum, due to its high energy density, easy transportability and relative abundance, has become the world's most important source of energy since the mid-1950s[1]. The major oil consumption regions happen to be net importers of oil, so their demand creates a need to move oil safely and efficient from its various sources (Glen, 2002). The oil tanker, which emerged as a specialized vessel during the 1940s and 1950s, was developed to meet that need (ibid). When we look back, we can have a general view as the international shipping market of tanker is a competitive and fast changing market, it is an industry which influence by many factors such as worldwide political environment, economic fluctuation, and new technology development, etc.

Long time ago, lots of environmentalists criticized using tanker to transfer oil for sea pollution either from accident causes or operation of tanker. Once a tanker has an accident at sea, it will make a huge disaster to the countries around and high sea. As a result, MARPOL73/78 convention (the international convention for the prevention of pollution from sea, 1973 as modified by the protocol 1978) had been issued by IMO for regulate the condition of tanker in order to minimize pollution of sea, including dumping, oil and exhaust pollution. The object of this convention is to preserve the marine environment through the complete elimination of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances.[2] The Convention includes regulations aimed at preventing and minimizing pollution from ships, both accidental pollution and that from routine operations, and until 2007 it includes six technical Annexes. On 2003 December 4th, IMO issued the 2003 amendments, it revised of regulation 13G of annex 1 of MARPOL, restate the

[1] http://gollum.easycp.de/gollum/gollum.php?a=core&l=en&wl=en&q=#Petroleum_by_country
[2] http://gollum.easycp.de/gollum/gollum.php?a=core&l=en&wl=en&q= MARPOL

deadline of single hull tanker out of market[3]. This amendment has entry into force in 2005 April.

The development of China's economy is during a rapid growth period, it require huge amount of petroleum and other raw materials. Since China is not a country that has lot of petroleum, the gap of supply and demand of China oil is expanding every year since 2003. Some economists predicted that China will be the largest oil import country in the world, and this definitely will enlarge the gap in the near future. Although China already been a big oil import country, there are still lots of problems of China oil import system. The biggest one is that the singularity of Chinese oil import source and that made the majority of oil is transfer by foreign companies, in some years the ratio of foreign tanker companies transport amount reach even 90% of Chinese total import oil amount. The dependence level is so high that Chinese government begins to worry about national security once those foreign companies stop transfer oil to China. For this reason, Chinese government makes a target as Chinese owned tankers companies should transport the majority of Chinese import oil. This is very good news for Chinese tanker companies since is a brilliant develop opportunity for them to expand their fleet capacity. Currently single hull tanker capacity occupies more than half of Chinese tanker fleet. As there is a time lag between order a ship and deliver the ship, those companies have to consider how to enlarge or at least maintain their fleet capacity in the circumstance that single hull tankers will force to out of market.

Chinese companies can learn something from those developed countries which have experience with the strategies of single hull tanker. Usually those countries use three methods that are update it into double hull tanker, convert it into FPSO or scrap. Hebei ocean shipping (HOSCO), which is a pioneer among Chinese tanker company, has try to solve this problem not only follow what had already done (they update a single hull tanker into double hull tanker) but also use a brilliant idea that converted a

[3] http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258

single hull tanker into a dry bulk vessel. As both convert and update job increase, some Chinese ship yards especially Shan Haiguan shipyard begin to do this job, and have successfully updated or converted single hull tanker for both domestic and foreign companies.

1.2 Literature review

From IMO website we can see that the MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years. The amendment to MARPOL Annex I brought in a new global timetable for accelerating the phase-out of single-hull oil tankers that was subsequently revised again by the 2003 amendments. Under the revised regulation, the Condition Assessment Scheme (CAS) is to be made applicable to all single-hull tankers of 15 years, or older. This amendment also consider some single hull tanker may not build longer, it allow individual flag and port accept shipowner continued operation not go beyond the anniversary of the date of delivery of the ship in 2015 or the date on which the ship reaches 25 years of age after the date of its delivery, whichever is earlier.

This amendment made a lot of scholars wrote articles about the future of single hull tanker, but most of them only mentioned about the future impact of demand and supply of tanker market from both economic side and political side instead of possible solutions for the companies that have single hull tankers.

Ellison (2006) uses some models to give the conclusion as although the capacity of the tanker fleet through 2010 can be projected fairly well (given the mandatory retirement schedule and the newbuilding orderbook), the demand for oil transport is much more difficult to project. Even so, assuming historic levels of growth in oil volumes to be transported by tanker, it seems likely that the market for oil transport

will remain tight through 2010 – but that a crisis seems unlikely.

Stopford (2007) thinks the amendment allows countries can defer the phase out, so there is no guarantee that 63m DWT will disappear in 2010. Japan, China and Singapore, all big traders, have already said they will be flexible. In another article of Stopford (2008), he thinks the tanker fleet is edging along the path IMO charted for it and it looks as though by 2010 most single hull tankers will either be in the recycling yard or maybe having fun terrorizing owners in the dry bulk market.

Waldegrave (2005) who seems support convert single hull tanker mentioned once the markets stay reasonably good owners will be loathe selling relatively young vessels for scrap and some owners are already looking for alternative uses for their vessels. In another article (2004) he mentioned the characteristics of the current market present a niche opportunity for shipowners, which may lead to more conversions of single-hull tankers to bulk carriers in the near future. Stopford (2008) also agree this point, he think on the supply-side, the conversion of single hull tankers into ore carriers and FPSOs is a significant development. Li Shengjing(2007) think the coming deadline and the prospective of dry bulk market is the main driving force of single hull tanker owner to convert single hull tanker into dry bulk carrier.

Waldegrave (2004) said further cut-off dates of 2010 for the remaining single hull fleet, with 2015 the absolute latest date that non-double hulled tankers will be allowed to trade. What this means for the tanker fleet is that the make-up and appearance of the fleet will radically change over the coming years with effects on scrapping in both the short and the long term. Stopford (2007) mentioned that during 2007 scrap price is dramatically escalated due to there are not nearly enough ships for demolition to go round at the moment.

As majority of Chinese tanker fleet are single hull tankers, Chinese scholars also look at this problem. Some articles mentioned about the possible solution of single hull

tanker for those companies, but they are more emphasis on the fact instead of analyze the profit and loss of the single hull tanker owner. Like Liu Liping(2004) ,Tong Cuilong(2005) mentioned that HOSCO converted a single hull tanker MV “INNOVATOR” into dry bulk carrier. Those articles just state a fact of those works but not how to evaluate those actions.

In this dissertation, the author will use some forecast method to predict the future situation of dry bulk market, tanker market and demolition market. Some articles like Armstrong’s (2001) gives one hundred and thirty-nine principles used for summarize knowledge about forecast. Stopford (2004) regard the models available today are too sensitive to small changes. He suggests 4 steps for reviewing strategy for shipping: Step 1: Diagnose the problem today. What exactly is the state of the market? Is it a bubble, a new paradigm, or just a rather frothy shipping cycle? Step 2: Define what's causing the problem. What precisely has led to the situation which is so different from the past and what is happening today that will affect the future? Step 3: Specify what the consequences of current developments as economic forces work on them over the next few years. Step 4: Develop an action plan to deal with that.

1.3 The framework and content of this dissertation

The main goal of this dissertation is to use economic model to analyze the possible solutions that deal with single hull tanker and suggest the possible replacement solution according to the companies’ ability of financial. Due to the limitation of information, this dissertation will mainly focus on VLCC type tanker and in this dissertation the author will take Z Company as typical Chinese petroleum transportation company example to study, and then deduct the general strategy of this kind of Chinese companies should take. To achieve this purpose, this dissertation will first analyze the history records of both dry bulk market and tanker market and then forecast the future of both markets like freight rate, newbuilding price, and secondhand price. Second, use economic models to calculate the profit and loss of

five strategies of how to deal with single hull VLCC tanker and state the potential problems by take Z Company as an example. Third, give the author's recommendation for Chinese single hull tanker companies.

This dissertation will use some economic principles and several mathematical forecasting methods/ models. The principle of supply and demand is the foundation method of forecast both dry bulk market and tanker market. Qualitative and quantitative analysis have been used on both the supply and demand sides of the market in order to make a study on the trend of the tanker and dry bulk market. This dissertation will also apply moving average method, exponentional smoothing method and gray forecast system when forecast.

1.4 Forecast methods

As the author mentioned above, in this dissertation, the author will use three forecast methods to predict the future, which is moving average method, gray system theory and exponentional smoothing method. As moving average method and exponentional smoothing method is very easy to understand, which standard methods in Excel are. The author will only introduce the gray system theory method.

Chinese scholar Deng Julong first introduced gray theory in 1983 and then this theory has been widely used in many areas like transport, economic, engineering, etc. The main feature of this method is this model can solve problem even under the circumstance that is discrete data, unclear system and insufficient information. Those features made this model can deal with the problems that have uncertainly information, variable input and incomplete data.
Steps of building a gray system model is as follow:

Establish the original data array: $X^{(0)} = \{x_1^{(0)}, x_2^{(0)}, \ldots\ldots x_{n1}^{(0)}\}$:

1. Using the original data to generate the new data by adds each data

$X^{(1)} = \{X_1^{(1)}, X_2^{(1)} \dots X_{n1}^{(1)}\}, X_I^{(1)} = \sum_1^i X_{j^{(0)}}$

2. Make data matrix X and data vector Y

$$X = \begin{bmatrix} \frac{-1}{2}(x_1^{(1)} + x_2^{(1)}) & 1 \\ \frac{-1}{2}(x_2^{(1)} + x_3^{(1)}) & 1 \\ \dots & \dots \\ \frac{-1}{2}(x_{n-1}^{(1)} + x_n^{(1)}) & 1 \end{bmatrix}$$

$$Y = [x_2^{(0)}, x_3^{(0)} \dots x_n^{(0)}]^T$$

3. Use least squares method to calculate a and b:

$$B = \begin{pmatrix} a \\ b \end{pmatrix} = (X^T X)^{-1}(X^T Y)$$

4. Make time respond function:

$$X_i^{(t)} = (x_1^{(0)} - \frac{a}{b})e^{-ai} + \frac{a}{b}$$

5. Make discrete gray model:

$$X_{i+1}^{(t)} = (x_1^{(0)} - \frac{a}{b})e^{-ai} + \frac{a}{b}$$

According to this function we can get the gray model forecast value, then use the formula: $X_i^{(0)} = X_i^{(1)} + X_{i-1}^{(1)}$ to get the aim forecast value.

CHAPTER2 REASONS AND IMPACT OF SINGLE HULL TANKER OUT OF MARKET

2.1 Reasons of single hull tanker have to leave market

Oil pollution of the seas is first recognized as a problem in the first half of the 20th century and various countries introduced national regulations to control discharges of oil within their territorial waters. In 1967, the tanker MV ”Torrey Canyon” grounded while entering the English Channel and spilled her entire cargo of 120,000 tons of crude oil into the sea. This is the biggest oil pollution accidents ever recorded up to that time. The incident raised questions about how to prevent oil pollution from ships and also exposed deficiencies in the existing system for providing compensation following accidents at sea[4]. Finally, in 1973 IMO had a conference to adopt the International Convention for the Prevention of Pollution from Ships.

Although MARPOL convention has largely improved the environment safety standard, there are still several disasters happened later. In 1989, the Exxon Valdez hit reef near Alaska area and dumped 11 millions gallons of crude oil that polluted over 1100 miles coastline which is the largest oil spill accident happened in American waters. This made the American government adopted an Oil Pollution ACT next year, which set a deadline of the phase out of single hull tanker access American coastline. Single hull tanker is a vessel that oil in the cargo tanks is separated from the seawater only by a bottom and a side plate. Once this plate is damaged as a result of collision or stranding, the contents of the cargo tanks risk spilling into the sea and causing serious pollution. Double hull tank, which surround the cargo tanks with a second internal plate at a sufficient distance from the external plate, protects cargo tanks against this kind of damage and thus reduces the risk of pollution[5]. In 1992, IMO amended the

[4] http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258
[5] http://europa.eu/scadplus/leg/en/lvb/l24231.htm

MARPOL convention to make it mandatory for tankers that is 5,000 DWT or more ordered after 6th July 1993 to be fitted with double hull, or an alternative design approved by IMO (Regulation 13F in Annex I of MARPOL 73/78)[6].

In 1999 December the MV"Erika" sank at the coast of France and leakage more than 10000 tonnes of heavy fuel oil that made Europe commission set a proposal on the safety of the seaborne oil trade in 2000, the main purpose is to replace single hull tanker in the near future and require IMO to accelerate the speed of force single hull tanker out of market. This impetus IMO to tight the safety net, in another word, accelerate the timetable of phase out of single hull tanker. In 2001, IMO adopted a revised schedule of single hull tanker, which is the revision of regulation 13G of MARPOL 73/38.

In 2002 November, another single hull tanker MV "Prestige" sank at the coast of Spain and leakage 63000 tones oil. After this accident, the Europe commission ban heavy density single oil tanker and published regulation No.1726/2003 that state a new requirement of all single hull tankers which want to access Europe commission member's ports. This incident also finally leads IMO in 2003 issue a further revision phase out timetable to the 2001 amendment.

According IMO proposal, the 2003 amendment divide oil tanker into three categories which are[7]: Category 1: an oil tanker of 20000 tons deadweight or more carrying crude oil, fuel oil, heavy diesel oil or lubricating oil as cargo, and of 30000 tons deadweight or more carrying oil other than the above, which does not comply with the requirements for new oil tankers as defined in Annex I of MARPOL. Category 2: an oil tanker of 20000 tons deadweight or more carrying crude oil, fuel oil, heavy diesel oil or lubricating oil as cargo, and of 30000 tons deadweight or more carrying oil other than the above, which complies with the requirements for new oil tankers as

[6] http://oils.gpa.unep.org/facts/prevent-sea.htm
[7] http://europa.eu/scadplus/leg/en/lvb/l24231.htm

defined in Annex I of MARPOL. Category 3: an oil tanker of 5000 tons deadweight or more but less than that in categories 1 and 2. The table below shows the year of retirement of each category of oil tanker.

Table2.1 Timetable of the 2003 amendment

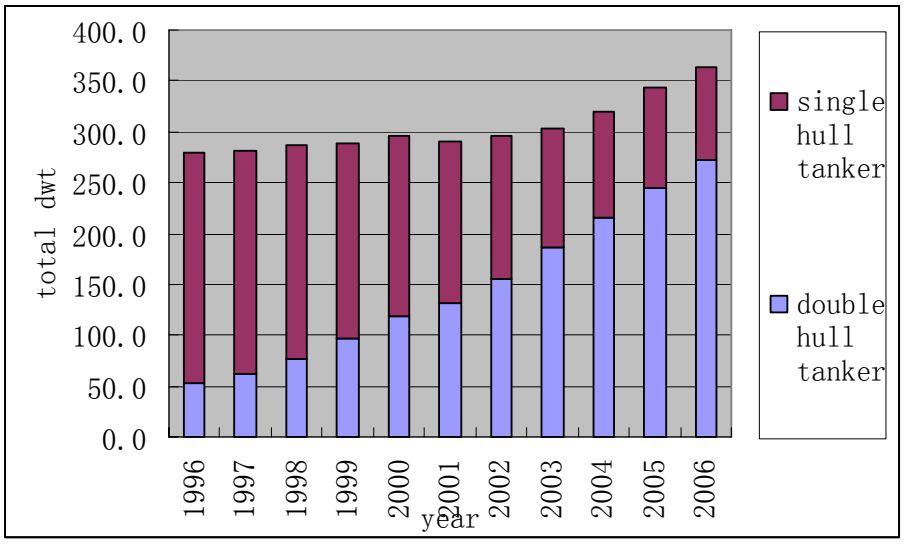
Category of oil tanker	Date of year
Category 1	5 April 2005 for ships delivered on 5 April 1982 or earlier 2005 for ships delivered after 5 April 1982
Category 2 and Category 3	5 April 2005 for ships delivered on 5 April 1977 or earlier 2005 for ships delivered after 5 April 1977 but before 1 January 1978 2006 for ships delivered in 1978 and 1979 2007 for ships delivered in 1980 and 1981 2008 for ships delivered in 1982 2009 for ships delivered in 1983 2010 for ships delivered in 1984 or later

(Source: IMO http://www.imo.org/Conventions/contents.asp?doc_id=678&topic_id=258)

2.2 Impact of tanker market after this proposal

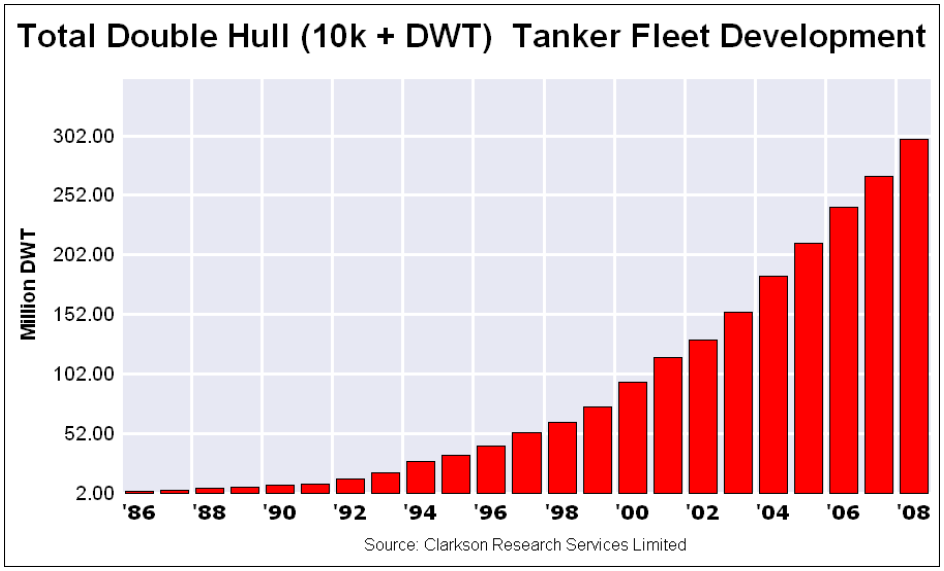
After IMO published 2003 timetable of phase out of single hull tanker, it has hugely impact the world tanker market. From figure 2.1 we can see that the percentage of double hull tanker in the total tanker fleet is rapidly increasing every year. In 1996, double hull tanker only occupy about 20% of total tanker fleet, in 2006, it almost occupy about 70% of the whole tanker fleet. Figure 2.2 shows development of total double hull tankers fleet, from this figure we can find out the total fleet capacity has almost doubled from 2003 to 2008 reach almost 302 million.

Figure 2.1 Tanker fleet developments by hull type



(Data source: Clarkson research)

Figure 2.2 Double hull tanker developments



(Source: Clarkson research)

Normal time difference between the shipowner order a ship and he/she actually get the ship is 2-3 years depends on different types of vessel, this is why lots of orders were made in 2006 which means the shipowners can get new tonnages around 2010 to replace the single hull tankers, from table 2.2 we can clearly notice this situation by compare the ratio of ordered ship's deadweight to exit single hull tanker deadweight

in the begin and end of 2006.

Table 2.2 Ration of single hull tanker DWT to ordered ship DWT (million DWT)

Vessel type	Begin of 2006			End of 2006		
	Order DWT	Single hull tanker DWT	Ratio	Order DWT	Single hull tanker DWT	Ratio
VLCC	27.9	47.2	59.1%	46.6	44.2	105.4%
Suezmax	9.5	11.5	82.6%	15.7	10.8	145.4%
Aframax	16.7	17.2	97.1%	23.2	15.5	149.7%
Panamax	8.8	5.9	149.1%	9.1	5.2	175.0%
Handy	22.3	26.4	84.5%	29.5	24.9	118.5%
Total	85.2	108.1	78.8%	124.1	100.1	123.9%

(Data source: Clarkson research)

Tanker time charter rate also reflects this: in 2003 one year time charter rate of double hull tanker is first time higher than that of single hull tanker among all three types (VLCC, Suezmax and Aframax) and the gap between those two kinds is became larger and larger every year. This situation is even more obvious in 3 years time charter rate which means shipowner/charterer doesn’t has much confident on the future of single hull tanker. If we look those data in detail, we can get that from 2005 when the new timetable comes into force, the hire difference of all three types is increasing more quickly especially when market is good in 2008, this situation also indicate that the charterers has pessimistic attitude to the future of single hull tanker. And the reason behind this situation is more and more countries had set revised timetable of phase out of single tanker and most of those new timetables are earlier than 2010. As the time charter rate indicates the direct result is single hull tanker owners had or will find it is more and more difficult to find a charterer who wants to charter a single hull tanker.

Table 2.3 One-year Timecharter rates of single hull and double hull tanker

	2005	2006	2007	2008	18-Apr
VLCC DH	58721	58308	55548	67500	70000
VLCC SH	47635	48221	42154	45000	48000
Suezmax DH	43423	43173	44452	42000	42500
Suezmax SH	35038	32462	29500	29000	28000
Aframax DH	35144	33154	33144	33000	31500
Aframax SH	27615	23202	22404	22000	20000

(Data source: Clarkson)

2.3 Asia sounded death knell for single hull tankers

Since the IMO amendment allows each country to set timetable of single hull tanker out of market itself, once the new timetable is no later than 2015. This made some economists like Martin Stopford (2007) mentioned that some big Asia oil import countries like China, Japan or Korean may allow single hull tanker access to their ports until the deadline for economic consideration and that may encourage the shipowner to hold the vessel in market longer than IMO planed. Nowadays, nearly 96% of single hull VLCCs trade in Asia due to tighter rules in the US and Europe avoid these tonnages ahead of the IMO phase out in 2010[8]. Fixture data also prove this: during 2006 and 2007 South Korean and India are the only two countries in the world which have increased the number of single hull tankers they chartered especially in VLCC. Take Korean as an example, Koreans businessmen chartered 173 of 628 fixed single hull VLCCs in 2007 which means around 60% of crude oil transferred to Korean is done by single hull tanker. So we can deem Asia as the last big market for those single hull tanker owners, once Asia ban single hull tanker, it will destroy this market.

This day finally came in 2007 December a Chinese single hull tanker MV “Hebei Spirit” spilled nearly 11000 tonnes which is the worst oil spill accident in Korean

[8] http://www.tmcnet.com/usubmit/2007/12/11/3156309.htm

history. The disaster made Korean government ban single hull tanker access Korean ports or enter into its water since 2010, which is 5 years earlier than the Korean government originally planned. As the author mentioned above, Korean play an important role in single hull tanker market, this made Korean government banned the single hull tanker will make the single hull tanker owners loss lots of business. Two major Korean oil refiners, GS Caltex and SK Energy, already announced they would phase out the usage of single hull tanker.

Korean government's acceleration of its timetable of phase out of single hull tanker may not only impact on the single hull tanker owners' business in Korean, it may be just the first domino card. Philippine government already responds on Korean's proposal and announced they will also ban single hull tanker from April in 2008, two years earlier than planned. Other Asia countries such as China, Japan, and Singapore may also learn from this accident and then ban single hull tanker ahead the timetable they originally planned. Once all those countries ban single hull tanker access their ports, it will make the single hull tanker's time charter rate decrease even more as the charterer will hardly find any big oil import country which will to allow them access. Just as EA Gibson said this accident could be a trigger for a major shift in the tanker industry[9].

So in this circumstance, it is reasonable to conduct that Chinese government will follow near countries' experience then to forbid use single hull tanker than they planed. This made Chinese tanker companies have to think how to deal with their tankers in advance.

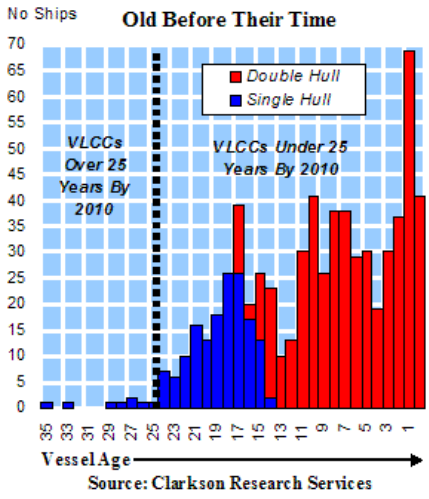
[9] http://www.sustainableshipping.com/news/2008/01/70339?gsid=e7f6226df8a4bc62e639af00e74e91e4&asi=1

CHAPTER 3 METHODS TO DEAL WITH SINGLE HULL TANKERS

In chapter 2 the author mentioned that single hull tanker would be forced out of market in 2010. Although some single hull tankers will run for around 25 years in 2010, the others which build in around 1990 will be scraped before their design age, and this situation is especially serious in VLCC field (see the figure below). Consider this and the rule of economic of scale, activity shipping peoples are focus on the VLCC convention project, and this is the main reason this dissertation only discusses the VLCC market.

From figure 3.1 we can see that the age profile of VLCC fleet which only 8 of the 162 non-double hull vessels in the current fleet will be over 25 years in 2010, this leaving 154 vessels (41.8m DWT) less than 25 years with the youngest single hull ships just 14 years of age (Waldegrave, 2007). As those vessels will not be fully utilized that made the shipowners very unwilling to scrap them for financial consideration and made lots of VLCCs still operating in market.

Figure 3.1 Age profiles of tankers



(Source: Clarkson research services)

Although the shipowner can operate their vessels until 2010, wise owners already began to think about whether there is any possible solution to solve this problem or at least to minimize their potential lost. Generally speaking, there are five solutions deal with single hull tanker: first, update single hull tanker into double hull tanker, second, convert single hull tanker into dry bulk carrier, third, demolish single hull tanker, fourth, convert it into FPSO and fifth, run single hull tanker only in domestic area. In the following paragraph we can see the future of each solution.

3.1 To update single hull tanker into double hull tanker

The first strategy those single hull tanker owners may choose is update single hull tanker into double hull tanker. Tanker pacific company is the first one who uses this strategy. This company signed contract with Huarun Dadon shipyard for convert a single hull VLCC M.V. ”Sunrise Jewel “which DWT is 302000T (build in 1992) into double hull tanker. Due to the confidentiality of business, the exactly cost is not released, some experts predicted that the total update cost is around 20 million USD plus freight loss about 6.5 million USD (due to the whole update process is about 6 months, the shipowner have no income from this vessel)[10]. Hebei ocean shipping company is the first Chinese shipping company that updates a VLCC into double hull. This company updated a single hull VLCC M.V. ”Hebei Mountain “which is a 301665 DWT (build in 1994) in COSCO Dalian shipping yard. This project taken around 7 months and for the same reason as Tanker pacific the author can only use numbers from Dalian government which indicated that the total cost is about 25 millions USD[11], almost the same as Tanker Pacific’s. The converted vessel is predicted to use for another 15 years which is similar to the supposed remain years of this single hull tanker.

[10] Maritime research newsletter 2006.9 P70
[11] http://2005.dl.gov.cn/gov/news/detail.vm?cid=69&diid=36032

3.1.1 Risk of updating

Lots of VLCCs still operating in the market illustrate the shipowners are hesitating about whether they should update their vessels or not. Someone may think safety is main barrier for them to make the decision, since there are lots of cases to illustrate the possibility of update single hull tanker into double hull tanker and all those updated tankers are safely operating until now, also consider plenty of shipyards can do the update work, then the author believe that technical aspect should not be the main barrier for the hesitation of those shipowners. So what is the true barrier in front of those shipowner? The author believes the main risk of update single hull tanker is whether put so much money is worthy or not, the shipowner doubt whether they can get their investment back. Shipowners may consider what is going on in the future tanker market and then do trade off about whether spend around 25 millions USD (it not only includes the update fee about 20 millions USD but also they must consider the loss of freight income during the update period about 5-6 months) is a wise investment. If tanker market is not goes as well as they wish, shipowners have to bear a great financial burden of pay operating cost and interest day by day especially for such a huge vessel. This is why the essential driving force is still the future of the tanker market, whether the freight rate will attractive enough or not. So in the next paragraph, the author will analyze the demand and supply of tanker market.

3.1.2 Analyses of supply and demand of future tanker market

No matter which business, supply and demand is always the essential factor to decide the price, the tanker market rate is also following this rule. The supply and demand of tankers decide the future market rate, once there are too many tankers in the market, the freight will decrease, and vice versa.

3.1.2.1 Demand side of future tanker market

Tanker demand should be look from two sides, one is the actual volume of oil to be

transferred, and the other is tonne miles, which used to calculate the actual demand for tankers.

From table 3.1 we can see that the demand of oil is increasing constantly those years and those enlarged demand is mainly contribute by non-OECD countries such as China and India which quickly development during those years. From table 3.2 we can find that more and more non-OECD countries begin to widen their suppliers which means those countries will not only fixture loading places around Middle East Gulf as usual but also South American, West Africa, etc. This situation will make the demand of tankers increase even if the import oil amount is the same due to the total tonne miles will increase. Take China as an example, according to Cliff Tyler (2008), China accounted for 36% of all trade volume growth since 2000 and China import oil from Atlantic reach 34% in 2007 compare to 18% in 2001. If we can take Venezuela as a typical oil export country, then we can see how much will increase the demand of tanker if China imports more from Atlantic area. Nowadays, China oil import amount from Venezuela is 200000 B/P and America imports 1400000 B/P from Venezuela. Once China imports more oil from Venezuela, as Venezuela can't increase their export capacity immediately, it means once Venezuela decide export more oil to China, America has to find another oil export country to replace the loss in Venezuela, let's assume West Africa. By use some distance calculation software, we can get that from Venezuela to the Gulf of Mexico the come and back voyages take 15 days (assume speed is 14.5 knots), it takes 60 days for Venezuela to China, 38 days for West Africa to Gulf of Mexico. The reason why Venezuela wants to export more oil to China is the same as China want to find more suppliers, which is lower the dependence of one country and diversify the risk. If China really imports more from Venezuela, let's say 5000000 B/P, and using a 75000 DWT vessel to transfer 70000 DWT cargos (assume 7.2 barrel=1 DWT). Transfer those oil needs at least 350 voyages, in another world, it needs at least 59 vessels (1 vessel can fulfill 6 voyages at most, 360/60 and 350/6=58.3) compare to if those amount of oil transfer to American only needs 15 vessels. The result is both China and American will increase its demand of tankers. As

developing countries like China, India or other developing countries already begin to look for more export oil countries than Middle East, and also some oil export countries begin to sell oil to more countries, it confidently to say that even the future oil transport amount doesn't increase much, it still will increase the demand of tankers.

Table 3.1 World oil demand (millions barrels per day)

	2004	2005	2006	2007	2008
OECD Demand	49.4	49.7	49.3	49.2	49.5
Non-OECD demand	33.1	34.2	35.5	36.8	38.2
Total demand	82.5	83.9	84.8	86	87.6
		1.70%	1.07%	1.42%	1.86%

(Source: Oil market repots http://omrpublic.iea.org/balances.asp)

Table 3.2 World oil supply (millions barrels per day)

	2003	2004	2005	2006	2007
OPEC and Non OPEC Middle East Supply	20.9	22.1	22.5	22.7	21.7
Non-OPEC and Nom-Gulf OPEC Supply	52.7	55.2	55.3	55.5	56.5
By net Importers	28.2	28.1	27.9	27.9	26.2
Total supply	79,7	83.3	85.5	87.2	87.2
		4.60%	2.60%	2.00%	0%

(Source: IEA Status, Total including NGLs and processing gain)

In table 3.3, the author use moving average method based on the average increasing rate (OECD demand increase 0.05%/year, Non-OECD demand increase 3.65%/year,

supply increase 2.3%/year) to predict the future oil supply and demand amount. From this prediction we can see that the in the future the main demand growth is still contributed by non-OECD countries and it will almost import as much as OCED countries' in 2012.

Table 3.3 Prediction of future supply and demand (millions barrels per day)

	2008	2009	2010	2011	2012
OECD Demand	49.5	49.5	49.6	49.6	49.6
Non-OECD Demand	38.2	39.6	41.0	42.5	44.1
Total	87.6	89.1	90.6	92.1	93.7
Future supply	87.2	89.2	91.3	93.4	95.5

As the author mentioned above the total supply can't increase immediately and once those Non-OECD counties import more and more oil, no matter the OECD countries can successfully purchase in other places to replace the loss or not, there will at least one country has to find a longer distance oil export country. According to this situation, the author in the future the actual demand of tankers will increase more than the demand of oil. From table 3.4 we can also find this phenomenon that the actual oil carrier demand growth rate (average growth rate is 4.5%, for VLCC side is 4.31%) is larger than the oil demand growth rate (average growth rate is 1.7%). Then by use the same forecast method we can get the future oil carrier demand and future VLCC demand in table 3.5.

Table 3.4 Tanker demand (m DWT)

	200,000+	Change	Total	Change
2003	114.6		249.9	
2004	122	6.46%	268	7.20%
2005	128.2	5.08%	282.3	5.30%
2006	133	3.74%	289.2	2.40%
2007	135.6	1.95%	297.8	3.00%

(Source: Drewry tanker forecaster 07 4Q, p28)

Table 3.5 Tanker demand forecast (m DWT)

	2008	2009	2010	2011	2021
VLCC forecast	141.4	147.5	153.9	160.5	167.4
Demand forecast	311.2	325.2	339.8	355.1	371.1
Drewry forecast	310	337.8	348.2	364.5	376.8

3.1.2.2 Supply side of future tanker market

First, in 2010 all single hull tankers will be forced to out of market which means there is a question of whether there are enough double hull tanker capacity to replace them. Maritime economists like Martin Stopford (2008) mentioned that the single hull tanker fleet is still 83.4million DWT and account for 23% of the total fleet in 2008 March and he doubt whether those tankers can out of market in time if the new capacity can't fulfill the demand. From Clarkson's data there are 43.6 million DWT single hull VLCC still operating in the market up to 2007 and account for 30.3% of total fleet capacity. As the author mentioned in chapter 2, shipowners had order a lot of double hull tanker in 2006, from table3.6 we can find that in 2009 there are huge amount of VLCC will be delivered and the total orderbook is account for 39.9 of current fleet capacity. If we don't consider single hull VLCC, this number will around 50%. So there is no problem of replaces the single hull VLCC and possible situation is oversupply situation will widen in 2009 although if those single hull tankers can out of market timely the oversupply situation will be effectively soften.

Table 3.6 VLCC fleet profile and order book

Tanker fleet year end				1-Apr-08	
2004	2005	2006	2007	No	m.DWT
130.6	137.7	142.3	138.3	499	147.2
Order book and delivery schedule					

No	m.DWT	%Fleet	2008	2009	2010+
191	58.8	39.9	9.8	20.4	28.7

(Data source: Clarkson)

So the question is whether those single hull tanker can timely out of market or the demolish rate will still so low? From table3.7 we can see that since 2003 demolish rate is not as high as it should be especially in VLCC field. Compares to table 3.6 we can see that the remained single hull tanker fleet is 43.6m DWT that is even larger than the sum of scraped vessel capacity from 2003 to 2007. The main reason of this situation is the average scrapping age for tanker over 100000 DWT was 28.3 years[12]. As the author mentioned in the beginning of this chapter that most of those single hull tankers especially VLCCs are not old enough to make owners willing to scrap it, so the author really doubt whether those vessels will all be scraped before 2010 or not. Possible situation is most of them are forced to scrap after 2010 and that will made the scrap price decrease. One good news is in 2008 update to March, there are already 2 VLCCs be scraped due to the shipowners are afraid this situation maybe true in the near future. But although there are some demolish work, it still too little to soften the imbalance of tanker, in another word, the oversupply situation seems will not change much before 2010.

Table 3.7 Tanker scrap activity (000DWT)

	10-50,000	50-80,000	80-120,000	120-200,000	200,000+	Total
2003	1494	1417	2665	1574	10059	17209
2004	947	1026	1952	1425	1340	6690
2005	750	961	1405	544	262	3922
2006	1304	435	909	0	0	2648
2007	1525	320	999	324	0	3168

(Source: Drewry tanker forecast 07 4Q)

[12] Shipping market outlook 2007 spring P22

If single hull tankers can't phase out in time, is there any chance that some double hull tankers may out of market? We can find the answer from table3.8 that the size and age of the double hull tanker in 2007 indicates that majority of double hull tankers are even younger than single hull tankers. Consider this and after 2010 the new delivery VLCC account for around 50% of total fleet, the result is there is very unlikely that the tanker demolish market will has a lot of double hull tanker scrap jobs even around 2012, in another word, in the supply side there only has a very small chance to reduce a lot at least in 2 years.

Table3.8 Double hull tanker fleet by size & age up to 1st September 2007

Fleet Nos. and '000 Dwt												
Size Dwt (tonne	20 yrs & over		15 - 19 yrs		10 - 14 yrs		5 - 9 yrs		0 - 4 yrs		TOTALS	
Less than 10,00	98	443	60	332	164	983	227	1,369	385	2,193	934	5,320
10,000 - 14,999	13	148	7	93	56	664	68	833	159	1,978	303	3,715
15,000 - 19,999	8	132	3	51	26	443	79	1,415	130	2,421	246	4,462
20,000 - 24,999	9	205	2	47	4	88	16	360	13	301	44	1,001
25,000 - 29,999	14	393	12	344	8	227	7	183	34	916	75	2,062
30,000 - 34,999	9	285	5	165	17	543	40	1,305	53	1,776	124	4,074
35,000 - 39,999	13	510	8	294	33	1,235	76	2,792	148	5,516	278	10,348
40,000 - 44,999	8	349	21	885	40	1,695	24	1,045	88	3,627	181	7,600
45,000 - 49,999	10	472	22	1,021	42	1,945	98	4,554	253	11,840	425	19,832
50,000 - 59,999	2	106	1	55	2	111	0	0	69	3,549	74	3,821
60,000 - 69,999	12	793	10	677	18	1,191	22	1,489	32	2,147	94	6,297
70,000 - 79,999	3	232	0	0	2	148	16	1,166	147	10,768	168	12,314
80,000 - 89,999	8	670	15	1,264	4	351	9	776	3	255	39	3,316
90,000 - 99,999	1	99	32	3,115	73	7,049	18	1,783	13	1,253	137	13,300
100,000 - 119,99	2	213	7	744	19	2,002	114	12,174	287	31,218	429	46,352
120,000 - 159,99	6	759	21	3,065	42	6,057	86	12,859	101	15,703	256	38,442
160,000 - 199,99	1	191	0	0	0	0	10	1,620	28	4,719	39	6,530
200,000 - 254,99	0	0	0	0	0	0	0	0	0	0	0	0
255,000 - 319,99	0	0	0	0	58	17,181	134	40,199	148	45,322	340	102,703
320,000& Above	0	0	0	0	0	0	2	884	3	1,203	5	2,087
TOTAL	217	6,000	226	12,151	608	41,914	1,046	86,807	2,094	146,707	4,191	293,578

(Source: Clarkson research)

3.1.3 Analyses of freight and newbuilding price

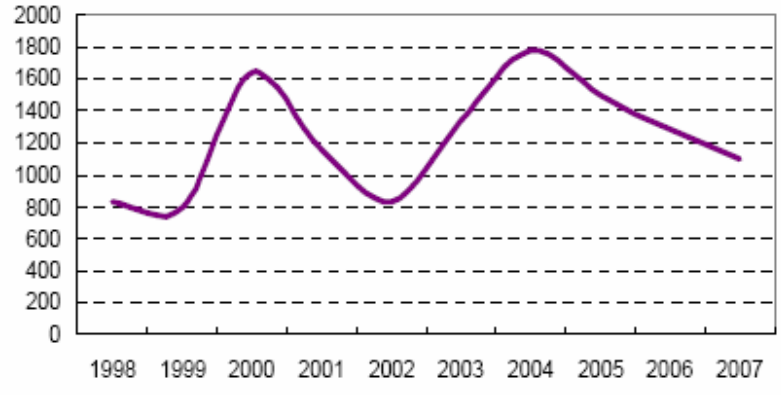
After the author analyzed in chapter 3.1.2, we can find that demand of tanker will increase above 4% and the new capacity will increase 9% every year. It seems the gap will widen, but always remember there are 29% current fleet is single hull tanker,

when and how they out of market will decide the future of VLCC. If no less than half of those single hull tanker can out of market timely, the market will be much better.

3.1.3.1 Future freight rate

From figure 3.2 we can see that the since 2004, the BDTI (Baltic Dirty Tanker Index) is decreasing constantly; from table 3.9 we can see precise freight rate and hire of VLCC. In spot charter, the main trend of VLCC is declining. In contrast, time charter hire's general trend is climbing. This is very strange that shipowners had different attitudes towards same market. Martin Stopford's (2007) explanation is for short run, the shipowner/charterer consider freight more depends on sentiment, for long run they decided it more depends on the supply and demand rule. We can see this phenomenal more clearly by table 3.10. As the author mentioned in chapter 2.3, in 2007 December there is an oil leak accident happened in Korean, no one know what is the effect of the accident and this made the spot rate boosted in that month due to charterer didn't know what is going on in the future, they may afraid the supply of VLCCs will sharply dropped by ban single hull VLCCs. As they found the reality was not as bad as they thought, the market rate sharply decline in January 08. From this, we can say that the spot market is really an unreasonable index to reflect situation of the market when compare to period rate. Also consider sentiment is a thing which almost impossible to be precisely predicted so in this dissertation the author will only calculate future VLCC tanker freight and invest in those tankers base on time charter rate.

Figure 3.2 BDTI from 1998 to 2007



(Source: Clarkson)

Table 3.9 Freight rate change for VLCC

		2003	2004	2005	2006	2007	2008(first three months)
VLCC 5yr 280KDWT	Spot rate ($000)	47	90.1	51.6	46.3	39.5	
	Change	124.70%	91.70%	-42.70%	-10.30%	-14.70%	
	Period ($000)	33.6	53.9	60.1	56	53.3	67
	Change	42.90%	60.40%	11.50%	-6.80%	-4.80%	25%

(Data Source: Drewry)

Table 3.10 VLCC spot and time charter rate from 07 NOV to 08 FEB

VLCC (280000DWT)	AG-Japan	AG-S.Korea	AG-N.Europe	5yr old (TC1year)	10yr old (TC1yr)	5yr old (TC3yr)
7-Nov	30900	42600	47300	40267	53000	48000
7-Dec	149000	137300	132100	62000	49500	50500
8-Jan	82200	83200	105900	62000	50000	50000
8-Feb	57600	57600	57000	70000	53000	53000
8-Mar	57000	45800	51100	71000	54000	53000

(Data Source: Drewry tanker insight)

Using gray forecast GM (1, 1) to predict the time charter rate of a VLCC.

From table 3.10, we can get the original data array:

$X^{(0)} = \{33.6, 53.9, 60.1, 56, 53.3, 67\}$

1. Add each item from $X^{(0)}$ and get the new array

$X^{(1)} = (33.6, 87.5, 147.6, 203.6, 256.9, 323.9)$

2. Data matrix

$$x = \begin{bmatrix} -\frac{1}{2}[x^{(1)}(1) + x^{(1)}(2) & 1 \\ -\frac{1}{2}[x^{(1)}(2) + x^{(1)}(3) & 1 \\ -\frac{1}{2}[x^{(1)}(3) + x^{(1)}(4) & 1 \\ -\frac{1}{2}[x^{(1)}(4) + x^{(1)}(5) & 1 \\ -\frac{1}{2}[x^{(1)}(5) + x^{(1)}(6) & 1 \end{bmatrix} = \begin{bmatrix} -60.55 & 1 \\ -117.55 & 1 \\ -175.6 & 1 \\ -230.5 & 1 \\ -290.4 & 1 \end{bmatrix}$$

Data array:

$Y=\{x^{(0)}(2), x^{(0)}(3), x^{(0)}(4), x^{(0)}(5)\}^{T} = \{53.9, 60.1, 56, 53.3, 67\}$

3. Get a and b

$$\begin{bmatrix} a \\ b \end{bmatrix} = (X^T X)^{-1}(X^T Y)$$

$$= \left[\begin{pmatrix} -60.55 & -117.55 & -175.6 & -230.5 & -290.4 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{bmatrix} -60.55 & 1 \\ -117.55 & 1 \\ -175.6 & 1 \\ -230.5 & 1 \\ -290.4 & 1 \end{bmatrix} \right]^{-1}$$

$$\times \left[\begin{pmatrix} -60.55 & -117.55 & -175.6 & -230.5 & -290.4 \\ 1 & 1 & 1 & 1 & 1 \end{pmatrix} \begin{pmatrix} 53.9 \\ 60.1 \\ 56 \\ 53.3 \\ 67 \end{pmatrix} \right]$$

$$= \begin{bmatrix} 185666.8875 & -874.35 \\ -874.35 & 5 \end{bmatrix}^{-1} \begin{pmatrix} -51891.13 \\ 290.3 \end{pmatrix}$$

$$= \begin{bmatrix} 3.05164E-05 & 0.005336397 \\ 0.005336397 & 1.133175689 \end{bmatrix} \begin{pmatrix} -51891.13 \\ 290.3 \end{pmatrix}$$

$$= \begin{pmatrix} -0.034373 \\ 52.049275 \end{pmatrix}$$

a= -0.034373 b=52.-40275

4. Get gray model:

$X^{(1)}(t+1) = (X_1^{(0)} - b/a)\, e^{-ai} + b/a =$

$(33.6+1514.26933)*e^{-0.034373i} - 1514.26933 = 1547.86933e^{-0.034373i} + 1514.26933$

From this equation we can get the predict $X^{(1)}$ and predict Y_2 (table 3.14)

Table 3.11 Forecast and actual freight rate ($, 000) of VLCC using gray model

Year	2003	2004	2005	2006	2007	2008
Actual amount	33.6	53.9	60.1	56	53.3	67
$X^{(1)}$	33.6	87.7	143.75	201.73	261.7	323.85
Y_2	33.6	56.68	56.1	57.9	54.1	68.04
Difference	0	-0.2	4	-1.9	-0.8	-1.04

As the difference is very small, so the author use gray model to predicts the future tanker freight and gets the table below.

Table 3.12 Predict future freight rate ($, 000) of VLCC

Year	2008	2009	2010	2011	2012
Freight rate	68.04	64.29	66.52	68.86	71.26

3.1.3.2 Future newbuilding and secondhand price

Although the freight rate is very fluctuating and generally didn't increase too much,

the newbuilding market and secondhand market of VLCC are still very strong (newbuilding VLCC price increase from 67.1millions USD to 147 millions USD, 5 years secondhand VLCC price increase from 60.3 millions USD to 136 millions USD[13]). So why newbuilding and secondhand vessel price is increasing while the income of shipowner is decreasing? Some analysts think this is an indicator that shipowners have faith on the future freight market rate. The author admit this maybe one reason for why the price increasing those years, but the author thinks there are also other reasons that made this situation which are first, rising steel price (figure 3.3 shows that the price of steel growing so much especially in Asia, which is the main shipbuilding area occupy about 88% of global order book[14]); second, there are not enough berths in shipyard made the insufficient supply; third, due to the shipyards have orders stretching to at least 2010 which made them not hurry to lower their price and happy to wait and see the future market. So it is not wise to just make the conclusion that booming shipbuilding price and secondhand price is contributed by the faith in future from charterer.

Figure 3.3 Global and Asia steel price index

(Source: www.crugroup.com)

[13] Drewry tanker monthly report 2008 4th
[14] World shipyard monitor volume 15 No.2 February 2008 P10

In 2008 Feb, Asia's three largest steelmakers (Nippon Steel Corp., JFE Holdings Inc. and POSCO) agreed to pay the world number one iron ore producer Vale 65 percent more for iron ore compare to 2007 which setting a global benchmark for prices[15]. Even increasing 65 percent, some experts think this number is under their estimated number due to the end customers of those iron and ore companies are in shipping or other industry which still very strong. The negotiation with Australia huge iron and ore traders Rio Tinto and BHP Billiton is deemed even harder than that with Brazil and predicted increase more than 80%. The latest news is those two companies demand a 100 percent price hike, they think they should get a higher price than Vale for it is cheaper to transfer iron ore from Australia than Brazil. The problem is once those iron and ore buyers accept the price with Rio Tinto and BHPB, Vale may protest and want a higher price. Since shipyards already have orders until 2012 that means they will not hurry to sign new orders if the price is not charming. So consider both factors, the author think the price of both newbuilding and secondhand VLCC price will not decrease a lot at least before 2010, especially newbuilding price.

3.2 To convert single hull tanker into dry bulk carrier

Since the tanker freight is flagging and dry cargo market is booming (the difference between freight of same DWT of dry bulk carrier and tanker is even 50% and that lead China shipping and COSCO's revenue from dry bulk market increased at least 30%. Sinotrans, which main business is tanker market, suffer around 1 million RMB) in 2007 then a hot topic is generated, shipowners begin to think about convert those single hull tankers into dry bulk carriers.

Hebei shipping is the first company, which tried to convert single hull tanker into dry bulk carrier in the world. After discussed with many experts and had the permission of China classification society, in 2004 a VLCC M.V." Hebei Innovator" which was originally 250000 DWT single hull tanker had been began to convert by Shan

[15] http://www.au.all-biz.info/news/index.php?newsid=147

Haiguan shipyard, after 8 months working, the ship was successfully converted into a 236697 DWT dry bulk carrier. After passed the inspection from China classification society, this vessel had already run 10 voyages safely update to 2007 May.

According to Clarkson's information up to November 2007, there are 114 vessels to be considered as candidates for conversion projects, including 60 VLCCs for conversion to VLOCs[16]. TNT, a Taiwan shipowner will convert 7 VLCCs to VLOCs and that will make this company become one of the biggest bulk carrier operators in the world. The table below shows the conversion works in 2008, we can see that during this year the total capacity of conversion VLOC is about 3.7 million DWT which is even larger than that of current VLOC fleet (2.2 million up date to 2007). So we can see how much impact the VLCC made or will make to bulk market.

Table 3.13 VLOC bulker under conversion in 2008

Name	New Type	DWT	GRT	Unit	CGT	Yard	Current Owner
Hebei Warrior	Ore	243,850	140,850	DWT	40,100	Yiu Lian Dock	HOSCO
Sala	Ore	279,989	153,506	DWT	42,260	Beihai Shipyard	BW Ltd.
Sino Trader	Ore	259,993	147,421	DWT	41,231		Sinokor Mer. Mar.
Orient Jewel	Ore	275,628	144,567	DWT	40,742		Zodiac Maritime Agy.
Stellar Cosmo	Ore	269,581	146,802	DWT	41,125	COSCO Zhoushan	TMT Co. Ltd.
Shourong	Ore	255,396	138,197	DWT	39,637		Nippon Yusen Kaisha
K Cosmos	Ore	254,991	137,746	DWT	39,558	Unknown Yard	Korea Line
Margot N	Ore	277,020	142,488	DWT	40,383		General Ore Corp.
Hebei Ambition	Ore	285,640	153,347	DWT	42,234	COSCO Zhoushan	HOSCO
Renata N	Ore	285,933	153,427	DWT	42,247		General Ore Corp.
Sino Carrier	Ore	261,284	146,463	DWT	41,067		Sinokor Mer. Mar.
Rebekka N	Ore	255,346	142,367	DWT	40,362		General Ore Corp.
Pacific Ruby	Ore	260,988	146,455	DWT	41,066	Unknown Yard	Cido Shipping
BW Bureya	Ore	279,986	153,506	DWT	42,260	Beihai Shipyard	BW Ltd.

(Data source: Clarkson)

[16] Martin Stopford, The End Approaches? Is it Time To Get Converted?,2007

3.2.1 Cost of conversion

Convert cost of a VLCC into VLOC include two parts as update VLCC: conversion fee and freight loss of about 6 to 7 months. First, we look some conversion examples.

The first example is three small Handysize tankers conversion work. According to a shareholders' meeting report of Haisheng shipping company, which is a subsidiary company of China shipping, they bought 3 tankers and will convert them into dry bulk carriers. They spent 69638133 RMB to buy those vessels and the table below shows the details about them.

Table 3.14 Detail about Haisheng shipping company's conversion work

Vessel's name	Vessel type	DWT (000,ton)	Building date	Price (RMB)
Jian Chi	Single hull tanker	31	1977-2-1	23888606
Yong Chi	Single hull tanker	34	1977-1-1	24780994
Da Qing 244	Single hull tanker	22.9	1977-1-1	20968533

(Source: Haisheng shipping company's shareholder meeting report)

From this table we can find one strange thing which is those vessels are almost will be required to scrap according to Chinese ministry of communication's order 8 in 2006 which is the maximum running periods of an vessel is 31 years. According to the shareholder meeting report of Haisheng, after convert those vessels into dry bulk carriers, they can still use for another 3 years, this also shows how anxious that shipowner want to has new bulk capacity. The cost of convert three vessels is about 132500000RMB (Jian chi about 46500000RMB, Yong Chi 46500000RMB and Da Qing 244 39500000 RMB). Although the total cost is 202140000RMB and those

vessels can use only for 3 years, Haisheng Company still predicts the rates of return of this invest is at least 10% which also demonstrates how good the dry bulk market is.

From above examples, we can see the conversion cost of average tonnage is relative expensive when compares to updating. But is it the true story? From the next example which shows a VLCC convert into VLOC work we can find that the cost of convert a VLCC around 280000 DWT is around 20 millions USD which is only about 15% expensive than the total cost of convert three small vessels and the DWT difference is about 3 times. This can explain the question in beginning of this paragraph, in another word, the economic of scale phenomena is very obvious in both types of conversion works. And this is why there are more VLCCs owners want to convert their vessels than owners of other types of tanker.

From table 3.15 we can also find that main cost of convert a single hull tanker into dry bulk carrier is relate to steel which take more than 80% of total cost (though here the source of this reference could not be revealed due to the confidentiality policy of this shipowner company concerned). This can also explain why the newbuilding price is increasing so much as steel price is booming.

Table 3.15 Main cost of convert a VLCC (280kDWT)

	Unit	Unit price (USD)	Qty	Total
1.Dock service				
Wharfage	Day	3000	180	540000
Other services				Around 100000
2.Conversion work				
2.1 Working drawing	Lump sum	200000	1	200000

2.2 Paint service (sand blasting to SA 2.0 including painting and dehumidifier)				
Ballast tank and new hold paint	㎡	22.5	200000	4500000
Other paint service				Around 180000
2.3 Structure renew				
Steel	Kg	1.73	7800000	13494000
Other services				Around 270000
3.Outfitting				
Steel work				Around 100000
4.Hatch cover				
Steel	Kg	1.8	650000	1170000
5.Staging for the conversion & repair				Around 600000

3.2.2 Analysis of the supply and demand of future dry bulk market

As the author mentioned in chapter 3.1.2, the supply and demand of a market will decide the future of this market, in another word transportation always depends on trade. Since 2006 lots of economics thought the collapse of this market will come soon due to the bulk trade is so hot that lots of capital invested into this market. They thought the oversupply will very widen after so many new capacity will in market, but due to shipping industry has a time lag feature which means the available fleet capacity can’t increase immediately, this lead us still can’t say when the turning point will finally comes.

Since converted VLCC, which we should call VLOC, is mainly used to transfer iron

ore and coal, so in the next paragraph when the author analyzes the demand side, it will only focus on those areas.

3.2.2.1 Demand side of future dry bulk market

Table 3.16 shows world demand of dry bulk during recent years, we can find that the total dry bulk tonne mile grows faster than the total dry bulk trade which means the distance between the import country and export country is became longer, just the same as tanker. As the result, the demand of bulk carriers will also grow faster than the demand of dry bulk trade.

Table 3.16 World dry bulk demand (million tonnes)

	2003	2004	2005	2006	2007
Dry bulk trade (m ton)	2340	2510	2637	2797	2975
% Change	5.5%	7.3%	5.1%	6.1%	6.4%
Dry bulk (tonne mile)	10763	11978	12745	13694	14764
% Change	7.9%	11.3%	6.4%	7.4%	7.8%

(Date source: Drewry)

From table 3.17 we can see that the fastest growth dry bulk is iron and ore, which is just the most suitable cargo for VLOC to carry and this impetus lot of capital invests in this area. The main reason for iron ore increase so much is due to China factor. From Clarkson research data, we can see in 2007 the total dry bulk trade amount increase 136 million tonnes compare to 2006 and more than 50% percent of this growth is contributed by China which most of them is iron and ore. Since India limits its iron and ore export amount and in May they impose 15% more export duty on iron and ore[17], China has to go to Australia and Brazil to purchase more to replace it. As the distance between Australia or Brazil and China is longer than that between India and China, the direct result is increasing import amount from those two countries lead

[17] Interocean iron and ore report May 2008

the demand of bulk carriers increasing. Some economists predicted that once China imports 50000000 tons more iron and ore, it will need another 30 to 40 Capesize bulk carriers, the more iron and ore import from Brazil, the more vessels China needs. Also consider the rule of economic of scale is very clear in shipping which means using VLOC to transfer that bulk is cheaper than using Capesize when we look at freight per ton.

Table 3.17 World dry bulk seaborne trade (million tonnes)

	Iron ore	Coal	Grain	Minor bulk	Total trade
2003	580.4	619	211.1	957.5	2368
2004	643.9	650	207.9	1024.2	2526
% Change	10.9%	5.0%	-1.5%	7.0%	6.7%
2005	715.4	675	211.9	1049.7	2652
% Change	11.1%	3.8%	1.9%	2.5%	5.0%
2006	758.7	709.4	221.1	1101.8	2791
% Change	6.1%	5.1%	4.3%	5.0%	5.2%
2007	811.8	769	227.8	1155.4	2964
% Change	7.0%	8.4%	3.0%	4.9%	6.2%

(Date source: Drewry)

Another impetus of booming dry bulk demand is due to India government wants to expand its domestic steel industry that means huge amount of coal is needed. Previously China was the third largest coal export country to India, but since China limit its coal export amount since 2006 due to insufficient electronic supply, India has to import more coal from Australia, Indonesia or Canada which means longer distance and more bulk carriers are needed. Also consider the electronic fees in China is so cheap that lead some power station can not gain the profit, once those power stations decide to increase the electronic fees it will lead some users have to take coal instead of electronic and that will also impetus the demand of coal.

From above analysis we can see that China and India who want to develop its steel industry limit its own raw material export amount and this is really good news for shipping, which means both countries have to find other suppliers to replace the

missing amount from each other, and usually it takes longer distance to fulfill the short-hull shipping. So the author think even the total seaborne trade amount doesn't increasing a lot, the total demand of dry bulk VLOCs will still increase. Since iron and ore's base number is very large, the changed percentage will decrease when keeping the same amount of cargo. Also consider every country must have its limitation, the weakening appetite of iron and ore from China and India means the growth rate will decrease especially China due to the construction work of Olympics almost finished. So the author believe the increasing pace will slower than the last 5 years (8.8%) and little bit higher than the last 20 years increasing percentage (3.9%). And the last 5 years and 20 years average increasing percentage is 5.6% and 4.6% respectively. Also consider the average increase percentage ratio between tonne mile and cargo tonne is 1.33 and the average increase percentage ratio between tonne mile and fleet is 1.12, so the author deduct the average fleet demand percentage increase should be around 6%. But as the author mentioned above, the negotiation with the world's number two and three iron ore supplier Rio Tinto and BHPB is still going, once those two companies can't make deal with main Asia buyers like POSCO, Baosteel, Nippon Steel, no one know whether dry bulk market especially VLOC sector can keep increasing 6% per year.

3.2.2.2 Supply side of future dry bulk market

Table 3.18 show the supply and demand of bulk carriers especially VLOC type bulker, from this table we can find that the imbalance between supply and demand of both the total dry bulk carrier and VLOC sector are became narrow from 2003 to 2006 and the gap is a little bit widen in 2007. Consider around 29% of the total dry bulk fleet is older than 20 years, it seems the future of dry bulk market will be even better due to this will lead the shrink the supply side of bulk carrier in the first sight.

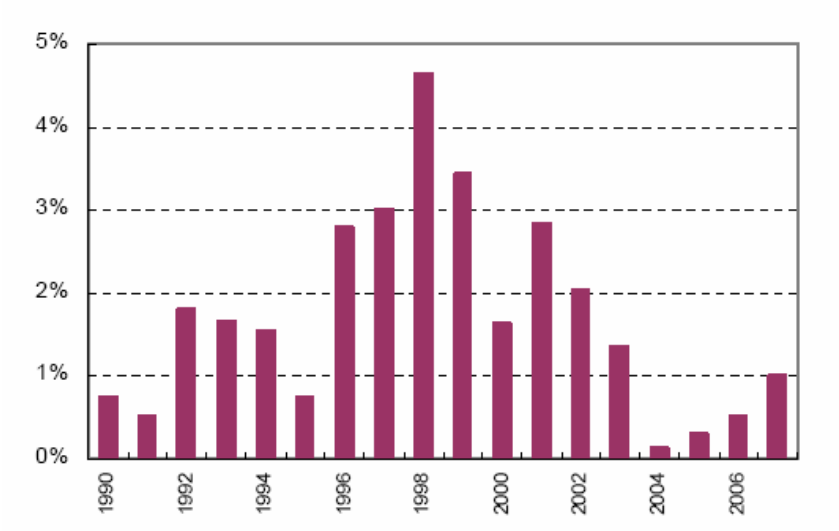
Table 3.18 Supply and demand of VLOCC bulk carrier (mDWT)

	Demand tonne miles (billion)	Demand deadweight (million)	Supply	Total	Imbalance
2003	160	9.7	11	313/262.4	50.5
2004	176	11.9	13.6	325.5/276.3	47.1
2005	195	13.5	15.5	345.7/299.5	46.2
2006	205	15.6	17.3	368.1/327.2	40.9
2007	219	20.5	22	391.7/360.2	31.5
2008	462	24.7	27.7	416.7/370.2	46.5
2009	485	32.4	38.3	456.7/395.4	61.3
2010	754	35.1	44.1	518.4/441.4	77
2011	773	39.7	52.3	578.3/471.2	107
2012	1062	47.2	66.2	621.1/497.1	123.9

(Source: Drewry)

But there are two things should be noticed, the first one is as dry bulk market is so strong that owner reluctant to scrap their vessels and want to put them in the market as long as possible, the author known even some 37 years vessels still running between Malaysia and China transfer coal, this made the demolition rate extremely low those years that since 2004 the demolition rate never higher than 1%(figure 3.4). The second thing should be noticed is new bulker capacity account around 60% of the current total fleet capacity and this number is about 129% in VLOC sector, also consider the huge amount of conversion VLCC maybe put in market around 2009, it clearly indicates that the future total bulk carrier capacity will increase more than the scrap volume. As the author mentioned the increasing percentage of demand side should be around 6% and the supply side will sharply increasing in 2009 and then still keep increasing at least 10% in the next 3 years, and regard the overage vessels doesn’t out of market in time, it is clearly that the gap between supply and demand will widen again significantly in the coming years and has great impact on the dry bulk freight if those predicted tonnage hit the water on time.

Figure 3.4 Demolish rate of bulk carrier from 1990 to 2007



(Source: Clarkson research)

3.2.3 Analysis of freight and newbuilding price of future dry bulk market

2007 was a phenomena year in dry bulk market history, in this year the market reach extraordinary high level, BDI (Baltic Dry Index) started at 4451 points and reached the history peak at 11039 point. Since the author mentioned in table 3.18, there are still 31.5 million DWT differences which are even a little bitter more than 2006, why dry bulk market boost up so much when actually the supply is increase? The author think there are two reasons for this: First, as the author mentioned above China and India limit its raw material export amount and this made the total needs of dry bulk carrier increase, in some extend this made the actual supply is not as enough as 2006. Second, a high level of port congestion situation made the vessel take more time than it should be to finish a voyage, for example, the highest average waiting time of Australia Newcastle port (a main export port of Australia) in 2007 is 26 days and once there are 82 vessels congested in this port, this has been predict to impact at least 14% of world dry bulk fleet capacity. Consider the huge amount of new dry bulk capacity in market and lots of port authorities decide to enlarge their ports, those two problems will not impact dry bulk market so much.

3.2.3.1 Future of dry bulk rate

From table 3.19 we can see that the freight rate in 2007 almost increase 2.5 times compare to 2006 and as the author mentioned in chapter 3.2.2.2 the oversupply situation will be widen in the future, the author think it is reasonable to predict the future freight rate will decrease especially after the mid of 2009 when huge amount of new vessels will put in market. As Mr. Yang (2007) said nowadays more than two thirds of total charterparties are time charters or time charter trip. This opinion also been proved by the author's working experience that the owner extremely doesn't like voyage charter in a hot market. The reasons are first in the booming market delay even one day is a huge loss for owner and if owner can't start the laytime clock, second owner prefer to use time charter or time charter trip for they can gain a long time stable income in a high lever. So in next paragraphs the author will only predict the future of dry bulk market based on period rate.

Table 3.19 Freight rate of Capesize from 2003 to 2007

		2003	2004	2005	2006	2007
VLOC	Average trip rate	40670	69100	50430	45080	116210
	Period	30020	55920	49950	45645	102880

(Source: Drewry)

After the author used some forecast methods like moving average, regression, exponent smoothing, and gray model, none of them exactly or even closely predicted the freight rate in 2007. The main reason is the increasing in 2007 is too unexpected even we can say it is growth unreasonable which much higher than most shipping businessman's expectation. As this dissertation is not focus on the prediction of future freight, the author will use the Drewry's prediction of future freight rate for reference.

Table 3.20 Drewry's prediction of future freight

		2008	2009	2010	2011	2012
VLOC	Average trip rate	104750	66200	59390	44540	39590
	Period	136460	91880	77000	70000	60000

(Source: Drewry dry bulk forecast 08.1q)

From Drewry's report we can see that both trip rate and period rate will decrease a lot since 2009, just as Mr. Rikard Vabo analyst of Fearnley Fonds in a recent Reuters report said that "Rising bulk ocean freight rates may continue throughout 2008, but the massive order book will probably facilitate a fall in rates sometime in 2009 or early 2010, and we do not believe cancellations and delays could save the dry bulk market from 2010."[18]

3.2.3.2 Future of newbuilding and secondhand vessel price

From the table below, we can see that both the newbuilding vessel price and secondhand one price are increasing since 2003. After 2005 secondhand ship price is even expensive than newbuilding one shows the shipowner didn't want to wait for the time lag of building a vessel. Although in 2008 there are some signals indicate the market has high possibility going down after 2008, the price of secondhand vessel is still increasing while newbuilding price is very slightly down. The author think for secondhand vessel, as the freight market is still hot which means income is much more than daily cost then the owner still wants to take advantage of this situation immediately since maybe they can sign a long period contract in a booming market and then gain a over average profit in the next few years; for newbuilding market, the shipowner also doubt the future of dry bulk and this made the price is decreasing, but due to increasing steel price and shipyards have orders until 2012 that make the decrease margin is not so much. This can also be proved from Drewry market report (2008 April) which indicated that the newbuilding activity already slowdown and in

[18] Interocean iron and ore report May 2008

secondhand market a vessel even as old as 30 years can still exchange several hands.

Table 3.21 Newbuilding and secondhand vessel price since 2003 to 2008 Feb

	2002	2003	2004	2005	2006	2007	2008(Apr)
Newbuilding price	36.3	48	64	59	68	97	95.5
Secondhand 5yr old	24.4	37	54.3	47.9	68.1	126.2	131.3
Secondhand 10yr old	20.5	32	46	38	62	105	110

(Source: Clarkson)

So it is reasonable believe that in the near future the margin between newbuilding dry bulk carrier and second hand dry bulk carrier will increase until the market reaches turning point that shipowners think they can't get their investment back. Then the secondhand price will decrease sharply while newbuilding price will not change much until 2011, this means buy a secondhand dry bulk carrier before the turning point will made the buyer face great challenge.

3.3 Other methods

First of all, the chance of use the other three methods is relative low compare to the above two for many reasons. In this chapter, the author only gives a brief introduction of those three methods and discusses more about the possibility and current citation of using those methods in China in the next chapter

3.3.1 Demolition

Clarkson research's information shows that ships broken tonnage is 10.6 m DWT in 2004, 5.7 m DWT and 6.6 m DWT in 2005 and 2006 respectively. Compare to the fleet capacity of each year, the percentage of scrap rate is just 0.6% percent in 2005, which is the lowest rate in history. Usually a ship can be operate for 25 to 30 years then average scrap rate should be about 3.3% to 4% of total fleet capacity each year which is much higher than the scraped rate since 2004. After look the whole picture,

we can also find this by looking the analyze in chapter 3.1 and 3.2 which shows demolition rates of both tanker and dry bulk carrier are lower than average demolished rate in the last 20 years. The main reasons are both the freight market is very strong and most of single hull tanker is very young that owner reluctant to scrap.

From the table below, we can see that the scrap price of both tanker and dry bulk carrier is constantly increasing through those years and generally scrap price of tanker is higher than bulk carrier. High rate of scrap price is mainly due to low scrap rate of both tanker and dry bulk carrier, which means insufficient supply.

Table 3.22 Scrap price ($/ldt)

	2005	2006	2007	2008(Apr)
Tanker	305	410	510	670
Dry cargo	330	390	470	630

(Date source: Clarkson)

TMT CO. Ltd scraped a 239351 DWT VLCC M.V “B Elephant” which is 31446 ldt in 2008 and received 22.48 millions USD. Although owner can receive around 20 millions USD for scrap a VLCC which seems owner can gain a big money, when we look at the booming secondhand vessel price, it is easy to understand why the scrap rate is so low. Table 3.23 clearly indicate that 5 years and 10 years VLCC is even expensive than newbuilding one and once the vessel reach 15 years, its price is only about 30% of a 5 years VLCC but still higher than demolish price.

Table 3.23 Secondhand vessel price of tanker

	2008 Apr $ M
VLCC 5yrs	145
VLCC 10yrs	125
VLCC 15yrs	43

(Data source: Clarkson)

Due to this situation, the author believes that scrapping is the last resort for a tanker

owner, they adopt this method only when the vessel they own is older than 20 years, and the author believe reasonable shipowner will not scrap a vessel younger than 15 years right now for sales and purchase market still offering an option to those old ships.

3.3.2 FPSO

FPSO is the oil gas treatment, oil storage and oil discharge, power generation, control and accommodation. It is the key facility for offshore oil development, and both technology-intensive and capital intensive (Fan MO, 2008). Every year there are about 6 new FPSOs run into the market, those FPSOs are either converted from tankers or newbuilding. Most of those converted FPSOs were done in Singapore. China, Korea and Japan also begin to join this market. In 1994, the ratio between newbuilding and converted is 1:3, in 2005 the ratio change to 46:54. From this we can find that the future of new FPSO market is shipowner prefer newbuilding FPSO for those new building FPSOs can work in a worse environment and deeper sea compare to converted FPSO. But due to the single hull tanker out of market, in 2007 and 2008 there are some FPSO conversion works happened. One thing should be noted is in FPSO conversion field, we can't see Chinese owner actively involved in like other shipping sectors.

Table 3.24 FPSO under conversion in 2007 and 2008

Name	DWT	GRT	Size	Unit	CGT	Yard	Current Owner
FPSO Saxi	310,991	150,762	368,897	cu.m	74,696	Keppel FELS	SBM Production Cont.
FPSO Cidade de Niteroi	258,034	143,166	298,849	cu.m	72,340	Unknown Yard	Modec Inc.
Azurite FPDSO	259,999	142,647	295,966	cu.m	72,177	Keppel FELS	Prosafe Production
FPSO Cidade de Sao Mateus	276,735	142,488	292,155	cu.m	72,127	Keppel FELS	Prosafe Production
FPSO Vincent	308,491	159,187	334,849	cu.m	77,257	Keppel FELS	A.P. Moller

FPSO Espirito Santo	268,865	130,894	325,565	cu.m	68,430	Keppel FELS	SBM Production Cont.
Petrobras 53	322,446	152,374	367,892	cu.m	75,190	Unknown Yard	Petrobras
FPSO Cidade de Vitoria	274,165	131,303	338,160	cu.m	68,563	Dubai Drydocks	ENI S.p.A.
FPSO Gimboa	274,165	131,303	331,093	cu.m	68,563	Dubai Drydocks	ENI S.p.A.
Frade	273,887	125,465	330,896	cu.m	66,656	Dubai Drydocks	SBM Production Cont.
FPSO Mondo	273,410	132,206	323,249	cu.m	68,855	Unknown Yard	Single Buoy Moorings
Petrobras 54	272,631	135,292	329,930	cu.m	69,847	Jurong S.Y.	Petrobras
FPSO Kikeh	273,409	132,206	323,248	cu.m	68,855	Keppel FELS	Single Buoy Moorings

(Data source: Clarkson)

Although there are more than 10 single hull VLCCs under conversion, we still can't deem every VLCC can convert into FPSO. Whether a single hull tanker can be convert into FPSO depend on its strength of structure, fatigue life and corrosion resistance. Since double hull tankers are not suitable to convert into FPSO (complex structure and twice time compare to convert a single hull tanker) and single hull tankers has above constrains, there are not that many vessels can be converted into FPSO. Consider there are not so many supplies and high technology requirement of converted a FPSO, few shipyards can and willing to do this job. So the cost of convert a single hull tanker into FPSO will be very high, BW Offshore's recent conversion of the VLCC MV"BW ENTERPRISE" into an FPSO cost a whopping $91.7m (Waldegrave, 2007), this is really a huge amount of initial input when consider both the conversion cost and VLCC cost. But consider a newbuilding FPSO cost about 200 to 400 millions USD, there are still many shipowners willing to consider single hull VLCC into FPSO.

A potential risk is although currently there is no international rule of whether FPSO should be single hull or double, and the normal situation is all converted FPSOs are

single hull and newbuilding FPSOs are double hull or double hull board side structure, no one know whether in the near future IMO will issue a conversion to prevent single hull FPSO for environment consideration or not. If there will be such a rule, it will made the huge conversion investment into nothing.

3.3.3 Operate in domestic area

As MARPOL only deal with international shipping problem, once vessels can’t run in worldwide, the owner can still operate the vessel in domestic area if the country they belong to doesn’t prohibit it. The advantage of this method is the owner doesn’t need to invest additional capital and still can gain profit. The disadvantage of this method is more and more countries have or will prohibit those single hull tanker operate both in international or domestic business. This means once the country shipowners belong to prohibit operating single hull tanker in domestic area, they still have to think about how to deal with those vessels and maybe at that time the shipowner will miss the best time to sell the vessel. Also as the inland water is not as deep as high seas in most countries, most big vessels can’t run in inland water, so even the owner want to choose this way, they can only operate small vessels. So the author believes most VLCC owner will not adopt this method.

CHAPTER4 COMPARE THE FOUR METHODS FOR Z COMPANY

4.1 Brief introduction of Z Company

Z Company is not only one of the oldest shipping companies in China, but also it is the first Chinese company that owns a VLCC type tanker. According to Chinese national statistic bureau's statistic, Z Company's tankers capacity account for 44.1% of the whole national large tankers fleet capacity. Z Company not only has business in tanker market but also operates their owned or chartered dry bulk carriers, which most of them are handymax type. Currently, it has 14 tankers which are almost 5 millions tons deadweight (8 VLCC, 1 Suezmax and 7 Aframax) and 14 dry bulk carriers which are almost 0.7 millions tons deadweight (12 Handymax and 2 Panamax). In 2006, income from tanker and day bulk market account 63% and 30% of the total income of Z Company respectively.

The main threat Z Company faces now is more than half of their tanker fleet is single hull tankers and then consider VLCC fleet account of more than half of its total fleet capacity, how to properly handle and cover the deficit capacity of those single hull VLCCs is an unavoidable question they have to deal. According to the author's analyze in chapter 3, the most popular methods are convert single hull tanker into dry bulk carrier and update single hull tanker into double hull tanker. Up to now, Z Company had already updated one single hull tanker into double hull tanker, which is a 281598 deadweight VLCC. How to deal the other VLCCs is still un clear especially consider bulk market is significantly strong.

Since China is one of the fastest economic growing countries in the world which means China needs huge amount of both dry bulk and oil, definitely national owned companies will have advantage when negotiate with Chinese businessman compare to

other international shipping companies. Since those two opportunities both seem very attractive, how to choose is very important to them and may decide the future of Z Company.

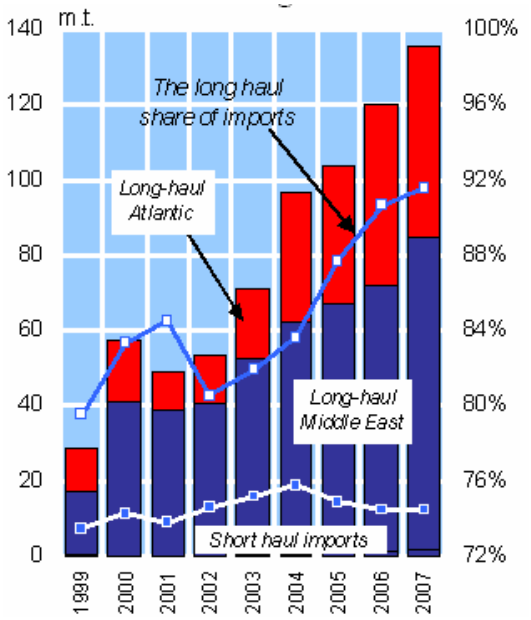
4.2 Development opportunity

Due to the majority of China import oil is transferred by foreign carriers. For national security consideration, Chinese government decided to encourage Chinese tanker companies increasing their tanker fleet capacity and made them to transfer the majority of import oil. According to China national development center's report, China will import 250 million tons of oil, which will be the largest oil import country in 2015. Base on above two points, Chinese government already issued a proposal that stipulate national fleet at least should transfer 50% of China import oil and then gradually increase this rate to 80% until 2015. If all those oil transfer by VLCCs and assume a VLCC can finish 8 voyages per year (average Brazil to China round voyage takes 70 days and average Australia to China round voyage takes 30 days), and then Chinese tanker operators need double their current fleet capacity then can reach the object Chinese government set, in another word, they have to increase at least 16% of its fleet every year. This policy actually made a barrier to those foreign tanker companies who already have lot of oil business in China for they have to loss their business chance in China. The direct result is Chinese tanker owners will have more bargain power when negotiate freight with Chinese oil companies or Chinese traders. Also consider Chinese government may give financial help to national tanker companies who enlarge their fleet, then this made nowadays is a great opportunity for Chinese tanker operators to enlarge their fleet. Some Chinese shipping companies like Changhang shipping has already set a timetable to enlarge its fleet capacity from the original 1740000 DWT (up to 2007) to 6580000 DWT in 2010.

China not only import more oil those years but also goes longer distance to import oil than before. From the figure below, we can find that the percentage of China oil trade

being transported longer distance has increased from 80% to almost 92%, also we can notice that the long haul imports business was sourced not only Middle East but also Atlantic and the trend is China begin to import more and more oil from Atlantic area. As the author mentioned an example in chapter 3.1, once China decide to import more oil from Venezuela, increasing rate of tanker demand will higher than that of oil itself. So in this situation, the author believes that the future of Chinese tanker company is quite good. Consider Chinese government will not allow those companies to enlarge their fleet forever, so the more time they consider the more chance the loss the opportunity.

Figure 4.1 China's oil import distance



(Source: Clarkson)

Although there is such an attractive policy for Chinese tanker operators, it still hard to say the future of tanker market is better than the future of dry bulk market for Chinese shipowner, as China play a more and more important role in dry bulk business particularly in iron and ore sector. According to Drewry report, China accounted for 49% of seaborne iron ore imports business in 2007, compare with just 16% in 2000 and expected share around 55% by the end of 2012. While doing this dissertation, the author also does an internship in a Hong Kong chartering company as a broker.

Working experience told me that more than 60% of our chartering business related to iron and ore and among those iron and ore business more than 70% related to China, in either shipowner or charterer aspects. A lot of Chinese cargo owners try to find a vessel to transfer their cargo particularly if they signed a COA contract and remember that China not only import iron and ore but also export steel product which means once China import iron and ore it contribute twice to shipping industry. Although there is no document statement that majority dry cargo import to China should transfer by national fleet like tanker, as the unique Chinese political system and famous face problem, lots of national owned companies still like use national fleet like COSCO or China shipping. Take COSCO and China Shipping as example, the dry bulk income has occupy more than 70% of COSCO total profit in 2007 and increase 34% compare to its 2006 income in 2006,China shipping also increase 72% of its dry bulk income in such a good market.

4.3 Potential risks of those methods.

It seems both methods will bring the owner lots of fortune, but there are still some risks they have to consider before they decide to update or convert their VLCC.

The first one owners must consider is shipping market has its own cycle, it cannot keep growing forever and currently the market is properly already reached its climax. Although lots experts have predicted that shipping market will collapse during those years many times and the fact is shipping market at such a prospective period, we still know the market will fall down one day. The question is only about when and this is why we need forecasting.

But we should always remember forecast of shipping is a very inexact science, it is so fluctuate, emotion, and different people have different reaction that lead the result is not so reliable. The main reason is prediction not just depend on the number, like in 2007 as the gap between supply and demand became smaller, no one even dream the

freight rate can up to this extend. This feature made the prediction act as a reference, and the real strategy a company takes is depending on opinion of the leaders in that company, what they think about the future market. For example, Frontline, which is the top tanker company, bought several vessels when lots of people predicted the market would keep going down. P&O is another situation, its chairman decided to sell the company when they just made a big profit, for they thought the future of container market can not that good. So after all which strategy to be chosen is depending on whether the broad's attitude is optimistic or pessimistic about the market.

From table 4.1 we can see that the require rate of operate a dry bulk vessel and oil tanker for 10% IRR in 2007 increase at least 30% and 10% respectively compare to 2006 that shows how prosperity the shipping markets are in 2007. In dry bulk market, operating a newbuilding vessel has lower require rate than operating a secondhand vessel shows the secondhand vessel is much expensive than newbuilding one when consider the older the vessel the less the freight rate. This also reflects the market is so hot that everyone wants to operate a vessel immediately instead of take a vessel one or two years later. Tanker market is another story, as after 2010 the market is predicted to be better than currently and that made capital invests in secondhand tanker is not as much as that put in newbuilding market. Consider 2007 is a phenomenal year in dry bulk history that made the last 5 years average freight of bulker is higher than tanker, and as the market finally will back to its track the author think consider 2002 to 2006 years average freight rate is more reasonable. Due to require rate for 10% IRR of both markets in 2007 is higher than the average rate of those two markets from 2002 to 2006 which may be an indicator that shows shipping market already reached its peak in this cycle. So investors have to consider do they have ability to bear the risk of can't get 10% IRR from this investment and the opportunity cost? Also as invest in shipping now needs a lot of money, either the money comes from bank or their own, it is a huge burden once they can't quickly get the revenue they want especially if they have to pay huge interest.

Table 4.1 Compare dry bulk and tanker rate for 10% IRR in 2006 and 2007

	2006		2007		2008.Apr	
	VLCC	VLOC	VLCC	VLOC	VLCC	VLOC
Newbuilding	55750	30750	63500	41150	64700	44000
Secondhand	47200	31100	51500	49800	54500	53000
02-06 average	45411	38950		03-07 average	51380	61760

NB: Delivery in 24 months, 25 year trading life. Prompt delivery five year-old, 20 year trading life. 10% IRR-basis 100% equity, 2007 operating cost, zero residual value, 360 trading days.

(Source: Drewry)

The possible solution for Z Company is using FFA (Forward Freight Agreements) which is a derivative product of shipping industry to hedge freight risk. Although, nowadays dry bulk business account for majority of FFA trade, as operating pattern and marketing structure is very similar between dry bulk and tanker, it is very likely that once the tanker market booming as dry bulk market nowadays, there will be lots of tanker FFA business. The principal of using FFA is two parties have an agreement to buy/sell a standard quantity of a specified good for delivery at a fixture future date at a price agreed today (Shuo Ma, 2007). For those companies who have interest relate to shipping can use FFA to manage their cash flow in advance, then avoid the risk of marking is changing beyond their expectation. Take dry bulk market as an example, BDI reached its history peak 11000 points in 2007, and then sharply decrease in January of 2008 to 5615 points, one month later it back to 8415 points and it already near the history peak point in April. From this we can see that if charterer chartered a ship in 2007 or owner charter a ship in January 2008, they will lose huge amount of money. But if they use FFA properly, they can partly avoid the vibration of freight market and effectively minimize the risks by take future market profit to compensate the spot market loss. Of course, FFA is not panacea to avoid the vibration risk, it only works when rightly handle, one Chinese shipping company misuse FFA and loss millions USD is a typical example. Due to currently not many Chinese shipowners involve in FFA, once Z company decide to use FFA method, they have to

try to hire some specialist as FFA is a two side sword.

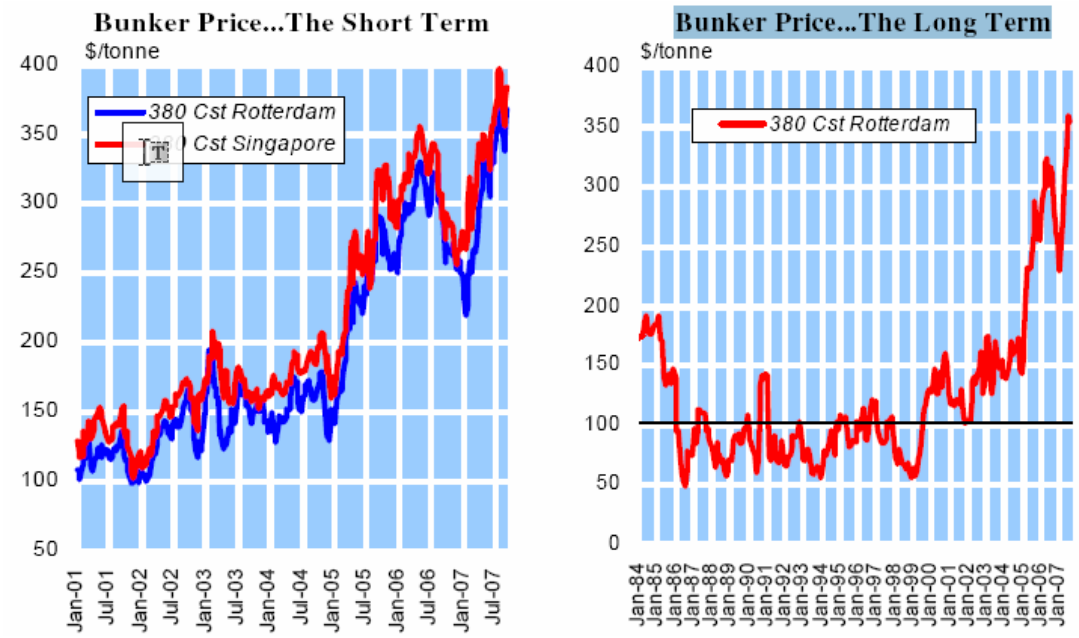
The second risk is safety of the vessel. Just as Drewry[19] mentioned Due to the fact that the design pattern for tankers and bulk carriers are fundamentally different, the former being strengthened lengthwise whereas the latter are strengthened crosswise which means its hull strength when loading cargo is totally different. In addition to this, vessel draught is also turning out to be a problem aspect that the draught of a converted tanker often is too big to compete with smaller vessels like Panamax and too small to compete with normal Capesize carriers. The same worry comes from general maritime corp.'s chairman and chief executive Peter Georgiopoulos and dry bulk specialist Jinhui Shipping & Transportation vice-president Raymond Ching who both doubted the suitability and safety of the converted VLOC[20], they think there are still insufficient successful examples to prove that those vessels' safety. Once those vessels have accident in the sea, it will damage the environment around especially due to those vessels are mainly very large vessels and then make the shipowner face huge amount claim. The author think this point has its sense, only due to vessels like Hebei Ocean shipping's converted VLOC operate 10 voyages safety, it still can not make sure that other converted vessels also don't have problems especially in a circumstance that shipyards have so many works which means they have to hurry up to finish more and has possibility to made the vessels not reach the quality they should be. The possible solution may be like shipowners should choose shipyard carefully, like those has a good reputation and try to scrutiny the vessel carefully when shipyard delivers it.

The third risk those shipowners have to consider is the threat of growing operating cost (high crew cost) and fuel cost. Figure 4.2 shows the bunker price both in short term and long term, from this figure we can see that the owner bear a greater burden of operate vessels than 10 years before as fuel cost already tripled. It doesn't like

[19] Dry bulk forecaster 08.1q
[20] Genmar fears on VLCC conversions, author: Michelle Wiese Bockmann, 2007 Dec 13th

freight market, which fluctuates so many times during those years, the fuel market is growing every year and no one knew where the peak point is. As the result, it seems high operating expenses and rising bunker cost will be a constant worry especially for short voyage. Once the market is not strong enough, operating cost may easily eat the daily income especially in a high bunker price age. For example, Teekay Corportation and Overseas Shipholding Group just announced their net income in 2007 down about 25% compare to there planning at the beginning of 2007 due to operating cost sharp hike around 38% and tanker market is not grow as they wish.

Figure 4.2 Bunker prices in short and long term



(Source: shipping sector report 2007 autumn)

As the author mentioned in chapter3, nowadays, the bulk freight is higher than the tanker freight when the vessel's DWT are the same, so the rising oil price has and will affect tanker market more drastically than dry bulk market in the next one year. On 2007 march, a VLCC's bunker cost represents 34% of freight income ($62193/day) and a Capesize bulk carrier's bunker cost account only 9% of freight income ($37045/day). By August it represents 60% of freight income ($47993/day) and 10 % ($93466/day) respectively. From this we can see that increasing bunker cost impact

tanker more than dry bulk carrier currently. So once the owners decide to update the single hull tanker, they should consider more about how to compensate the bunker price. Not only bulk carrier has better ability to bear the bunker cost, from table 4.2 we can also see that both Suezmax and VLCC tankers consume more bunker than dry bulk carrier in same deadweight. This feature made very large bulk vessel owner has an even better ability to bear the fuel cost compare to very large tanker owner nowadays. But remember the future of dry bulk market seems not as attractive as tanker market, it looks like at first tanker owner will have a tough time and then dry bulk owner will worry about how to cover their cost, so both methods have its advantage and disadvantage.

The possible solution for Z Company is adding a bunker adjustment clause in contract to compensate the increasing bunker price. Some shipowners like Zodiac already using this kind of clause long time ago. The drawback of this solution is due to the potential imbalance capacity between supply and demand of both tanker and dry bulk carrier then there is a possibility that charterers refuse this kind of clause since too many vessels open in market and the owner has to take it as their own cost.

The last risk the shipowners may face is the time lag between begin covert or update a vessel and shipyard finally delivers the vessel. This is more important of day bulk carrier owners due to different future of dry bulk market and tanker market. Since in 2009 huge amount of new capacity will go to the market, the owner have to consider when they finally get the vessel, the golden age of dry bulk has already gone. Tanker market seems has a better situation when the single hull tanker out of market after 2010, shipowners will glad to get the vessel around that time instead of take it right now for avoid the bad time. As the result, those shipowners who want to convert single hull tanker into dry bulk carrier have to consider two aspects: the first is if there are enough building berth to convert the ship, as currently there are so many newbuilding orders to shipyards, many shipyards already didn’t have any spare capacity to convert vessel until 2011; second problem is due to booming ship building

market, direct result is ship equipments market in a shortage condition. So when shipowners can really begin the conversion process not only depend on the availability of shipyard berth but also if the shipowner has to wait equipments, like hatch. Nowadays, time lag between order 2 hatches and shipowner finally get this two hatches takes more thane 15 months, in another word, once shipowner decide convert a VLCC to VLOC and they can't get hatches or other required equipment immediately, it will takes at least 15 months. The direct result is when the shipowner finally gets the VLOC, the market may already fall and the shipowner can't find any offer as they wish.

The Possible solution is sign long-term affreightment contract before convert a VLCC into VLOC. Like Zodiac that first sign 10 years COA with WuHan steel factory and then converted two VLCCs into VLOCs. COSCO Hong Kong also has this kind of contract with Bao steel. For Z Company, as it is a national owned company and has very good relation with other national owned factory, they can also follow COSCO's way that first try to persuade other local companies to use Z Company's vessel as their carrier to transfer their cargo and then convert the vessel.

4.4 Economic effect of different methods

By use what has been done in chapter 3, here we can deduct the economic result of those strategies and make the recommendation. Due to the limit of information the author got, update or convert cost of some vessels are unpublished. As the author has compared the cost of updates and converts a VLCC and the two total cost are almost the same, the author assume the cost of update and convert a same deadweight tanker is the same. In above paragraph, the author mentioned some shipping companies have signed the long time charterparty before they order a new vessel. This method of course can grant the shipping company has a stable income but it also made the owner can't gain a lot because in shipping market the longer the contract the lower the rate. Consider Z Company didn't have a very close relationship with the national steel

factories or traders, the author believe this is not a very useful way for them right now. In the calculation below, the author will take one-year timecharter rate to calculate the potential benefit.

Total cost of convert or update a single hull tanker: 20 millions + 170*50000(Z Company's VLCC is older than 10 years and assume the ship operate 340 days per year) =129.1 millions

The future 5 years of double hull tanker income is = (68040+64290+66520+68860+71260)*340 =115.25 millions

The future 5 years of dry bulk carrier income is = (136460+91880+77000+70000+60000)*340= 148 millions.

The operating cost of VLCC and Capesize is increasing since 1999. From the table below we can that the percentage of increasing is almost the same.

Table 4.2 Operating cost from 1999 to 2008

	VLCC		VLOC	
1999	7420			
2000	7295	-1.7%		
2001	7320	0.3%		
2002	7395	1.0%		
2003	7650	3.4%	5200	
2004	8130	6.3%	5516	6.08%
2005	8740	7.5%	5881	6.62%
2006	9445	8.1%	6406	8.93%
2007	9900	4.8%	6712	4.78%
2008	10310	4.1%	6996	4.23%

(Data source: Drewry)

So the difference of operating cost between VLCC and VLOC should be (10310-6996)*340=1.1 million USD. The total difference in 5 years should be 5.9

millions based on every year the increasing operating percentage is 4%.

Bunker cost also should be considered especially in an age of high oil price (see table 4.3, it calculate the average bunker price among Arabian Gulf, North Europe, Mediterranean, US Gulf, Caribbean and Singapore). From table 4.4, we can find that tanker consume more oil when the deadweight is the same. The difference should 540*(86.8-73.7)*340=2.4 millions USD.

Table 4.3 Bunker price from 2003 to 2007

	Average	Change
2003	171.7	
2004	183.2	6.7%
2005	273.8	49.5%
2006	325.8	19.0%
2007	384	17.9%
To date 2008	494	28.6%
18-Apr	540	9.3%

(Data source: Drewry)

Table 4.4 Bunker cost and speed knots

	Tanker		Bulk	
	Speed knots	t/day	Speed knots	t/day
160000-199999	15.1	70.5	14.4	55.7
200000-254999			14.2	64.4
255000-319999	15.6	86.8	13.4	73.7
320000+	16.2	114.2	15	87.1

(Data source: Clarkson)

So consider freight income, operating cost and bunker cost, the convert method can make the single hull VLCC owner gain around 30 millions USD than update method. It seems convert method is much better than update method, but two things should be

noted, first, the trend is different as in dry bulk market the freight is decrease while in tanker market is opposite; second, not only Australia, Brazil forbid overage (25 years) bulker access their ports but also in 2008 May India government issue a policy that forbid overage vessels. Those restrictions made the converted VLCC actually can only use about 5 to 6 years (consider most candidates VLCC of conversion are built around 1988 to 1992, and the earliest time the owner can get the vessel is 2009) that is about 5 years less than the update VLCC. So the author think update VLCC has more potential to gain a better retune of investment.

4.5 Other strategies in China

Just as the author mentioned in chapter 3, there are not much cases that adopted the other three strategies especially in China. Even the owners want to use those three methods they have to consider the domestic rule. This paragraph will discuss the Chinese rules relate to those three methods.

FPSO can not only transfer oil but also product and storage oil, the later two functions are subject to government control that made entrance level of having a FPSO is very high. Currently, CNOOC is the only company in China that owns FPSO type vessel. Those FPSOs are distributed in the BoHai Sea and the South China Sea. The tonnage is from 50000 tonnages to 250000 tonnages and totals deadweight over 1.7 million tons, and those vessels have been operating in depth water ranges from over 10m to 330m (Fan Mo, 2008). Since in China it is very unlikely the government will allow another company to have FPSO that made convert VLCC into FPSO work very unpopular in China. Even those Chinese single hull tanker owners want to convert a single hull tanker into FPSO, they have to first have the permission from Chinese government which means they have to do a lot of relationship work, otherwise they can only sell it to CNOOC or other foreigner buyers. According to the law of supply and demand we can easily notice that in China FPSO market is almost total buyer’s market that means the price will not very good. Also as the author mentioned in

chapter3, the huge initial input is a problem that covert a VLCC into FPSO is more than 4 times expensive than convert VLCC into VLOC.

Scrap market is not much more difference between domestic market and international market in a hot freight market. As mentioned in chapter 3, there are extremely few vessels scraped those years, so even the scrap steel price will still increasing due to the new iron and ore agreement the author still don't suggest shipowner adopt this method unless they really need cash flow or the vessel is operating more than 20 years. Since majority of Z Company's VLCC tankers build around 1992, which mean secondhand market still can offer a higher than demolish.

The only way shipowner can operate single hull tanker after IMO's deadline is finding a flag state and port state which willing to allow operate single hull tanker in domestic area. In 2003 Chinese government already suspend all secondhand tanker import activity and didn't allow it operate in domestic area. In 2007, Chinese communication department issued [2007] 394 orders, which suspend all new secondhand tanker capacity operate in Yangtze River. From this we can find the Chinese government's attitude, there is relative little chance that shipowners can operate single hull tanker in domestic area after IMO's deadline. The deep of water is also a problem as in China that seldom river can accommodate a VLCC type vessel.

4.6 Recommendations

After above analysis , we can see that Z Company, which currently has 3 VLCCs build around 1990, should only consider to adopt two solutions: convert single hull tanker into dry bulk carrier and update it into double hull tanker due for other solutions either has economic disadvantage or not in their core business. The remains two methods both have advantages and disadvantages: conversion method can quickly get the investment back while the update method can get more return. So which method to choose is depends on the condition of Z Company.

As the author mentioned above Z Company has good reputation in both tanker market and dry bulk market especially in tanker market. Since every company should enhance its competitive side that means it is a great opportunity for Z Company to expand their fleet and enhance its position in Chinese tanker industry in a circumstance of Chinese new national oil policy which actually set a barrier to foreign tanker companies. Due to the high price of both newbuilding tanker and secondhand one, how to solve the capital problem and time difference is the first thing Z Company has to faces when they want to quickly expand their fleet. For capital aspect, Z Company can get investment through issue stock, for time aspect, just buy the secondhand vessel is not only cost a lot but also may not design as they wish. So fully utilize single hull tankers they already have means a lot to them for above two aspects.

Due to Z Company not only have tankers but also bulkers, convert VLCC into VLOC is an alternative for them to spread risk. But the author didn't think this method will bring more to Z Company when compare update method for three reasons: firstly, there will be huge amount new vessel hit the water after mid 2009 which has high possibility to turn the bulk market up side down; secondly, due to the iron ore market is so irrational in China that made Chinese government may take some political methods to control the market and let it cooler especially when consider historical amount supply backing up at main Chinese ports; thirdly, Z Company's competitive strength is not in dry bulk side. The author always believes once a company want to build its brand, it must has its core business and this is why the author believe unless Z Company doesn't want to be number one in Chinese tanker market, they should not put much resources in other places.

From the above generalize analysis, we can then deduct the following more specific advantage and disadvantage for Z Company to covert VLCC into VLOC.

1. The average freight rate of dry bulk fleet in the next 5 years still predicted to be higher than the rate of tanker then this will made financial burden of Z Company can be quickly released. This is the main reason why Z Company can consider convert a VLCC into VLOC.

2. It is still not definite that the future of tanker market will be as good as those tanker owner hopes due to the new capacity in tanker market is very huge. This made convert a VLCC can help Z Company to spread the risk and made them have more ability to bear the potential fluctuation of tanker market. This is another reason why the author thinks Z Company can convert a VLCC into VLOC.

3. The main reason the author didn't recommend Z Company to convert more VLOC is their strength is in tanker market and they only has some small dry bulk carriers which means they are lack of experience of operating VLOC especially in human resources aspect. Currently in a high daily hire age, experience operator may make the vessel save 1 or 2 days, which may means more than 400 thousands USD, compare to the fresh one when the vessel meet some accident or unexpected situations. Also the owner must notice that very high market level doesn't mean an attractive income especially in cape market, which has less competition than the other markets. In this year the hire rate of capsize bulker increasing a lot due to Rio Tinto and BHPB, two Australia big iron and ore exporters, always charted in more than 10 vessels in one day that means there are insufficient or even none vessel open in the market for a while and then lead the BDI increasing a lot. Further result is market climb so high then currently Chinese traders or factories buy iron and ore in domestic market is even cheaper than buy it in Australia plus transport rate, and this made them stop import any more unless they have COA contract to perform. Everybody knows transportation is a derivative of trade, once there is no trade there is no transportation. So maybe the market will just look good and can't bring fortune to Z Company.

4. Chinese government issues the policy to encourage national tanker fleet transfer

the oil which made state owned tanker companies have more bargain power when negotiate the freight. Meanwhile, China iron and ore association attack Rio Tinto, one of China's biggest ore suppliers, was intentionally diverting ore to the higher-price spot market in May (Chinica market report 2008-5-15). The direct result is record iron ore stock in China ports which made all the main ports in China face serious congestion problem. And this is something Chinese government doesn't want to see, they arise warehouse fees almost four times in June that may made the Chinese import amount decrease and persuade Vale to stop export iron and ore to China for 1 to 2 months, whether this will infect the future of import in China is still unclear. But consider the huge amount of new vessels hit the water, once China's needs for demand for iron and ore slows down due to large stock amount in ports, then bulk freight will plummet instead of just decline.

5. Currently, there are only 10 to 12 specialized iron and ore ports in the world, among them only 3 to 4 can accommodate VLOC, which beam wide than 58m. It not only indicate that if lots converted VLOCs operating in the market, it will make those ports extremely crowded but also once those VLOCs can't access Australia and Brazil, it seems those vessels have little alternative options.

6. Since there are huge amount of newbuilding VLOC that can load more cargo than converted VLOC when the deadweight is the same due tot the strength of hull between original bulker and converted bulker is not the same. So when the market goes down it will make the converted VLOC has less competitiveness and the result is those vessels can only get the below average freight.

So the author think Z Company should update at least 2 or all single hull VLCCs into double hull that not only can enhance its tanker capacity but also can gain a lot with less risk. Once Z Company make their decision about how deal with single hull tankers they have, they should not only consider which shipyard they make their updating work but also should try to do those businesses (maybe their own maybe

they can try to take other companies which also interest in update their own tankers) together for a better price especially when they can buy steel itself and then provide it to shipyard for a cost reduction.

After they get the vessel they still should remember Chinese tanker fleet is still relatively small, Rome was not built in one day, so they should always remember to establish a strategy alliance which may help them to enhance their bargain power with foreign oil suppliers. Also they should consider divide their fleet into two parts, one operate in spot market and the other for time charter. This can effectively avoid the market risk, for shipowner can both gain a predictable fixed income and don’t miss the opportunity when market goes up. When the market is attractive enough to Z Company, they can also fix the near future income by long time charter all the vessels they have.

So update majority of their single hull tanker into double one in a good shipyard and running them in both spot and period markets are the recommendation the author made to Z Company.

CHAPTER 5 CONCLUSION

Shipping market is changing every day and that lead the attitude towards single hull tankers is also changing every day, which will raise fascinating possibilities. One thing seems quite certain is lots of single hull tankers especially VLCC will leave the market for either update or convert from 2008 to 2010. Although there are some potential risks, the author still believes after 2010 there will be a new era of tanker.

The conversion work made drastically impact on both tanker and dry bulk markets in supply profile of the fleet. Although lots of pioneers already did the conversion or updating work, there are still plenty of investors hesitating to make their choices. The author believes that actually projects made will depends on both the availability of shipyard capacity, in another word, whether there are spare berth, and developments in tanker market and dry bulk market.

No matter how uncertain the environment is, how to deal with huge amount of single hull tankers is a question Chinese tanker companies can’t avoid. As currently shipping market is still strong, the sooner those companies make the decision the higher profit they may gain due to the time difference between the owner make their decisions and actually they can use the vessel. Those shipowner should also consider the deadline of operating single hull tanker, once it pass the deadline the shipowner can only put the vessel in shipyard for conversion or demolish and maybe not only wait a long time but also have to suffer weak market. Most important, as a Chinese tanker company, how to fully utilize the develop opportunity of China to expand the scale and increase its share in shipping market is the key for their future since those companies have advantages in both location and relationship with government and cargo owner when compare with international companies.

Although there are so many values the single hull tankers still have, we cannot

overlook the potential risk. First of all is whether the converted or updated vessel is safe enough since their original design structures has huge difference. Second, the surge in oil and iron ore price is very likely to depress growth in the global economy and then lead to inflation. In the beginning of 2008, the stock amount of iron ore in Chinese main ports never less than 60 millions tonnes, this lead Chinese government issued a policy to slow down the unreasonable iron and ore import. No body knows what is the effect of this policy and once China decide to lower its iron ore import amount ,it will made the winter of dry bulk market comes earlier than people predict. On June 6th, BCI just surfer the sharpest fall in history (decrease 2855 point from 18033 to 15178), which seems a signal that the market has lack of energy to continue going up. Third, in tanker market, high oil price already made the supply of oil in Chinese market is insufficient that made people have to wait long time then can fulfill their cars, this is also a signal that oil company already feel burden to import oil, always remember trade is the foundation of transportation. So the author believes every Chinese company which involved to faces single hull tanker problem has to consider how to respond when the market goes down.

Nobody knows exactly of the future, the author hopes this dissertation may help somebody who is trying to know something about how to deal with single hull tanker. After all which methods will be choose is depends on the company actual condition and what's they feel about market. Convert market seems have more risk than updating method when consider most companies which own VLCC are good at tanker market, also dry bulk market is more fluctuate than tanker market (can seen chapter 3 which shows the change of freight rate in tanker market and bulker market) and tanker structure is more suitable for update into same type of vessel than convert into a total different design pattern one. But every coin has two sides, by taking higher risk, it also come along with more possibility to gain a high profit. So which methods to be chosen finally will depends on their feeling about the market and their ability to bear the potential loss. But the author heartily hope those Chinese tanker company can have a competitive tanker fleet to take the burden of secure China has enough oil to

use.

Since both tanker and dry bulk markets are very huge and complex which influenced by many factors, this dissertation can only give a general instruction and definitely has a lot of drawbacks. Due to a lot of cost information is confidential, the author only analyzes VLCC type of tanker and this is a regret of this paper. Also as this limitation of ship building experience this dissertation didn’t involved a lot with the conversion or updating technique, the author focus on the economic aspect then made this dissertation not cover other aspects.

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