Based on the Shipping Prosperity and Ship Renewal Decision

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Abstract. As the carrier of the shipping industry, the carrying capacity of the ship is determined by the state of the ship to a large extent, and affects the amount of related costs incurred in the operation of the ship. The timely renewal of the ship can not only keep the ship in good operating condition, but also guarantee the minimum transportation capacity of the shipping enterprise. This paper will study and analyze the relationship between shipping prosperity and ship renewal, to find the best ship renewal opportunity, provide the best ship renewal scheme for ship operation enterprises, to ensure that ships operate in the optimal state, and at the same time, ensure the continuous renewal of shipping capacity and create the greatest economic benefits for shipping enterprises.

1. Introduction
The transportation capacity of the shipping company to a large extent is determined by the state of the ship which is one of the important decisive factors of the operation state of the shipping enterprise. At the same time, to a certain extent, the economic returns of a shipping enterprise is influenced by the state of the ship. As a means of transportation, there must be many common problems, such as the aging of equipment, the loss of hull, the backward function and so on. How to use it properly to analyze the shipping market trend of the whole shipping industry, so as to choose the right time to update the ship is particularly important. This paper will analyze and study the prosperity of the whole shipping market, and find the relationship between the prosperity of shipping market and the factors that affect the renewal of ships. At the same time, the trend of shipping prosperity and ship renewal are combined to determine the best ship renewal opportunity through shipping prosperity, and the decision of ship renewal is obtained, to create the greatest economic benefits for shipping enterprises.

2. Analysis and Research on Shipping Prosperity
The analysis of shipping prosperity mainly focuses on the analysis of the shipping market trend. Monitoring the current situation of the shipping market and forecasting the overall trend of the future shipping market are obtained through the analysis of the overall trend of the shipping market. Through the systematic analysis of the shipping market, it is realized by updating the fleet reasonably to maintain the strong competitiveness of shipping enterprises in the current and future shipping market.

2.1. Model Analysis
The fluctuation of shipping prosperity is mainly reflected in the influence of shipping market fluctuation on shipping prosperity. The analysis of shipping prosperity can be done by monitoring the volatility of shipping market. The dynamic model of monitoring shipping market is established. BDI, CCFI, CSPI, HRCI, Clarkson index and other shipping market related indexes are selected. The...
relevant data are analyzed by time difference analysis method and K-L information quantity method to find out the correlation and sensitivity. The fluctuation of China's shipping market can be reflected by CCFI and CSPI, but the monitoring effect of global shipping market is not ideal. Clarkson index is a response to the trend of shipbuilding market. HRCI is the container ship charter price index. Although the container transportation volume is on the rise in recent years, the market share of container transportation is still far lower than that of dry bulk transportation. Therefore, BDI index is selected as the barometer of shipping market as the benchmark index of this paper. By analyzing the trend of BDI index, shipping market is divided into three different states: cold, warm and hot. According to the boom interval theory, when the critical value of BDI index is less than 1000, the shipping market appears in the "cold" range; when the critical value of BDI index is 1000-3000, the shipping market appears in the "warm" range as a whole; when the critical value of BDI index is more than 3000, the shipping market appears in the "hot" range. The dynamic analysis model is as follows:

![Dynamic analysis model of shipping prosperity](image)

**Figure 1.** Dynamic analysis model of shipping prosperity

Through the monitoring and analysis of A, B, C, D, E and other reaction indexes in the model, the monitoring and analysis results are put into the model. After the analysis of the reaction index, each reaction index is combined into a new comprehensive index. The comprehensive index has the basic characteristics of all response indexes and is the comprehensive embodiment of all response indexes. Through the analysis of comprehensive index, we can monitor the status of shipping market.

In the correlation analysis, the paper analyzes the correlation by using the BDI index instead of the reaction index. The correlation analysis, the calculation of the correlation index should be mainly focused. The correlation index directly reflects the correlation between the response index and the fluctuation of the shipping market. The benchmark index of correlation is determined. The benchmark indicators for correlation are determined during the analysis process, and the benchmark indicators are used as the leading indicators to measure the correlation.

K-L information method is to calculate the distribution of the difference between the relevant indicators and the benchmark indicators to reflect the impact of the response indicators on the model. During the calculation, the difference between the correlation index data and the benchmark index data is constantly changed. When the K-L information is the smallest, the correlation index data and the final index data are obtained. Move the selected index data one month before and after the benchmark index, and observe the change of K-L information difference. When the amount of K-L information is the smallest, it shows that the response index can best reflect the real degree of the model.

After analyzing the BDI index, the shipping market is divided into three situations: cold, warm and hot. The index which reflects the state of shipping market is affected by various complex factors and has great uncertainty. X-12arma method is used to modify the index time and dynamic, and the time
interval with large fluctuation is adjusted to stable time. Then the BDI index is integrated into the analysis of this time to determine the zero point of different interval of BDI index. The regional division and distribution map is as follows:

![Regional distribution of shipping market](image1)

**Figure 2.** Regional distribution of shipping market

2.2. Systems Analysis

Shipping market is one of the most complex and changeable markets, which has many characteristics, such as wide range, large amount, difficult to determine property disputes and so on. It has complicated relations with financial market, national policies, international laws and regulations, total amount of market trade circulation, etc. Therefore, the shipping market is difficult to be monitored. The indexes which can reflect the shipping market state are analyzes in the paper, that is, the reaction indexes A, B, C, D and E in the above model. Through statistics related knowledge, taking into account the impact of related indexes, more than 100 indexes affecting the shipping industry were screened, and the most suitable correlation index was selected for monitoring and analysis. Among them, the indexes that have great influence on the shipping market are BDI, CCFI, CSPI, HRCI, Clarkson index, etc. In order to directly reflect the impact of the response index on the shipping market, BDI index, known as the barometer of the shipping market, is selected to represent the response index. Through the analysis of BDI index, the trend of the shipping market is monitored. BDI index in the first half of 2019 is shown in Figure 3:

![BDI index in the first half of 2019](image2)

**Figure 3.** BDI index in the first half of 2019

One year in 2011, the BDI index experienced an unprecedented shock. In one year, the highest point of the BDI index was 11459, and the lowest point was 663. In such a short period of time, the highest point and lowest point successively appeared, which is unprecedented since the BDI index was released. And in the future, BDI index is still falling. Although it has picked up occasionally, there is no higher index point again. Between 2014 and 2018, the BDI index fluctuated back and forth between 200 and 1700, with the highest not exceeding 1700. It can be seen that the prosperity of the shipping market is relatively low, and the overall state of the shipping market is not good. But from April to
September 2019, the BDI index is in an upward trend, with only a small fall back in July. It can be seen that since 2019, the recovery of shipping prosperity is obvious. The overall status of the shipping market is good.

In this uncertain situation, the attention of enterprises to the BDI index of shipping market is self-evident. The trend of BDI affects the trust of shipping enterprises to the whole shipping market to a great extent. When the BDI index fluctuates greatly, corresponding countermeasure are likely to be made by the shipping enterprise according to the current shipping market. One of the biggest aspects is to update the ships of the enterprise fleet so that the company's transport capacity can better adapt to the current shipping market. There are three situations:

1. When the BDI index continues to decline, it indicates that the current shipping market is not stable, and large fluctuations in the shipping market were led various uncertain factors at any time. Shipping enterprises do not have strong confidence in the market, and under this influence, various indexes will also fall significantly. At this time, the shipping market is the most complex.
2. When the BDI index fluctuates in a small range in a period of time, it indicates that the current shipping market is relatively stable and will not fluctuate greatly in a short period of time. The shipping market will not fall or rise in a short period of time can be predict by shipping companies.
3. If the shipping enterprises monitor that the BDI index rises continuously in a period of time, and there is a trend of continuous rise, it indicates that the current shipping prosperity is in an upward trend, the whole shipping market is in good condition, and the operating income of the shipping enterprises will have a significant growth trend.

3. Analysis of the Factors Affecting Ship Renewal

Ship renewal is mainly affected by the internal decision-making and external shipping market environment. For the internal decision-making factors, different decisions and different countermeasures can be made by shipping companies. However, for the changes of external shipping market environment, shipping companies need to strengthen monitoring and make timely countermeasures for the changes of different shipping markets.

3.1. The Influence of Ship's Economic Life on Ship Renewal

Determining the economic life of a ship indirectly determines the economic benefits that a ship from the end of its construction to its abandonment can be create by a ship. The competitiveness of shipping enterprises can be greatly increase by the good ship renewal plan and keep the fleet's capacity at a high level.

As a kind of transportation carrier, ship will inevitably cause wear and tear and consumption in the process of operation, and the value of ship itself will be reduced accordingly. This process is called depreciation of ships. Since the ship has wear and tear and consumption, it is necessary to maintain it. When the basic operation process can’t be completed by the ship after maintenance although the operation can be complete by it, but the benefits it creates are lower than the cost needed for maintenance, the maintenance of the ship is completely unnecessary. Therefore, it is very important to determine the economic life of ships and then determine the timing of ship renewal.

3.2. The Influence of Shipping Enterprises' Development Focus on Ship Renewal

The investment of shipping enterprise is a kind of investment with high risk. The company's ship purchase and sale, ship leasing have a huge circulation of capital flow, and there is a huge investment risk in this process. Therefore, the enterprise recognizes the risks existing in the operation process of the enterprise itself, and makes correct preventive measures, so as to be able to respond stably when the risks occur. Among them, it is particularly important for shipping companies to find the right development focus.

The Great Depression of the global economy in 2008 was caused by the economic crisis of, and many industries were in great turbulence in this economic crisis. Shipping industry is no exception. BDI index fluctuates and is unstable before and after the economic crisis. The shipping industry is in the doldrums. At this time, in order to cope with the impact of the economic crisis, great adjustments are made to the company’s internal by the shipping enterprises, and focus on one aspect of
development, so as to have greater competitiveness in this aspect of the shipping market and reduce their own losses.

4. Shipping Prosperity and Ship Renewal Decision

It can be seen from the above discussion that the prosperity of shipping market can be divided into three trends, and the specific trend can be predicted through the trend analysis of BDI index.

(1) When the overall trend of BDI index is low, it can be predicted that the current shipping market is in a depressed state. At this time, due to the instability of the shipping market, the transportation capacity and market demand will be unbalanced. The transportation capacity invested by shipping enterprises is larger than the market demand, resulting in excess tonnage. It is necessary to consider whether the ship needs to be sealed up and stop the operation of the ship.

(2) When the BDI index fluctuates up and down in a small range, it indicates that the current shipping market is in a relatively stable state. If there is no serious impact factor, the shipping boom should not have a large fluctuation in the future, and there will be no rapid decline and rise. At this time, shipping enterprises should monitor the trend of shipping market, strengthen the maintenance of the ship, and make the ship in the best seaworthy condition. To deal with the fluctuation of shipping market at any time in the best condition.

(3) When the BDI index continues to rise for a period of time, and there is a trend of continuing to rise, shipping enterprises can appropriately increase the company's transportation capacity, expand the company's shipbuilding, or according to their own business conditions, when chartering, they can appropriately increase the ship charter period. We will appropriately increase the number of ships manufactured and expand the shipping capacity of enterprises.

5. Conclusion

In recent years, the global shipping market continues to decline, and many shipping companies have been holding a negative attitude towards the continuous decline of the shipping market, but in recent years, the shipping market has a slow recovery. In the 11 years since the financial storm in 2008, the shipping market is slowly recovering from the impact of the financial storm. The future shipping market is still very broad. Shipping companies may need to strengthen ship renewal when the shipping market is about to recover, so as to deal with various unstable factors smoothly in the future complex shipping market. At the same time, it can occupy its own advantages in the increasingly enhanced market competition, expand its own transport capacity, stand out in the competition, and create the maximum operating efficiency for the company.

6. References

[1] Wan Zhengtian. Research and application of ship renewal based on green concept. Master Thesis of Wuhan University of Technology 2011.
[2] Zhang Jiahui, He hongdi, Multifractal research on BDI index and CBFI index before and after financial crisis. Computer engineering and application 2019. 55.
[3] Yan Jiaming. Economic analysis and Countermeasures of large container ships in the economic downturn. Master Thesis of Shanghai Jiaotong University 2012.
[4] Qing Qian. Research on the prosperity index of global dry bulk shipping market. Master Thesis of Shanghai Jiaotong University 2012.
[5] Zhou Dequan, Zhen Hong. Development trend of China's shipping industry based on China's shipping prosperity index. Water transport management March 2010.
[6] Zhou Dequan, Zhen Hong, Yue Meilong. China Shipping Prosperity Monitoring and early warning system. System engineering July 2015.