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# **The research of Ningbo City's marine economy development**

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## **Abstract**

The 21<sup>st</sup> century is the century of the ocean. The development and utilization of marine resources and the development of marine economy has become a solution to the current issues such as human population explosion, environmental degradation and shortage of resources. It's also an important way to speed up the world and Chinese economic development and enhance their own strength. Chinese marine economic development in its infancy, with the developed countries have greater gaps, in this historical context, of Ningbo City, the marine economy of Ningbo City is in a stage of rapid development, but on the other hand its lack of research relatively. The paper used quantitative analysis, qualitative analysis, comparative analysis, static analysis and dynamic analysis method to study Ningbo City's marine economy.

In this paper, I take Ningbo City as research object and take marine economics as the subject. I summarize the correlation theories and literatures of the marine economy and use quantitative analysis method of marine economy and industries to analyze the current situation of Ningbo City's marine economy including industrial scale, industrial structure, industry effectiveness. After that, on the basis of leading industries theory, we selected the leading industries of Ningbo City including off shore oil and gas extraction and processing industry, coastal ship manufacturing industry, marine chemical industry, maritime construction industry, marine transportation industry. After analyzing the current situation of Ningbo City's marine economy we can identify the problems of marine economic development in Ningbo City. For these issues, I put forward the measures and safeguards of the development of marine economy from different aspects of Ningbo City.

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## **Introduction**

Speaking of the theoretical importance of this paper, now the research on marine economy has not yet formed its own theory frame and contexts. The research includes economics, geography, resources science, oceanography, ecology, management science, environmental science and other basic disciplines of theoretical knowledge; the marine economy theory is still in formation and developing stage. Through the summary of the theory development course of marine economy study of China for many years, by the application of various marine economic statistical method and attempting to the oceanic economy research method in order to providing certain theoretical support and reference for the development of the marine economy of Ningbo City.

As for the reality importance of this paper, the research is benefit for the direction of marine economy development practice. This paper on the background of the marine economic development at home and abroad, I analyze the current situation of the development of the marine economy in Ningbo City, then based on the theory of leading industry selection, I select the leading industries of Ningbo City's marine economy. According to the analysis results above, to show the problems existing in the development of marine economy to find out the reason and put forward feasible measures in order to provide useful ideas and basis for marine economy sustained, healthy and rapid development in Ningbo City.

This paper takes Ningbo City as an research object and bases on the subject of marine economics in order to achieve the goals of selecting the Ningbo City's marine economy leading industries and putting forward some feasible measures to promote Ningbo

City's marine economy development. So that, there are lots of objective works I need to do, the following is the list:

- (1) To know the foreign and domestic background of
- (2) To collect relevant literature materials and find the useful scientific theory
- (3) Combining with local conditions of Ningbo City, to analyze the current situation of its marine economy development
- (4) To find recent years' economic data of Ningbo City and other Chinese coastal city and comparing analyze.
- (5) Through the comparison analysis, to find the leading industries of Ningbo City, then discover the main problems.
- (6) Taking Ningbo Port developing practice as an example, to get some useful experiences and enlightenment for feasible measures
- (7) To put forward some safeguards to guarantee the measures above
- (8) Drawing final conclusions for the whole paper

The research method of the paper are as follows: ① Survey method. This method is including field surveys and retrieval of relevant information. By referring to the Ocean Yearbook, Regional Economic Yearbook, China statistical yearbook data mastered the relevant data of Ningbo, Dalian, Qingdao, Xiamen, Zhoushan City and area of marine economy, the national economy, regional economy; ② Comparative method. Based on the comparative study by the large amounts of data material, including general state of marine economy of Ningbo City and the country, the comparison, including the comparison of Ningbo and Dalian, Qingdao, Xiamen, Zhoushan etc, from which we draw a conclusion; ③ Static and dynamic analysis. Generally, it can explore things in

motion at rest, when in motion is more likely to reveal things. This article analyzes both the Ningbo City in the development of marine economy, and analysis of the Ningbo City a year period on the development of marine economy, resulting in an analysis of the status quo and can reveal the law of the development of marine economy, therefore let us to better predict the future development trend; ④ Combination of quantitative analysis and qualitative analysis. Through the combination of quantitative analysis and qualitative analysis, we can make a quantitative evaluation and qualitative analysis of the research objects. In this paper we in the marine economy of Ningbo city overall scale, the industry scale made quantitative analysis, and the industry of such as labor productivity, industrial structure coefficient of variation of the qualitative analysis, so as to realize the problem from two aspects of qualitative and quantitative analysis; ⑤ Combination of normative research and empirical research. It emphasizes on how to do it from the economic theory, and pays particular attention to how to do it, from the existing facts and experience, to study the need and possibility of economic development, and then put forward the decision standard. Especially leading industry selection, such as Hector seaman benchmark, Shinohara benchmark theoretical research and support a variety of marine economic practice data, also includes the proportion of production value, the increasing proportion, the pace of development, labor productivity, employment contribution value of comparative analysis, therefore, for leading industry analysis including research methods in most of the methods.

The following is structure of this paper, for the first part, I summarizes the correlation theories and literatures of the marine economy. Then, I use quantitative analysis method of marine economy to analyze the current situation of Ningbo City's marine economy

including industrial scale, industrial structure and industry effectiveness.

After that, for the second part, on the basis of leading industries theory, I selected the leading industries of Ningbo City including offshore oil and gas extraction and processing industry, coastal ship manufacturing industry, marine chemical industry, maritime construction industry and marine port transportation industry. After analyzing the current situation of Ningbo City's marine economy, I identify the problems of marine economic development in Ningbo City.

Finally, for the third part, I take a typical company in Ningbo City (Ningbo Port Group Ltd.) which is committed to develop marine logistics as an example and get some valuable experience from its successful practice in recent years. Then, combining with the issues in second part, I put forward the measures and safeguards of the marine economy development from different aspects of Ningbo City.

# **Chapter1 Preface & Theory**

## **1 Background**

At the beginning of this paper, I prepare to introduce the international and domestic background of marine economy in order to show its developing history and strategic role of the world.

### **1.1 International background**

Today, the human is faced with serious challenges of population growth, food shortages, environmental degradation, and energy & resources shortage. Looking for new space for survival and development has become a major issue for the governments and scientists all over the world. In view of the development of land resources utilization trends to limitation and land living environment gets worsening, the survival and development of human beings is facing a serious threat, in order to get rid of the crisis, the humans has returned to the life starting point-marine, has explored the rich resources under blue waves. From the utilization of land resources to the development and management of marine resources, getting wealth from the sea, transferring the marine resources to economic products, has become more and more people's consensus. Thus, marine will become the "Second Empire" for humans' survival and development. Actually, it has a great strategic significance and it is also the material basis of the 21st century human society and sustainable development.

Since 1990s, the development of the world's marine economy has been developing rapidly. World marine economy output in 2000 reached 1500 billion, accounting for 16% of the world's total economy output value, in 2005 reached 1900 billion,

accounting for 20% of the world's GDP. World marine economy is growing at an average annual rate of 11%, its growth rate has been higher than the world's economy growth rate.[1] The United States, Canada, Australia, Japan, Russia, Germany, France, South Korea, India and other coastal countries have formulated their own maritime strategy and established the specialized research institutions in order to speed up the development of marine technology support, vigorously develop the marine technology and strive to remain invincible in the future competition.

## **1.2 Domestic background**

China not only has 9 million 600 thousand square kilometers of land, but also has about 3 million 600 thousand square kilometers of ocean land whose area is more than 1/3 of the land area. China has a coastline of more than 18000 kilometers with more than 6500 island which provides vast space and huge amount of energy for the sustainable development of economy of our country. Chinese eastern coastal areas accounts for only 20% of the land area, while the GDP accounted for 60% of the country. In the marine economy has become the world's economy development trend in the background, the coastal provinces and cities have introduced marine development policy.

《The marine economic project of Ningbo City 2005-2015》 puts forward that basing on the “Five aspects” (Including a. the target of constructing “Ocean Economy City”; b. the theory of scientific development; c. the main focus of port-centered industry, marine transportation industry and fishery; d. the engine of institutional innovation and technological progress), implementing the linkage strategy of “Port-Bridge-Ocean” to increase the comprehensive utilization and development of marine resources and to

strengthen the marine resources and environment protection in order to optimum the marine industrial structure layout. Then, it forms the modern system of marine economy industry with the factors of reasonable structure and powerful competitiveness and establishes the marine economic center in the region of Zhejiang province and the south of Yangtze River Delta. [2]

## **2 Literature review**

Before doing the research of Ningbo City's marine economy, collecting some information and data from the relevant books and journals is a necessary and important step. Previous scholars' perspectives will provide the Pieria Spring for the research of this article. Here, I will divide the literature review into two parts: Foreign part and domestic part.

### **2.1 Foreign literature review**

At the beginning of the seventies of the 20th century, American scholar Gerald J. hmangon prepared the 《United States Marine Policy》 which firstly proposed the concept of marine economy. In 1974, the United States puts forward the concept of "Marine GDP" and its calculation method, the research focus is to determine the marine industry and related economic activities. Rhode Island University resources economics professor Niels Connaught - Haomu studied marine industry on the economic impact of Southern New England, using input-output method to get the marine industry and economic status of some measurement scales. In 1989, Columbia University in the United States to estimate the contribution of the U.S. Marine Economy to the national product of the demarcation criteria proposed by the enlightenment. He believes that if

the main activities of the enterprise at least meet the following criteria, then the whole or part of the company's output will be included in the maritime industry counterparts. Demarcation is the main production activities of enterprises is from the ocean in collecting the basic activities of biotic or a biotic materials enterprises using seawater as the main products of the production process of the basic elements of the enterprise output is marine the demand of enterprise's geographical location is close to most of the features of marine areas inside the door is committed to the functions of coastal and marine resources development, management, or legislation, or department is engaged in marine education and research. Columbia University of J • M Armstrong and P • C Reiner's the look to be marine management «From a new angle, the prospects of marine economy» were predicted. Gore Hillel explores the potential of sea water aquaculture in the books of «modern and future of marine economics» . L F Robert writes «marine resource management» .[3]

The former Soviet Union is one of the first countries to study the ocean economics. In 1975, L • B Biunique has published «the development of marine economic problems» ; In 1977, in his writes of «The ocean economy» , proposed the concept of «ocean economics» , of which mainly discussed the main marine resources and industry development prospects, and in the aspects of ocean economics and ecology are also reviewed. In 1982, L • B Boliesilafu editor in chief of «The world ocean development means the technical and economic evaluation» etc. In 1983 B • C Zaloumi writes «The human need for ocean» ; A • Evoznesensky's editor in chief of «The ocean research and development» . The Kaki Cano J and Orr Rolf thought that the marine economic science is faced with new task, that is, study on the planning and management of modern

scientific methods, the rational use of marine resources and the protection of the natural resources of the economic mechanism. Fedoseyev put forward to improve the efficiency of marine economy in the current stage of the extensive use of the latest achievements in scientific and technological progress based on the production of savings. Soviet scientists also use mathematical tools to study the economic and ecological problems of the marine environment, and put forward some mathematical models. [4]

The important significance of the marine economy development in 《Japan's marine development》was discussed by Shimada Hito in Japan. And he also published 《Fisheries economics》 . The research focuses on marine fisheries, shipbuilding, offshore oil and gas exploitation of seabed mineral and ocean energy power generation. [5]

The results of these studies mainly discusses the important significance for the development of marine economy, planning and management of marine economy of the modern scientific method, rational utilization of marine resources and the protection of the natural environment, economic mechanism presents the ocean as a whole management, the implementation of comprehensive development of marine resources and sustainable utilization advocate, in guiding the practice of marine development and promote plays a positive role in the development of the marine economy.

In 1974, the Marine Economy Analysis Department recognized the contribution of GDP economics, in this study, the Bureau of economic analysis of marine economic statistics in 1972 GDP was calculated. Pontecrovo used the similar method to calculate marine output in 1977 and 1987. These studies focused on those who are clearly defined the industrial and economic activities, these activities, either in the production process of making use of ocean resources, or dueling to the need for some traits of marine

products and services production. Taking this as the foundation, 66 departments of national income accounts are selected to be used for data analysis. [6]

In 1992, according to the Lugar industry compactness and direct utilization of marine resources of the coastal area, the industry is divided into the coastal zone, the coastal zone dependent correlation and coastal service activities. This method expands the type of marine economic activities to a great extent, and the coastal economy introduced into the measurement process of the marine economy. [7]

From the 1990s of last century to the beginning of 21st century, people pay more attention to the national income accounts this definition is extended, including previous studies have been attempted to incorporate into categories with economic value in the accounts of the related resources. The attention from people worried about the national income accounts is a good but imperfect reflection of economic welfare scale. Therefore, the present study attempts to use the traditional many countries are excluded from the system of national accounts but taking economic welfare important factors into account.

In 1992, the Bureau of economic analysis of the assessment of the value of natural resources is also incorporated into the national accounts statistics. American Academy of science by the National Research Council of the jury tests in Europe and Canada and other countries to the role of natural resources in economic in consideration of the necessity and possibility of economic and environmental accounts. [8]

Study on the Canadian province of marine economy depends on the special industry employment situation and to estimate the regional economic output model and its main focus on those easy to measure related to market activities.

In 2000, Charles S.colgan defines the definition of marine industry, the marine

economic value calculation method (GPO) is given, and calculate the output value of marine economy according to the Bureau of economic analysis in the data. In addition, he also proposed to calculate regional data and historical data in space and time to improve the marine national income accounts. [9]

In 2003, Charles S.colgan distinguishes between economy and marine economy and coastal marine economic dispute the enterprise number, wages and employment into the calculation of the marine economy according to industry classification standard and the North American industry classification standard, compared to Pontecorve and Lugar by the 9 departments marine industry differences economy, to compare the changes of outlook marine economic statistics and for each industry belongs to the coastal ocean or coastal service dependent type considering the impact of geographical division and administrative division of marine economic statistics pointed out that marine economic statistical account of the advantages and disadvantages that the future development of marine economic statistics should be given priority to calculation of oil and gas industry and the importance of updating the coastal leisure tourism data. [10]

In 2005, Judith Kildow and Charles S Cogan did a comparison between California's marine economy and other states of the whole country, then did a comparison of state's marine economy to make a comparative study of regional analysis of the specific development status of the marine industry statistics through the direct output of wages, employment, interstate marine output and indirect output to calculate the multiplier effect, this is an innovation, and the preliminary analysis into the multiplier effect of marine economy to analyze the change of 1991-2000 from marine economy. [11]

In 2007, after the system summarizes the previous research results of ocean economy,

Charles S Colgan firstly answers questions about the market economic data from the national marine economy project. For example, "what is the enterprise wages, employment and the source of the data?", "what time the data can be found?" Then, a little contribution of this paper is particularly prominent the economic multiplier effect of a marine economy for this method in economics formally introduced to the statistics of the marine economy to do theoretical thinking and preparation. [12]

## 2.2 Domestic literature review

In 1978, Xu Dixin and Yu Guangyuan firstly proposed the establishment of a new discipline of "marine economy". The research works of this period of study, new disciplines from the overall nature of the task, and the development of marine economy Chinese macro outlook. Economic research, Island Marine Resources Economic Research is on the coastal zone, as several national marine economies in the study of the most active areas. [13]

In 1982, Zhang Haifeng editor of 《Chinese marine economy studies》, Yang Jinsen in 1990 writes 《Marine development strategy of China》, In 2000, Xu Zhibin editor of 《Construction of marine economy strategy》, these works mainly discusses the significance, strategies and Countermeasures of marine development and management system. [14]

In 1990, Jiang Tiemin writes 《Chinese research of marine regional economy》. In 1994, Pan Yiyong writes 《coastal economics》; In 1995, Zhang Yaoguang completed the 《Economic type and zoning of Chinese Island》, Chen Zeshi published 《Chinese bays》. These works contributes a preliminary study on developing Chinese coastal regional marine economy. [15]

In 1986, Gu Shixian proposed the construction of “maritime Liaoning” proposition, Jilin Province in 1988 published the 《Tumen Jiang Tonghai sailing and opening up research papers》 ; In 1994, Jiangsu ocean-management institution published 《Jiangsu Province Marine Management Bureau》 ; In 1996, the Fujian Provincial Planning Commission published the 《The construction of Marine Province》 . [16]

Shandong Academy of Social Sciences Institute of marine economy and marine economy theory, resource development, Shandong Province, marine fishery, regional economy in Shandong province is discussed, the marine economy of Shandong province's earlier works.

In 1990, Tang Qisheng writes 《Shandong offshore fishery resources development and protection》 ; In 1992, edited by Zheng Baiyan, 《ocean strategy》 in Guangxi; In 1997, He Zonggui & You Fanghu, editor of 《Shandong marine research》 ; In 1998, Xu Zhibin & sun Jilting editor of 《Shandong marine industrial structure and layout optimization research》 ; In 1998, Wang Rongwu & Liang Song editor of 《Guangdong the marine economy》 ; In 1999, Su Jillian, editor of the 《Construction of Zhejiang Province “marine economic province” strategic research》 . These researches above focus on the study of regional economy, the coastal provinces began to realize the future of marine economy in the role, it also puts forward the strategy of the marine economy development. [17]

Because of the beginning of Chinese marine economy development is late; the development of the theory is also slow by the world ocean developed countries. From the above we can see that the marine economy works, before the end of last century the research is mainly on the research of marine development strategy, significance, and

countermeasure and management system of marine economy, marine department and regional economy. Because the practice is relatively backward, the analysis is mainly qualitative analysis and theoretical analysis of marine economic prospects preliminary outlook and forecast also noted that the problem of sustainable development of marine economy development, but the deficiency is the lack of sufficient data and quantitative analysis.

In 2008, Jiang Tiemin discusses the three main contents of economic theory, Bohai marine development and protection, countermeasures and suggestions. Zheng Guibin in 2001 on China's aquaculture, marine resources development, marine environmental protection, marine energy development status, development of coastal tourism, marine information industry is analyzed to find out the difficult problems, and put forward the development countermeasures. Su Wenjin in 2002 based on the analysis of development trend of domestic and international marine industry and marine industry in Fujian province development status, will accelerate structural adjustment, industrial restructuring of marine industry system, puts forward suggestions to accelerate the development of key industries of marine economy in Fujian province. [18]

Here are some studies on marine strategy: In 2004, Wang Shoguns papers on marine development strategy of the system summary, divided into the sea strategy, ocean development theory research and Practice Research of three part of ocean development. In 2005, Li Yaozhen Xu Xiangmin mainly analyzes the ocean of politics and law, marine culture and society, marine economy and management. In 2007, Jiang Shushing introduced the development of marine science and technology, such as offshore storage technology, marine information system, and marine monitoring network, aquatic

breeding, breeding technology of precision. In 2007, Li Zhujiang Zhu Jianzhen of China marine thought and national ocean policy evolution are discussed, and the China marine economic development background, current situation, development condition, principle, target and mode are studied, with particular emphasis on the protection of the marine environment and the sustainable development. [19]

Related work study on the marine economy for the basic theory of Chen Kewen, to the marine economy, marine industry, marine economy, marine economy sustainable regional economy are studied. On 2003 Xu Zhibin, with Niu Zengfu than the former increased the performance evaluation of marine economy, marine science and technology and knowledge economy, regulations and policies, the ocean marine economic management system etc. On 2005, Sun Bing Li Ying would also be included in the future of marine high-tech industry, marine division, coastal economy and economy of the island. A study on the increase of the marine disaster economics is Taiwan Strait marine development and international marine development in the study of Ye Xiangdong in 2006. Sun Bin, Xu Zhibin made a systematic study on the marine economy. [20]

In 2001, Han Lingbing in 《Jiangsu province marine economic development pillar industry choice》analyzes the history and current situation of marine economy in Jiangsu Province, the application of the theory of industrial economics, determine the pillar industry and Development Countermeasures of the marine economy of Jiangsu province. Zhang Quant in 2003, 《The study on the development of marine economy in Hebei province》 through the development of the marine industry input-output situation of marine economy analysis, and through the comprehensive evaluation system of

choosing the leading industry of the marine economy of Hebei province. In 2003, Wang Lei in 《Tianjin marine economic development》 summarized, and the inherent law of marine economy to explore to find the internal relations, and choose the pillar industry and give priority to the development of Tianjin marine economic development in the industry. The analysis of "economics" the sustainable development of marine economy in Liaoning province analysis of the status quo, advantages of marine economic development in Liaoning province in 2004. But, analyzing the existing problems and puts forward the solving measures. In 2006, Song Wenham's 《Shandong Province Marine Economic Development Research》 analysis basis and conditions of marine economic development in Shandong Province, and according to the history of the industry development and status quo of selecting leading industry of marine economy. [21]

In 2007, Cao Lida built the control model of the sustainable development of marine economy in 《The study on the sustainable development of marine economy China system model》 and carried on the analysis finally puts forward the main direction of sustainable development policies to support and solve problems by using statistical tools. In 2007, Sun Zhiyu's 《China's marine economy research Retrospect and prospect》 of China's marine economy research on the history and literature, during the works, this paper gives a detailed classified summary of this subject is the first report on the literature as the research object the paper. [22]

From the above review can also see that the rapid development of Chinese marine economy in this century to promote the development of marine economic theory. Especially after the national marine economy to the national development strategy,

many scholars have put forward theoretical support from the strategic development strategy, China ocean economy, made beneficial exploration. This period appeared on marine economy really works, its research content includes the basic theory of marine economy, marine industry, marine economy, marine economy, regional economic sustainable marine economic performance evaluation of marine science and technology and knowledge economy, marine regulations and policy of marine economy, marine management system of high-tech industry in the future, the sea division, coastal economy and island economy, marine disaster economics, Taiwan Strait marine development. Many of these works are proposed to measure the ocean economy scale and standard, the development status of the marine economy Chinese analyzed and prospected.

### **3 Research significance and method**

Just like a person can not live without his soul, after clearly showing the background and literature review, we have to know the research significance of the whole paper. Besides, a series of reasonable methods are also the best engine of research. Here, I will introduce them together.

#### **3.1 Research significance**

As a new research field with a number of interdisciplinary, now the research on marine economy has not yet formed its own theory frame and contexts. The research includes economics, geography, resources science, oceanography, ecology, management science, environmental science and other basic disciplines of theoretical knowledge; the marine economy theory is still in formation and developing stage. Through the

summary of the theory development course of marine economy study of our country for many years, by the application of various marine economic statistical method and attempting to the oceanic economy research method in order to providing certain theoretical support and reference for the development of the marine economy of Ningbo City.

Ningbo City is located in the coast line of Chinese central, the north near the Shanghai port and the Yangtze River waterway, the East is the vast sea, geographical location is extremely advantageous, and the port of Ningbo City is numerous, deep-water port width, with the development into a world of Eastern Dagang potential, Ningbo City on the mainland economy developed economy, perfect infrastructure, the strength of the economy, laid the foundation for the development of marine economy in addition the rapid development of marine economy in recent years, in the coastal city of very prominent. However, while the rapid development of marine economy in Ningbo City, the research is not enough. The only research is limited to the analysis of Ningbo port, and the lack of the overall situation of Ningbo marine economy, so this is not conducive to the sustained and rapid development of marine economy in Ningbo city. Learning theory is to better guide our practice. Under the background of the marine economic development at home and abroad, to analyze the current situation of the development of the marine economy of Ningbo City, and according to the theory of leading industry selection of leading industries in Ningbo City Ocean and according to the above analysis results showed that the problems existing in the development of marine economy, find out the reason, and put forward feasible measures, so as to marine economy of Ningbo City, sustained and healthy rapid development to provide useful

ideas and basis.

For the study of marine economy in Ningbo City, it can also study to other coastal city of marine economy to a certain guiding role model, so that people in the province, the coastal areas of marine economy development at the same time also pay attention to various coastal cities on the development of marine economy, from a micro level analysis of the development of marine economy, putting forward more feasible and practical measures and methods, development of marine economy has more specific development goals and the development of the carrier.

### **3.2 Research methods**

Here are several research methods we may use in the paper:

(1) Survey method. This method is including field surveys and retrieval of relevant information. By referring to the Ocean Yearbook, Regional Economic Yearbook, China statistical yearbook data mastered the relevant data of Ningbo, Dalian, Qingdao, Xiamen, Zhoushan City and area of marine economy, the national economy, regional economy.

(2) Comparative method. Based on the comparative study by the large amounts of data material, including general state of marine economy of Ningbo City and the country, the comparison, including the comparison of Ningbo and Dalian, Qingdao, Xiamen, Zhoushan etc, from which we draw a conclusion.

(3) Static and dynamic analysis. Nature is, it can explore things in motion at rest, when in motion is more likely to reveal things. This article analyzes both the Ningbo City in the development of marine economy, and analysis of the Ningbo City a year period on the development of marine economy, resulting in an analysis of the status quo

and can reveal the law of the development of marine economy, therefore let us to better predict the future development trend.

(4) Combination of quantitative analysis and qualitative analysis. Through the combination of quantitative analysis and qualitative analysis, we can make a quantitative evaluation and qualitative analysis of the research objects. In this paper we in the marine economy of Ningbo city overall scale, the industry scale made quantitative analysis, and the industry of such as labor productivity, industrial structure coefficient of variation of the qualitative analysis, so as to realize the problem from two aspects of qualitative and quantitative analysis.

(5) Combination of normative research and empirical research. It emphasizes on how to do it from the economic theory, and pays particular attention to how to do it, from the existing facts and experience, to study the need and possibility of economic development, and then put forward the decision standard. Especially leading industry selection, such as Hector seaman benchmark, Shinohara benchmark theoretical research and support a variety of marine economic practice data, also includes the proportion of production value, the increasing proportion, the pace of development, labor productivity, employment contribution value of comparative analysis, therefore, for leading industry analysis including research methods in most of the methods.

## 4 Theory of marine economy

After analyzing and collecting a large amount of material and data information, this paper plans to make use of the following marine economy theories to research. Here, I will simply introduce them.

#### **4.1 Definition of marine economy**

In 1984, Yang Jinsen in his paper 《The development of marine economy must implement a balanced policy》talked about“the marine economy is the various economic activities sum of taking ocean as activities place and marine resources as developing object”.[23] Feature is focusing on the definition of the marine economy from the extension.

In 1986, Quan Xijian in 《Marine economics investigation》 defined marine economy activity processes, said that “marine economic activities is people in order to meet the needs of social and economic life, to the ocean and its resources for the object of labor, the labor input acquired material wealth of the labor process, namely human and marine nature between the material transformation process”.[24] The definition of marine economy is characterized as a process, and points out some relations including the process, attempts to explore the internal structure of some marine economic process.

In 1995, Xu Zhibin in his paper 《The marine economy and marine economy science》 talked about that “the marine economy is the product of the input and output, demand and supply, and marine resources, space marine, marine environmental conditions directly or indirectly related to the activity of collectively.”[25] The feature of the concept is that it involves the connotation of the concept, that is, the correlation between input and output, demand and supply in economic activities.

In 1993, Liu Shirring, a South Korean scholar, said that “the marine industry is the input and output of the economic subject and the special environment of the ocean and the special environment of the space and the needs and supply of all the industries which is including marine fishery, marine transportation, shipbuilding industry, coastal

engineering & construction including reclamation engineering, the construction of tourist facilities, continental shelf oil and gas development engineering, ocean to ocean development and mineral development projects.”[26] Its characteristic is that in addition to the marine economy or is input, either is the output, either the demand or supply, related to the ocean, the special space environment and the particularity of marine economy extension specific.

In 1998, Chen Wanling defined the marine economy as the economic activity or process of the development of all marine resources in the ocean and its space. Marine economy is essentially the economic problem of marine resources, that is, in order to meet the needs of people on marine resources, how to coordinate the development and management, utilization and protection, transformation and cultivation of economic problems.[27] This definition is starting from the definition of marine resources, elaborates the connotation of marine resources and marine economy and its system reform.

Xu Zhibin in 《Guangdong Province of oceanic economy research on major issues》 defines the concept of marine economy as “marine economy is from one or several aspects in the economic function of marine economy is dependent on various economic relations in general activity place, relying on resources, sales, service object, primary production of raw materials and marine. From the regional sense, the marine economy can be regarded as a certain area of the ocean economy.” He also pointed out that “these five aspects are not confused, can be regarded as a rough division of marine economy concept extension.” [28]

In 2003, in 《The national marine economic development plan》 , the definition of

marine economy is “marine economy is the development and utilization of the sum of the marine industry and related economic activities” .[29] He design of the main marine industries including marine fishery, marine transportation, ocean petroleum and natural gas industry, coastal tourism, marine shipbuilding industry, salt and marine chemical industry, water desalination and comprehensive utilization of marine bio pharmaceutical industry and. In the State Oceanic Administration released 《marine economic statistical classification and code》 of marine economy is defined as the development and utilization and protection of the ocean in various industrial activities, the sum and the associated activities. Marine industry is the production and service activities of the development, utilization and protection of the sea.

Chen Kewen pointed out that the marine economy is a general term for various economic activities which take the marine space as the active site or the marine resources as the object. [30] The essence of the sea is that the human beings need to use the ocean space and resources to obtain the production activities of the material products through labor. Marine economy and associated essential attribute is the difference of marine economy in the demarcation point of land economy, is also defined in the basis of marine economy. According to the economic activities and ocean associated with the degree of marine economy can be divided into two kind of generalized marine economy, marine economy to develop the marine resources, sea water and marine spatial and the formation of the economic generalized and means for the development of marine utilization conditions of economic activity, including special marine economy on the interface industry, coastal zone land industry and Hohai system in the inland economy which includes the island and coastal economy. The island

economy has close contact with the ocean space, ocean resources and environment on the whole island economy also belongs to the category of marine economy. The coastal economy especially the coastal economy, such as the Bohai economic circle, the southeast coastal economic zone, the Yellow River and the Yangtze River Delta economic zone should be incorporated into the marine economy. The geographical location advantage of marine is a great driving force for the entire coastal economy. Linhai industry, coastal tourism, coastal city construction also must rely on the sea, also belongs to the category of marine economy.

Xiamen University, Professor Yang Guozhen on the definition of marine economy is “human in the coastal zone, oceanic islands and directly or indirectly development utilization of the ocean resources and space economic structure, economic benefit, economic form and mode of operation.”[31]

In 2004, U.S. Commission on ocean policy in 《American ocean policy points and marine value evaluation》 takes marine economy as following definition that marine economy is directly dependent and ocean properties of economic activities, or in the production process depend on the ocean as input, or the use of advantage of geographical location, economic activities in the ocean.[32]

From the above definition can be seen marine economy contains the content is very broad, including the places of the development and protection of marine resources, marine space utilization, the transformation of ocean properties and utilization of marine geographical advantage utilization, marine education and management of marine resources and the protection, covering almost all economic activities associated with the Ocean. Therefore, in this paper we use the following definition of marine economy is

the sum of the development, utilization and protection of marine industry, and with the associated activity further contains the economic activities of the marine industry and marine related industries. Although the theory of Shanghai ocean economy, including content has been used widely, but in the reality of the marine economic statistical computing is mainly the leading marine industry output value, and for many industries such as marine information services, marine scientific research, marine education, marine insurance and social security, industry output, because of differences in national economic accounts and marine economy account and data is difficult to be separated is negligible.

## **4.2 Definition of marine industry**

Marine industry refers to human development and utilization of marine resources and marine space formed by the production category.[33] One of the main signs of marine industry development is the development of marine economy. The current level of economic development is an important symbol of the world's oceans.

According to international practice, the marine industry is the sum of refers to the development and protection of marine resources and the formation of all production material and non material production sectors, namely, the human use of the ocean resources and space of all production and service activities, human or in the ocean and on the marine resources as the object of social production, exchange, distribution and consumption activities. Marine industry related to the human economic activities of the sea. Marine industry is a comprehensive and multi - level industrial system. Marine resources must be transformed into the real economy and the marine industry must be developed vigorously.

The U.S National marine economic projects will be marine industry division for ocean dependent, such as marine fisheries, aquatic products processing, marine transport, port service, marine contact type (ship repair and manufacturing, aquatic products processing machinery manufacturing, sea sports products, such as) and marine service type (such as sea oil and gas exploration, aquatic products trade, coastal tourism, education and scientific research, and other types).

A study by the U.S National Bureau of economic analysis, marine industry can be according with the ocean of supply and demand relationship is divided into categories, namely marine resources dependent, such as marine fishery, marine oil and gas development, marine space dependent, such as marine transportation, marine supply (such as warehousing and logistics, maritime supply, etc.) and spatial convenience, such as aquatic products trade, coastal tourism reception, business services and so on. [34]

In 1999, National Oceanic Administration of China released the 《Statistical classification and code of marine economy》 to define the marine industry, in a certain sense, it can be considered to define the marine economy from the industrial point of view. [35] Its definition is “the marine industry is a human economic activity related to the sea”. And pointed out that the “related to the sea” in five aspects: (1) Obtaining the production of products and services directly from the sea; (2) Directly obtaining from the ocean products of a processing, production and services; (3) Applying directly to marine and marine development activities of the products of the production and service; (4) Making use of seawater or marine space as the basic elements of the production process of production and services; (5) Services and management closely related to marine scientific research such as education, social services and management. And the

marine economy is divided into 15 categories, 54 categories and 107 categories of statistics.

The marine industry classification of China in summarizing the foreign classification method based on more detailed distinction, not only simple distinction between the various marine industries, and the foreign marine industry into two big kinds: Ding dings of marine industries and marine related industries. [36] Marine industry is the development, utilization and protection of the marine production and service activities, is divided into three levels. The first industry, including marine fishery and the second industry including offshore oil and gas industry, ocean mining, marine salt industry, ocean shipping industry, marine chemical industry, marine bio pharmaceutical industry, marine engineering construction industry, marine energy utilization, seawater utilization industry and the tertiary industry including marine transportation, coastal tourism, marine scientific research and educational management services. Marine related industries are in a variety of input and output as a tie, and marine industry constitute industry technical and economic relations, including marine, agriculture, forestry, marine equipment manufacturing industry, involving seafood and materials manufacturing, sea related construction and installation industry, marine wholesale and retail industry, involving the sea services.

Definition of marine economy in our country is development, utilization and protection of marine all industry activity and the associated activity sum of marine industry is the development, utilization and protection of marine production and service activities of marine industry is in a variety of input and output as a tie, and marine industry constitution industry technical and economic relations from the definition can

be seen the ocean economy is the sum of the marine industry and marine related industries, marine industry and marine related industries is the basic component of the marine economy, the basic unit.

#### **4.3 Leading industry selection theory**

The continuous upgrading of the marine industry structure is the inevitable trend of the development of the marine economy. To speed up the adjustment of marine economic structure and to cultivate new marine economic growth point is the key to develop the ocean, to utilize the ocean and to develop the marine economy. Expand the growth of marine industries should first marine leading industry, and marine leading industry development, the key is to choose the correct leading industry. Therefore, we will the definition of leading industry, theoretical basis and leading industry selection principle are introduced, after leading industry choice provide theoretical support.

So, what is the definition of the leading industry selection theory? Here are some representative points: [37]

- ① Starting from the position of the leading industries, as the leading industry is the dominant position in the industry in the industry system.
- ② From the leading industry of promoting industrial structure to improve the quality of the angle, in certain stage, it can constantly rapid develop and absorb new technology and advanced industrial structure to promote the success of the industrial sector effectively.
- ③ From the leading industry to promote the development of the national economy and the characteristics of the performance of the GDP in the national economy plays an important role in the national economy and a larger chain leading role of the industry is

the leading industry.

④ From the perspective of the role of the leading industry, leading industry is the pillar that take the lead role in the national economy, it can promote the development of whole national economy and industrial structure upgrading industry.

⑤ Leading industry is able to absorb more advanced technology, in the face of a large increase in demand, maintaining a high growth rate and the development of other industries have a strong leading role in the industrial sector.

Therefore, it should choose industry with the factors of accounting for a certain proportion, occupying a dominant position, rapid development, more absorption of advanced technology, high rate of technological progress and having chain impaction to other industries and development of regional economy as the leading industry.

Selection of leading industry is the government in terms of the overall planning of the regional industrial structure, industrial planning under certain economic space, regional economy industry development sequence is determined, thus achieving the rationalization of the regional industrial structure. Because of the difference of regional development level and the difference of local natural endowments, the selection criteria of leading industry are not the same. But, the leading industries in different regions has the generic characteristics and regional leading industry choice and establish must also be carried out according to a certain standard. [38]

A. Hirschman Criterion. The development economist Albert • O • Hirschman thinks that strong correlation of industry should be to select and determine the basic norms of a leading industry, is to choose to drive and impetus for many industries and has a strong correlation to the industry as the leading industry.

B. Rostow Criterion. Rostow extends the industry association effect to three aspects:

①After-backward linkage effect, that is, the new department in a period of rapid growth and it will have a new investment demand for raw materials and machinery, so as to drive the rapid development of a number of industrial sectors; ②Bystander effect, the leading department will cause a series of changes in the surrounding; ③Prior-backward linkage effect, that is the leading sector by increasing the effective supply and promote economic development, for example, reducing other industrial sectors of the intermediate input costs, provide new products, new services to other departments. The benchmark is based on visible Rostow correlation degree between the industries to determine the leading industry sectors.

C. Shinohara Criterion. In 1957, Japanese Industrial economist Shinohara proposed benchmark of Japanese industrial structure plan named "income elastic datum" and "productivity rising benchmark." Income elasticity, also known as income elasticity of demand, refers to the rate of demand of industry and the national economy growth rate, which is used to measure the demand response to changes in national income, which reflects the demand for the product will increase with the growth of national income, and the sensitivity of this is because of the high income elasticity of industrial sectors, with broad market prospects, and broad market is the prerequisite for the further development of the industry. Productivity increase benchmark refers to when there is caused due to the productivity rate of rise of different income differences between regional industry, resources, capital and labor will be from low-income sectors transfer to the high income industry sector, the industry in the development can drive the related industries development, become a pillar of regional social economic growth and

active force. Rising productivity reflects the rate of technological progress benchmark, that is to say, to choose the technology progress rate high industry as the leading industry department.

D. Area Relative Comparative Advantage Criterion. This criterion thinks that the choice of leading industries must give full play to the comparative advantages of the region, the comparative advantage is the value of the region to increase the value and the result is comparison of labor productivity.

E. Environmental & Labor Content Criterion. In 1971, Japanese industrial structure Council proposed, in addition to Shinohara benchmark, add “environmental standards” and “labor content” benchmarks. Environmental benchmark is defined as the choice of less pollution, will not cause excessive concentration of the problem of industrial priority development of the labor content benchmark refers to those who can provide security, comfort and stability of the labor position of industrial priority development.

Based on the requirements above and the special nature of the marine industry, we can draw the following principles and objectives of the choice of marine leading industries.

(1)Market demand oriented principle. Marine leading industry not only plays a leading role in the development of marine economy, but also promotes the comprehensive development of the regional economy. The powerful product market expansion ability, rapid social product demand growth are the first condition of marine industry leading industry choice. Meanwhile, it should also consider the market demand of the dynamic development.

(2) Resource comparative advantage principle. Adequate resources or resource

recovery and regeneration ability, less environmental pollution, will not cause excessive consumption of resources, but also a basis for the choice of leading industries. Only it can be with a relatively concentrated marine resources and a good social and economic basis, in order to play a leading role in the economic development of the coastal areas.

(3)Economic growth rate principle. In many industries, productivity growth is the fastest industry and it is also the technology progress rate of high industry, the choice of marine leading industry in the industrial output value accounted for a certain advantage, high input-output ratio, and has growth potential and development ability.

(4)Industrial relevance principle. Marine leading industry in industrial structure should have a larger prior to contact, after to contact and lateral contact, it should also play an important role in the local economy, can form a certain gradient and land industry, promote the overall development of the local economy.

(5)Expanding employment principle. Select some of the large employment capacity of the industry as the leading industry. Here said the "large employment capacity" has two meanings: one is the leading industry's own employment capacity. In the industry, due to the continuous large-scale investment and the increase in the number of employment, so as to ensure the employment scale expansion of the second, although some leading industry itself employment capacity is very small, but it has a strong industry association effect, can induce and drive the development of a large number of related industries, open up new areas of employment and thus indirectly to expand employment effect.

(6)Sustainable development principle. No matter which one or several criteria to determine the marine leading industries, should consider the marine resources and

environmental issues, which is the main or the first standard. Only to achieve a harmonious and unified resources and environment, and natural harmony in order to achieve sustainable development, only to achieve sustainable development in order to have the best future.

(7)Resource advantage principle. While facing the question “which industry will be selected as the leading industry?” we must first consider the conditions of the region’s resources, regional resource advantage is often formed the basis of leading industry. The principle of the gifted advantage is to determine the choice of the industry is conducive to the resources of the region, to avoid the disadvantages of resources.

## **Summary of Chapter1**

In this chapter, I summarized the foreign and domestic background of marine economy develop and make a list of literature review. After reading all these valuable materials, I determine to choose “Leading industry selection theory” as the core theory to research the marine economy of Ningbo City. The target is by combining with the recent years’ economic data of each marine industry to find out appropriate objectives as local leading industries, then putting forward some reasonable measures to accelerate its development.

The conclusion is leading industry as an object with the advantages of accounting for a certain proportion in output value, occupying a control status, developing rapidly, high technical absorption/progress rate and playing the leading-chain role in the economy development of other industries and entire region is a reasonable and necessary choice.

# **Chapter2 Current situation, problems and perspectives of Ningbo City's marine economy**

## **1 The condition and overview of Ningbo City's marine economy development**

Ningbo City has rich marine resources, outstanding location advantages and substantial working foundation. It has possessed the real conditions of being a demonstration area of marine economy development in Zhejiang Province, China. The following, I will talk about its natural port advantages, rich marine resources, prominent strategic location, distinct characteristic industry advantages and powerful marine scientific research & education ability.



Picture 1- The location of Ningbo City

The location of Ningbo City is as Picture 1 showing above. The total port coastline of

Ningbo City is 1562 kilometers, accounting for more than 30% of the province. The available coastline are 872 kilometers, the deep water coastline are 170 kilometers. Nowadays, the port of Ningbo City has more than 300 productive berths which contain more than 60 deep water berths with the level of over ten thousand tons. And it has been open to navigation with more than 600 ports from 100 countries and regions around the world. [39]

The port coastline is not only the strategic resources of economy and social development in Ningbo City, but also the most distinctive advantage and supporter for Zhejiang province to develop marine economy and establish the image of “Ocean Zhejiang”.

Ningbo City has the rich resources of island, tidal flat, fishery, landscape and oil which have obvious combination advantages, and it is suitable for large-scale development.

(1) Large amount of island. Ningbo City has 516 islets with the acreage of more than 500 square meters, approximately accounting for 1/5 of the Zhejiang province. Its acreage of island is 524 square kilometers and the length of island coastline is 758 kilometers. [40]

(2) Sufficient tidal flat resources. Ningbo City has 1.4 million acres enclosed tidal flat which accounts for 34% of total tidal flat acreage in Zhejiang province. It mainly distributes in Hangzhou Bay, Damu Bay and north of Sanmeng Bay and has good condition of reclamation. [41]

(3) Rich fishery resources. Ningbo City is located next to Zhoushan Fishery and Xiangshan Fishery. These two fisheries have the reputation of “A-class Fisheries of

China” which provides an engine for Ningbo City to choose a sustainable and stable way of development.

(4) Superior marine tourism resources. The coastal area of Ningbo City has three characteristics (tidal flat, rock and island) which mainly distributes in Xiangshan port and coast. Every year, it attracts a large number of tourists to visit and becomes an obvious growth point of Ningbo City’s economy.

(5) Abundant oil and natural gas reserves. Chunxiao Oil and Gas Field of Ningbo City has ascertained more than 70 billion cubic meters natural gas reserves which has a huge development and utilization potential. [42]

Ningbo City is located in the core area of Yangtze River development axis and coastal development axis “T” - shaped junction and its sea area is located in the Yangtze River golden waterway next to the main channel of the Asia Pacific International Hub. It has become the connection hub between the Yangtze River Delta region and the Economic Zone on the west side of the Straits.

The implementation of Ningbo-Zhoushan integration makes the advantages of coastal port logistics and strategic materials storage-transportation bring into fuller play. With the Hangzhou Bay Bridge, Yongtaiwen Railway built and Hangzhou-Ningbo canal navigation facilities constantly improved, Ningbo City has developed from a vehicle terminal city to a hub which connects Shanghai, Jiangsu and key city of the West Bank of the Strait. And Ningbo City gradually becomes the bridgehead of Zhejiang Wentai and Western Zhejiang area connecting with Shanghai City.

Since 2010, the total marine production value of Ningbo City arrives at 80.6 billion Yuan; the marine industry system of Ningbo City is gradually getting perfect.

In the aspect of port industry, Ningbo City initially forms a coastal industrial belt stretching over 20 kilometers based on the pillar of petrochemical, energy, steel automobile and shipbuilding etc. Since 2010, its total production value breaks through 700 billion Yuan, Ningbo City has established East China's energy and raw material base and advanced manufacturing base. [43]

In the aspect of port logistics, 14 commodity trade platforms have been constructing and it has achieved 200 billion of total transaction value in 2010. Nowadays, the modern logistics industry added value of Ningbo City reaches 50.7 billion Yuan and it has more than 4000 all kinds of logistic-relevant enterprises. [44]

In the aspect of marine emerging industries, Ningbo City has cultivated a group of high-end equipment manufacturing enterprises such as Zhejiang shipyard and Xinle shipyard etc. In 2010, its total production value firstly exceeded 20 billion Yuan.

Ningbo City has a group of advanced scientific research institutions like Marine College of Ningbo University, Ningbo Institute of marine and fishery, Ningbo College of life science & biotechnology etc. And it also has 9 Key Laboratory of marine and fishery, its marine scientific and technological personnel are more than 2000 which obtain some key technological achievements in the field of marine navigation, marine aquaculture and halo bios etc.[45]

Recent years, Ningbo City's economy which takes the marine economy as the main body has a sustained and stable development. The article selects typical 2010-2012 data as a reference frame and evaluates the current situation of Ningbo City's economy.

Table 1- The total production value of Ningbo City in 2010-2014

<b>Years</b>	<b>Indicators</b>	<b>Total production value (Billion Yuan)</b>	<b>Growth rate (%)</b>	<b>Proportion of three main industries</b>
<b>2010</b>		512.582	/	4.2:55.6:40.2
<b>2011</b>		601.048	10.2	4.2:55.5:40.3
<b>2012</b>		652.470	7.83	4.1:53.9:42.0
<b>2013</b>		703.228	7.78	4.0:53.1:42.9
<b>2014</b>		740.366	5.28	3.9:51.7:44.4

As the Table 1 [46] shows that during 2010-2014, Ningbo City gets a great achievement and its total production value has a sustained and stable increase. In 2011, the growth rate reaches 10.02% and its total production value firstly breaks through 600 billion Yuan; after 2012, although the growth rate gets decline, the total production value easily exceeds 650 billion Yuan. Meanwhile, the structure of traditional three industries (agriculture, industry and service) is optimized, the proportion of agriculture and industry gradually reduce and service constantly increases. In fact, Ningbo starts to pay more attention to adjust the structure of industry in order to optimize the quality of development. However, among these three industries, the industry still occupies beyond half of the proportion which still don't achieve the standard of developed region. And, to compare with the high economy growth rate, the speed of industry structure optimization seems more slowly which still don't match with the current trend of economy development.

Table 2- The export-import trade volume of Ningbo City in 2010-2014

<b>Indicators Years</b>	<b>Total export-import volume (Billion dollars)</b>	<b>Growth rate (%)</b>	<b>Import volume (Billion dollars)</b>	<b>Growth rate (%)</b>	<b>Export volume (Billion dollars)</b>	<b>Growth rate (%)</b>
<b>2010</b>	82.90	/	30.93	/	51.97	/
<b>2011</b>	98.19	18.4	37.36	20.6	60.83	17.1
<b>2012</b>	97.58	-1.4	35.13	5.9	61.44	1.0
<b>2013</b>	103.44	6.0	39.34	12.0	64.10	4.3
<b>2014</b>	105.86	2.3	40.58	3.2	65.28	1.8

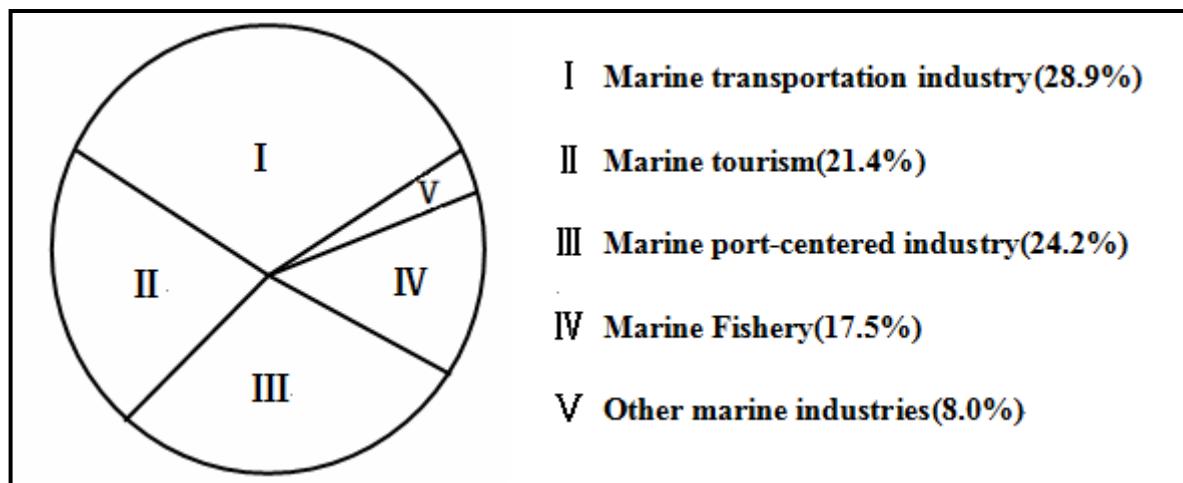
The Table 2 [47] illustrates that 2011 is the “Gold Year” of Ningbo City’s export-import trade and it has a qualitative leap to compare with 2010 and previous years. In 2011, the total export-import volume of Ningbo City reaches 98.19 billion dollars; its high growth rate even arrives at 18.4%. Among this data, its total import value is 37.63 billion dollars, the growth rate is 20.6%; its total export value is 60.83 billion dollars, the growth rate is 17.1%. Comparing with 2011, the total export-import value in 2012 decreases a little, but it can be forecasted that the total trade volume will be basically stable at a level above 95 billion dollars in the next few years. Meanwhile, the proportion of total imports and exports accounted for roughly 1:2 of the relationship which shows that Ningbo City is more inclined to export trade development.

Table 3- The foreign capital utilization and cooperation in 2010-2014

Indicators Years	Foreign capital utilization (Billion dollars)	Growth rate (%)	Foreign contracted project & labor service cooperation (Billion dollars)	Growth rate (%)	Services outsourcing cost (Billion dollars)	Growth rate (%)	Offshore service outsourcing cost (Billion dollars)	Growth rate (%)
2010	4.05	/	0.97	/	0.65	/	0.27	/
2011	5.02	24.0	1.08	12.2	0.86	30.9	0.38	40.1
2012	5.31	5.8	1.24	12.2	1.15	40.6	0.53	39.8
2013	5.87	10.5	1.40	11.4	1.36	18.3	0.78	47.1
2014	6.45	9.9	1.48	5.4	1.50	10.3	0.96	23.1

As the key coastal economy developing city of Zhejiang Province, Ningbo City attaches great importance to the foreign capital utilization and cooperation. During 2010-2014, Ningbo City continues to increase the introduction of foreign investment and carry out foreign cooperation projects which get a great achievement. In terms of the Table 3[48], in these five years, the data of foreign capital utilization, foreign constructed project & labor service cooperation, service outsourcing cost and offshore service outsourcing cost are all show the sustained, steady and rapid growth. In the future, it must be one of the advantages of Ningbo City's marine economy development.

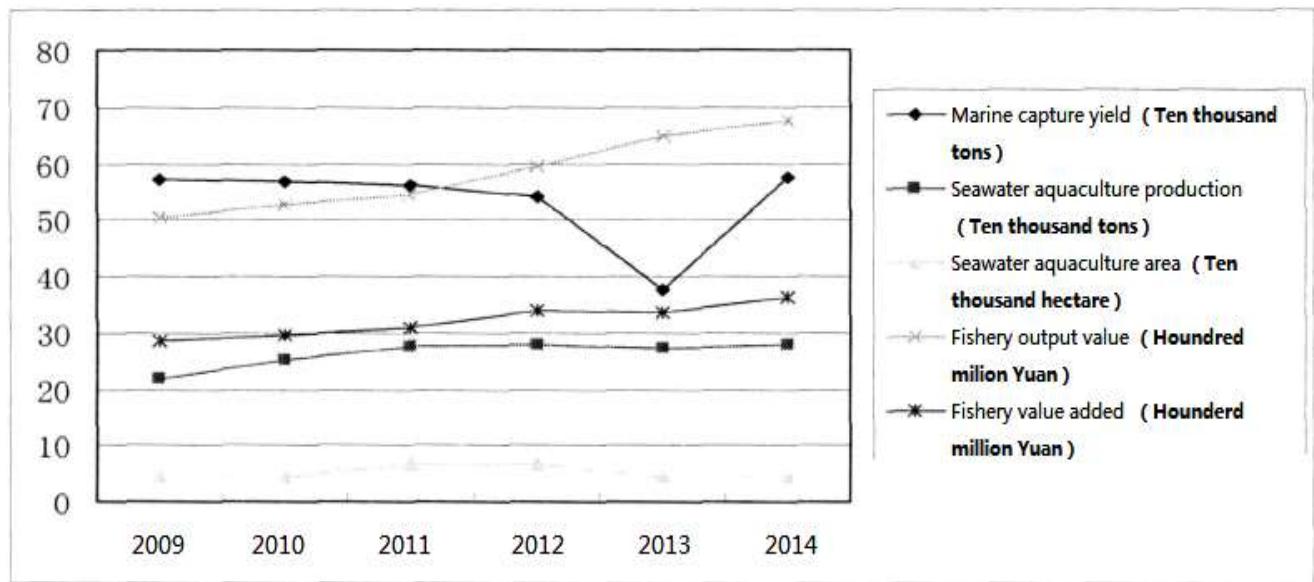
## 2 Current Situation of Ningbo City's marine economy industries



Picture 2- The structure of Ningbo City's Marine industry in 2014

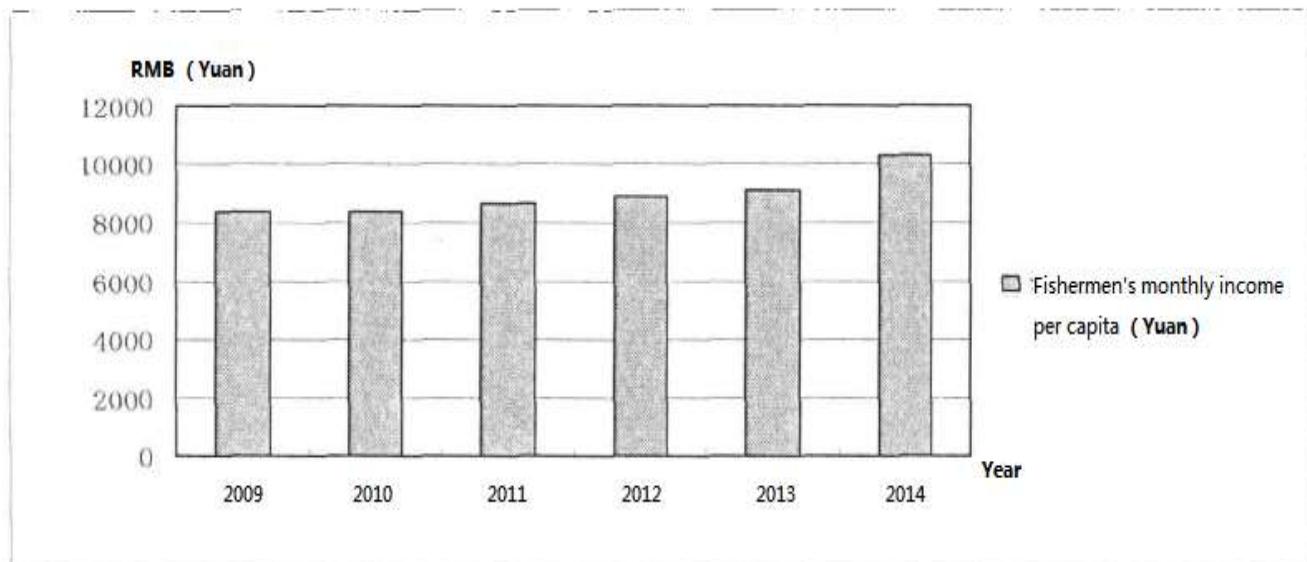
The port-centered industry, marine transportation, tourism and fishery are the “Top four pillar industry” of Ningbo City’s marine economy as the pie chart shows above. Basing on the analysis of Ningbo City’s marine economic statistics data, the article selects these four industries which are the most typical marine industry in Ningbo City as the study object.

## 2.1 Fishery



Picture 3- Fishery development of Ningbo City in 2009-2014

The Picture 3 [49] shows that during 2009 to 2014, the fishery of Ningbo City has a great development, the marine capture yield basically remains stable except the year of 2013 because of the typhoon impact. The seawater aquaculture production is also no changes during 6 years, but to its opposite, the seawater aquaculture area has a substantial increase during 2012 to 2013 which is beneficial to the transferring of marine cage from shallow area to wide deep water bay area. In 2014, due to the increase of shipping cost, it results in the decrease of fisherman expenditure and the production gets a drastic decline. Comprehensively, the development of Mari culture changes the fishery reality of only relying on marine fishing, it is beneficial to the fishery resources restoration and the fishery output stability. Meanwhile, it also improves the proportion of marine fishery structure so that it can be optimized constantly in the future.

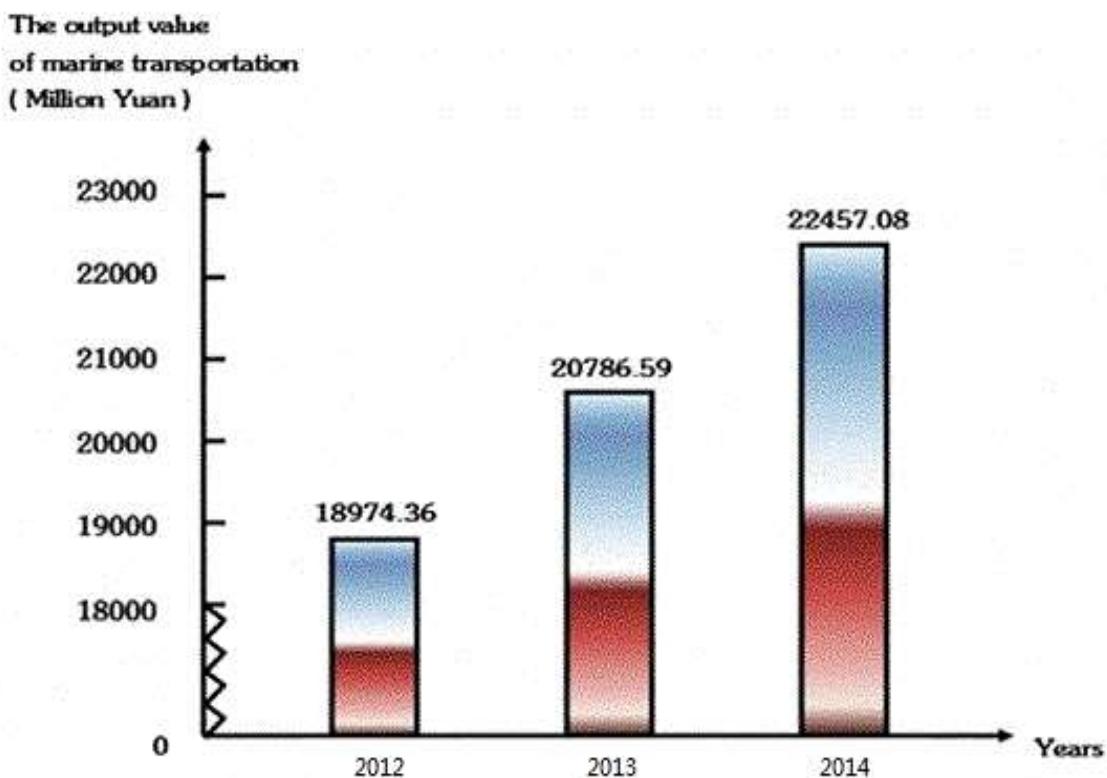


Picture 4- Fishermen's monthly income of Ningbo City in 2009-2014

During 2009 to 2014, the fishermen's monthly income per capita increases 1961 Yuan. However, its rising percentage is only 4.6% which is significantly lower than 91% of marine economy development rate and 23% of Ningbo City's GDP increase rate. And if things going on like above, the enthusiasm of the fishermen's production will be hurt in the future.

## 2.2 Marine transportation industry

Due to the good location advantages of Ningbo City, the government has stepped up the investment in the marine economy construction of Ningbo city. In 2009, the investment of Ningbo port construction has arrived 2530 million Yuan, the whole city has completed the 87 kilometers highway for “island-fishing village” construction, the Beilun port has finished 5 kilometers of coastal highway construction and the construction of the 18.8 kilometers highway around Xiangshan port has completed. [50]



Picture 5- Ningbo City's output value of marine transportation in 2012-2014

From the Picture 5[51], it is obviously that during 2012-2014, the output value of marine transportation has risen from 18974.36 million Yuan to 22457.08 million Yuan; the growth rate for two years has achieved 18.35%.

Table 4- The cargo throughput of port in 2012-2014

Years	Volume (Million tons)	Growth rate (%)
2014	453	4.5%
2013	430	5.2%
2012	410	/

The Table 4[52] illustrates that the port cargo throughput of Ningbo City has

increased nearly 43 million tons; the average annual growth rate has reached 5.24%.

Table 5- The port container throughput and route quantity in 2012-2014

Years	Volume (Million cartons)	Growth rate (%)	Total containers' route	Ocean-going lines	Near-sea shipping lines	Inside-island feeders	Inside-trade feeders
2014	15.671	8.0%	236	120	64	20	32
2013	14.512	11.6%	231	119	60	20	32
2012	13.004	/	228	119	57	20	32

In terms of the Table 5[53], it shows the tremendous growth of port container throughput in Ningbo City. Since 2012, the volume breaks the mark of 13 million cartons, it maintains the growth of about 1million cartons per year and the average annual growth rate has arrived at 9.8%. Until 2014, the volume has reached 15.671 million cartons which ranked fourth in Chinese domestic major ports, ranked 13<sup>th</sup> in the world. Besides, in 2014, its total containers' routes have got 236 of which ocean-going lines 120 and near-sea shipping lines 64 and it composed the covering-world marine transportation network.

### 2.3 Tourism

Recent years, Ningbo City constantly increases the investment and development of tourism resources and its investment areas is continually expanding. Meanwhile, the local government pays more attention to strengthen the construction of series products including vacation tourism, sightseeing, marine tourism, cultural tourism, sports tourism,

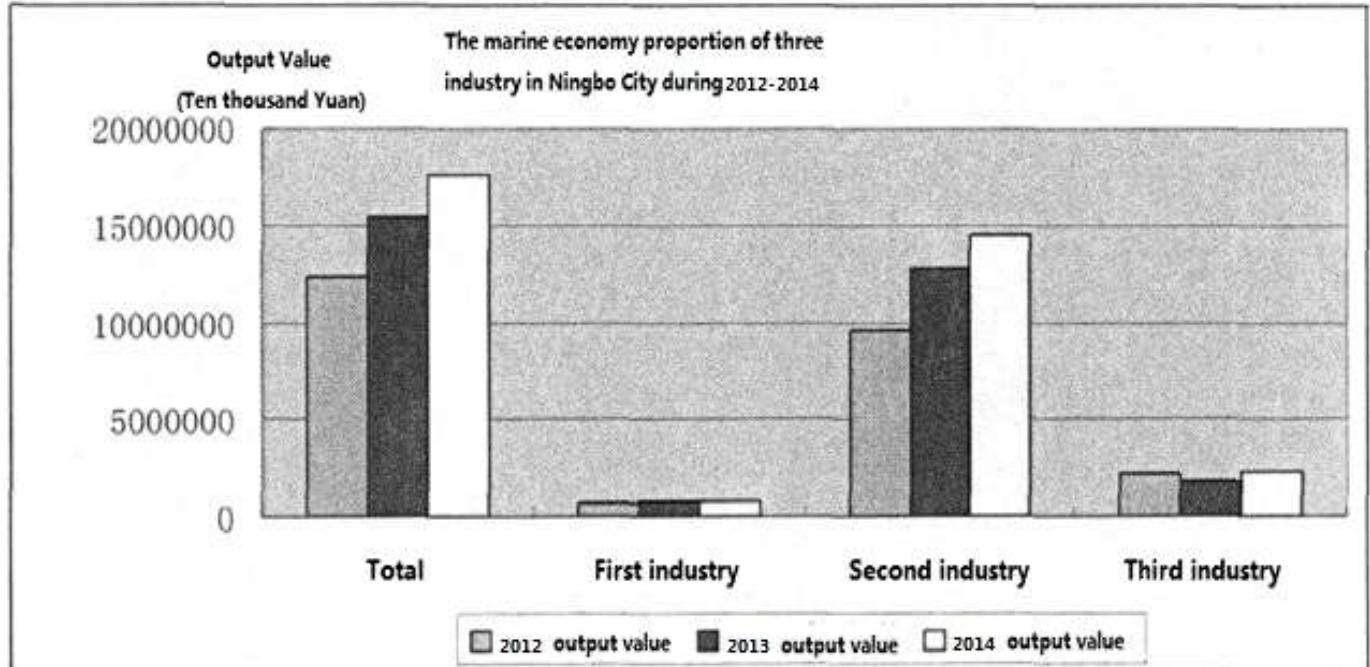
business tourism etc so that increasing the competitiveness of relevant enterprises.

Table 6- Marine tourism income growth of Ningbo City in 2012-2014

Indicators Years	Total income of marine tourism (Billion Yuan)	Growth rate (%)	Total income of Marine wholesale, retail and catering (Billion Yuan)	Growth rate (%)
2014	65.08	/	129.73	/
2013	75.13	15.4	146.68	13.1
2012	86.28	14.8	169.70	15.7

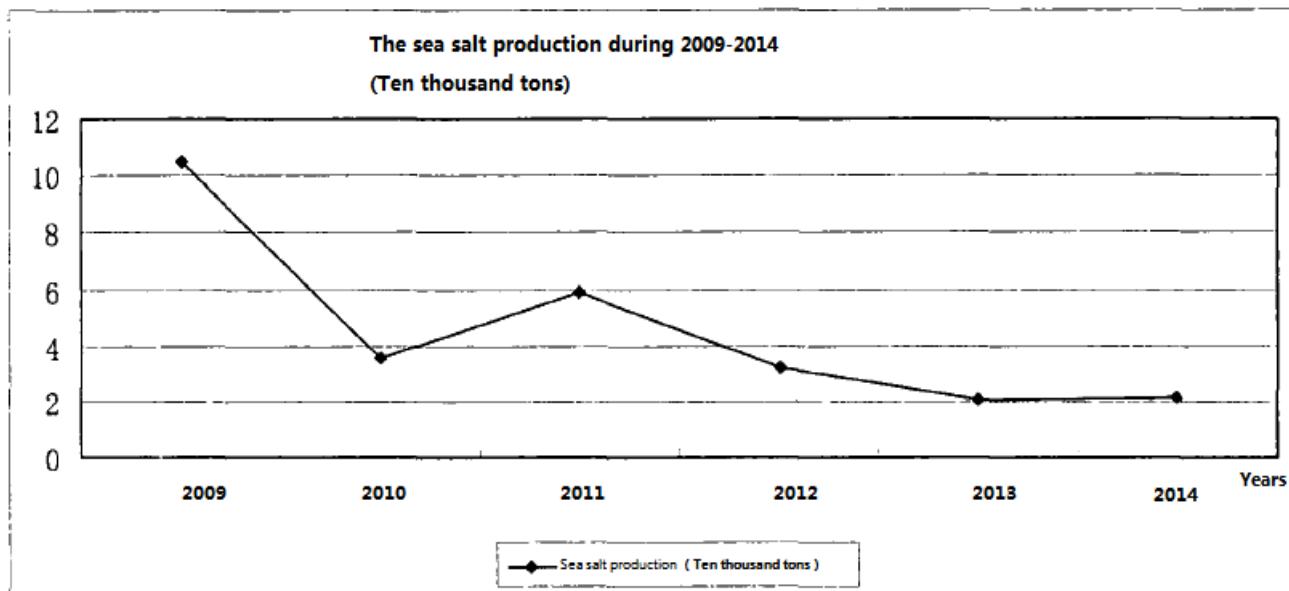
Here taking the statistical data during the year of 2012-2014 as an example.[54] From the table above, the total income of marine tourism rises from 65.08 billion Yuan (2012) to 86.28 billion Yuan (2014), average annual growth rate is over 15%. And the average annual growth rate of marine wholesale, retail and catering is also more than 17%, both of them is higher than 14% of GDP growth rate. However, the marine third industry represented by marine tourism and marine wholesale, retail and catering accounts for the low proportion in the whole marine economy: 2013 is 12.46%, 2014 is also only13.14%.

## 2.4 Port-centered industry



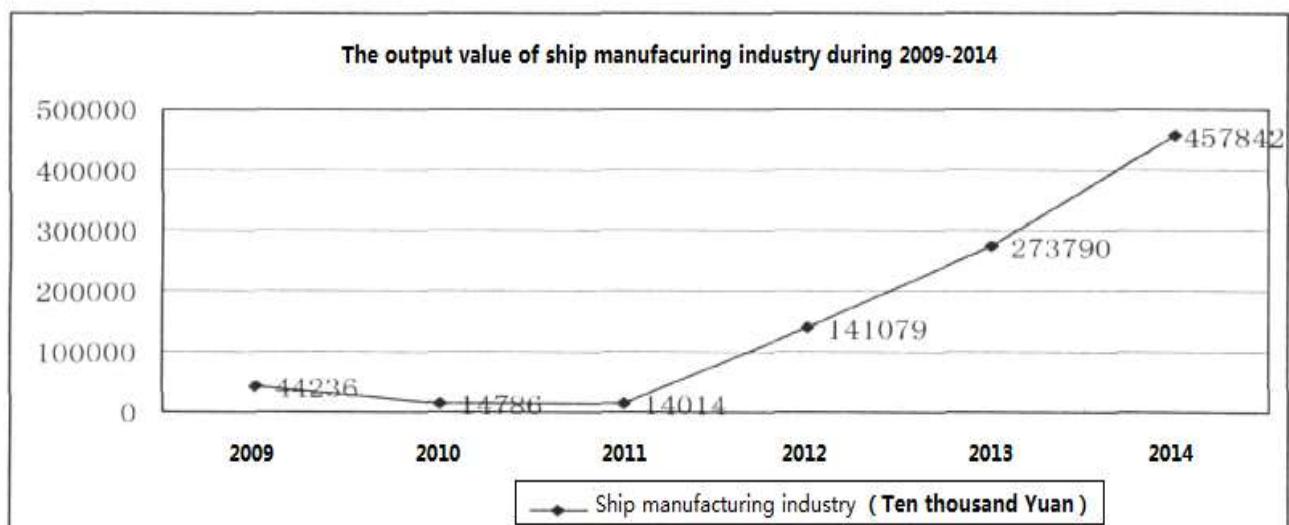
Picture 6- Ningbo City's marine economy proportion of three industries in 2012-2014

According to the Picture 6[55], the output values of second industry of Ningbo City's marine economy during 2012-2014 are 95520.95 million Yuan, 127513.17 million Yuan and 144779.79 million Yuan respectively; and they are also in proportion of marine economy output value which is 77.15%, 82.15% and 82.29% respectively. This information shows that the second industry plays the most significant part in Ningbo City's marine economy. To compare with other port cities during the same period, the data is also far higher than it.



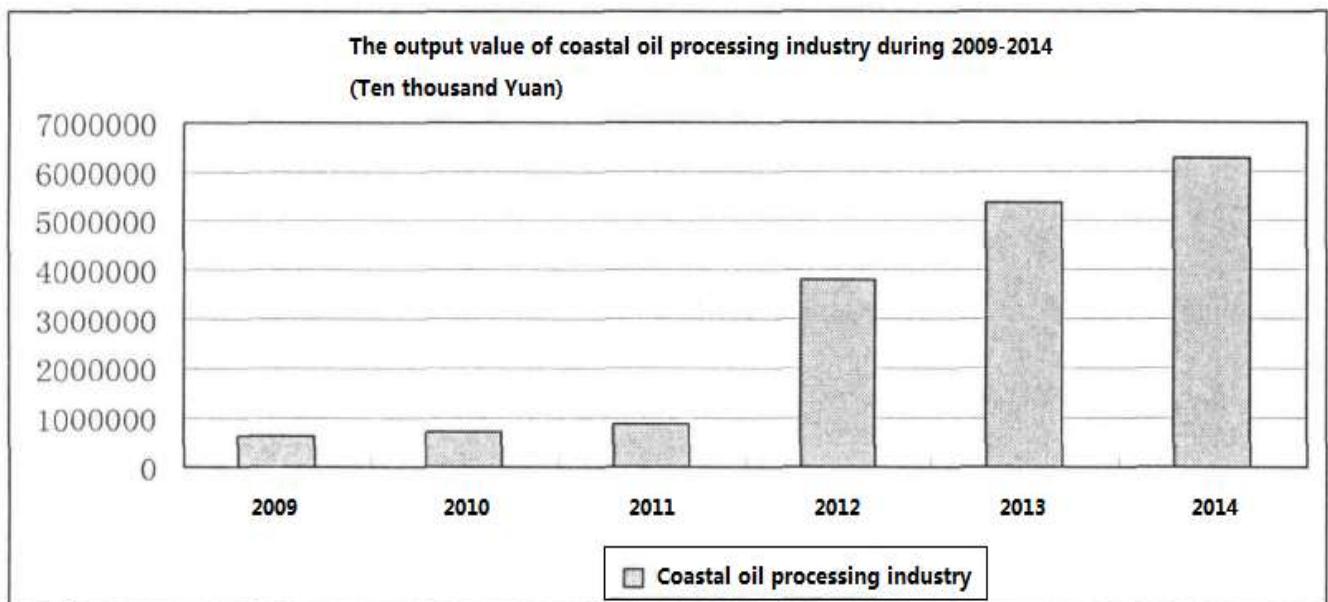
Picture 7- The sea salt production during 2009-2014

The Picture 7[56] illustrates that sea salt production is in the state of a sharp decline. On the one hand, its output decreases from 105 thousand (2009) to 21.1 thousand (2014). On the other hand, its output value maintains a stable state, the data changes from 38.39 million Yuan (2009) to 37.85 million Yuan (2014). Based on the information above, Ningbo City has made a great development of deep processing of sea salt, the added value of the products has increased and efficiency has improved.



Picture 8- The output value of ship manufacturing industry in 2009-2014

The Picture 8[57] shows that the output value of ship manufacturing industry in Ningbo City rises from 442.36 million Yuan (2009) to 4578.42 million Yuan (2014), the average annual growth rate achieves 190% which is a great contribution to marine economy development of the whole city.



Picture 9- The output value of coastal oil processing industry in 2009-2014

Similar to ship manufacturing industry, recent years, coastal oil processing industry has a rapid development in Ningbo City. On the one hand, the imports of crude oil in Ningbo port for consecutively 6 years ranks first in the country which accounts for 1/3 of domestic total amount. On the other hand, the location of Ningbo port sets next to East China Sea where there is rich oil and natural gas resources and it is continent to develop and process. In 2009, the output of this industry is only 6419.71 million Yuan. However, in 2012, it increases rapidly; the data adds up to 38000 million Yuan. Even more, in 2014, its output value arrives 62707.34 million Yuan. The average growth rate is beyond 175%.

### **3 The problems and perspectives of Ningbo City's marine economy**

The analysis is based on the analysis of the industrial production scale, industrial structure and industrial efficiency. The output value of scale is an important index to measure the degree of regional industry development. It is the result of interaction of various environmental factors in regional production, can reflect the concrete form of the industry development level of industrial structure is the proportional relationship between the various industrial sectors, condition of the ratio relationship how, not only can make us understand some of the regional industrial structure present situation, but also we formulate a proper industrial policy the fundamental basis for the benefit of industry reflects the ability of regional industrial organization management, industrial management, industry management benefit better can promote the industry to expand production.

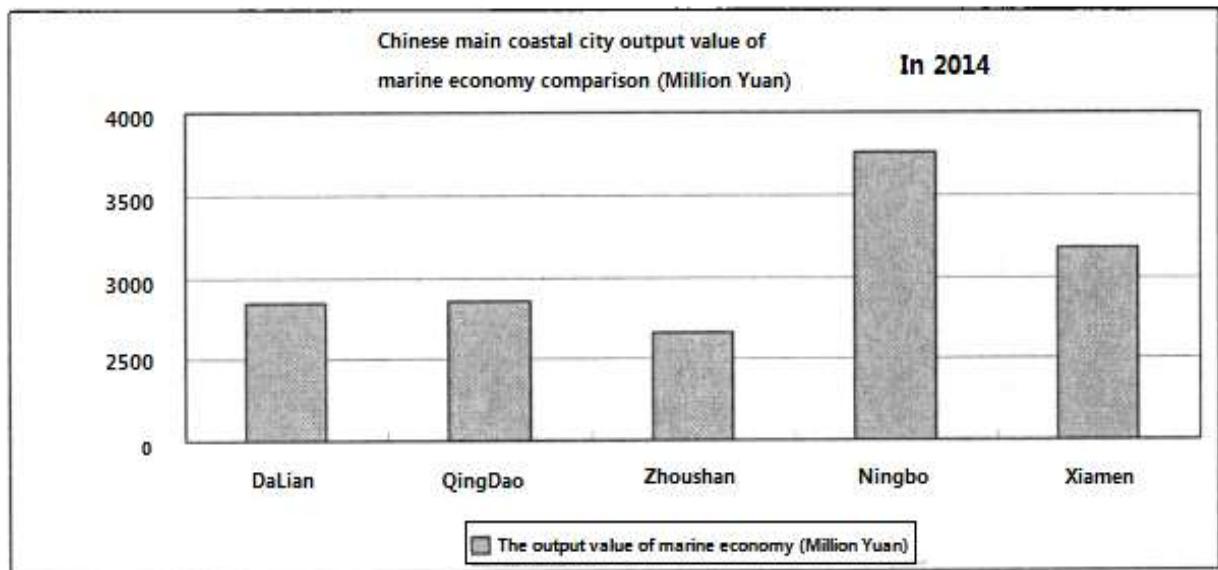
This section mainly through the current situation of the marine economy development in Ningbo City, marine industrial structure static analysis, variable analysis and benefit analysis, then adapting comparative method to analyze Ningbo City's industrial structure and other coastal cities of marine industrial structure so that to find out the problems existing in the development of marine industry in Ningbo City in order to realize the optimization of the marine industrial structure.

#### **3.1 Comparison of output value scale from Ningbo City to others**

In 2010-2015, Chinese marine economy has a sustained and healthy development and maintains a steady growth and the total marine economy has achieved a new breakthrough. It shows that the marine economy in the national economic and social

development occupies an increasingly important position. In 2014, Chinese domestic GDP is 4295.8 billion Yuan with the growth rate of 5.89%, accounting for the proportion of domestic GDP reached 10.5%. The main marine industry output value is 2276.8 billion Yuan with the increase value of 73.5 billion Yuan and growth rate of 8.7% which is over the previous year. It is equal to 4% of GDP over the same period, unchanged from the previous year. The proportion of marine three industry structure is 11:42:47.[58]

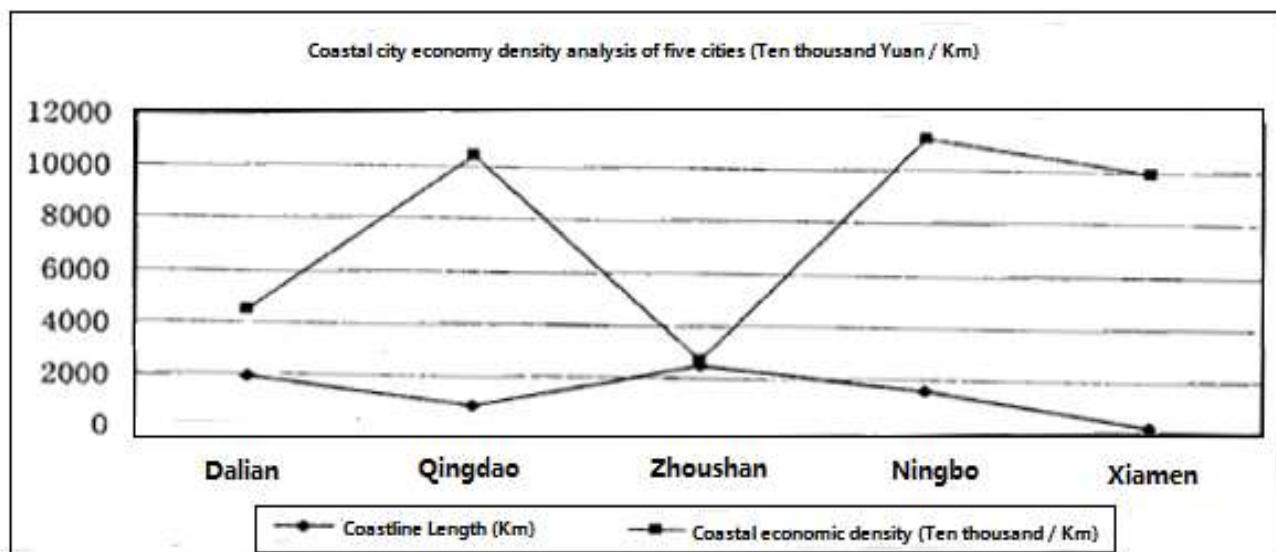
The top seven of output value of industries are coastal tourism, marine fisheries and related industries, marine transportation, ocean shipping industry, marine electric power industry, offshore oil and gas industry, marine engineering construction industry, marine chemical industry. National employment related to the sea for more than two people, an increase of 1.8 million jobs over the previous year.



Picture 10- Comparison of five cities' output value score in 2014

From the Picture 10 [59] we can see that in 2014, Ningbo city's output value of marine economy in Dalian, Qingdao, ZhouShan, Xiamen five coastal port cities ahead, is more than 1.5 times to the value of Dalian, Qingdao and ZhouShan respectively. As a

result, the output value of Ningbo marine industry is relatively low compared with other cities, and the development of the marine industry is relatively backward.



### 3.2 Comparative analysis of industrial structure

Picture 11- Coastal city economy density analysis of five cities

Density of coastal economy reflects the length of cities and units along the shoreline of marine industry output contribution and the relationship between the development of marine industry and ocean space may be obtained by comparing the. From the figure, we find that although the length of the coastline in Ningbo city in five cities in third, but the coastal economic density is first, which shows that the sea use efficiency is the highest in Ningbo city. Zhoushan, Dalian, the lowest density of the coast, is the most efficient use of the. Qingdao and Xiamen are in the 100 million Yuan / km above, at a moderate level.

Table 7- Relation between marine economy and GDP in 2014

Indicators	Ningbo	Zhoushan	Qingdao	Dalian	Xiamen
GDP (Billion Yuan)	386.45	100.08	339.57	326.98	187.44
Added value of Marine economy (Billion Yuan)	51.48	38.68	42.07	61.80	37.58
Proportion	13.32%	38.64%	12.39%	18.90%	20.05%

According to the Table 7[60], the coastal city rank of GDP is Ningbo, Qingdao, Dalian, Xiamen and Zhoushan respectively. And the highest added value of marine industry is Dalian, followed by Qingdao, Ningbo, Xiamen, and Zhoushan. So it can be seen that the contribution rate of marine economy to GDP of Qingdao is the lowest, Zhoushan is an island city, so the proportion is the highest. Ningbo City accounts for 13.32% of the proportion, so it can be concluded that the development of the marine industry in Ningbo City has the crucial impact for its overall economy development.

Table 8- Ningbo City's marine economy output value in 2014

Indicators	Marine oil and gas	Ocean power	Maritime Architecture	Marine transportation	Marine machinery repair	Marine fishery	Ship building	Marine chemical industry	Marine financial insurance
Output value (Million Yuan)	627.13	292.55	182.04	125.66	104.81	67.46	45.78	52.25	47.51
Proportion	36.0%	15.9%	10.1%	7.1%	6.0%	4.6%	2.6%	3.0%	2.7%

Table 9- Output value of China marine industry in 2014

Indicators	Coastal tourism	Marine fishery	Transportation	Marine power	Marine shipping	Marine oil and gas	Project construction	Marine chemical	Seawater utilization
Output value (Billion Yuan)	47.06	45.33	25.85	11.50	11.45	11.21	4.77	4.06	2.78
Proportion	25.6%	24.6%	14.1%	6.2%	6.2%	6.1%	2.6%	2.2%	1.5%

Table 10- Changes of China three marine industries

Year	2010	2012	2013	2014	2015
Proportion	4.2: 55.6:40.2	4.2: 55.5:40.3	4.1: 53.9:42.0	4.0: 53.1:42.9	3.9:51.7:44.4

Table 11- Proportion changes of Ningbo City's three marine industries

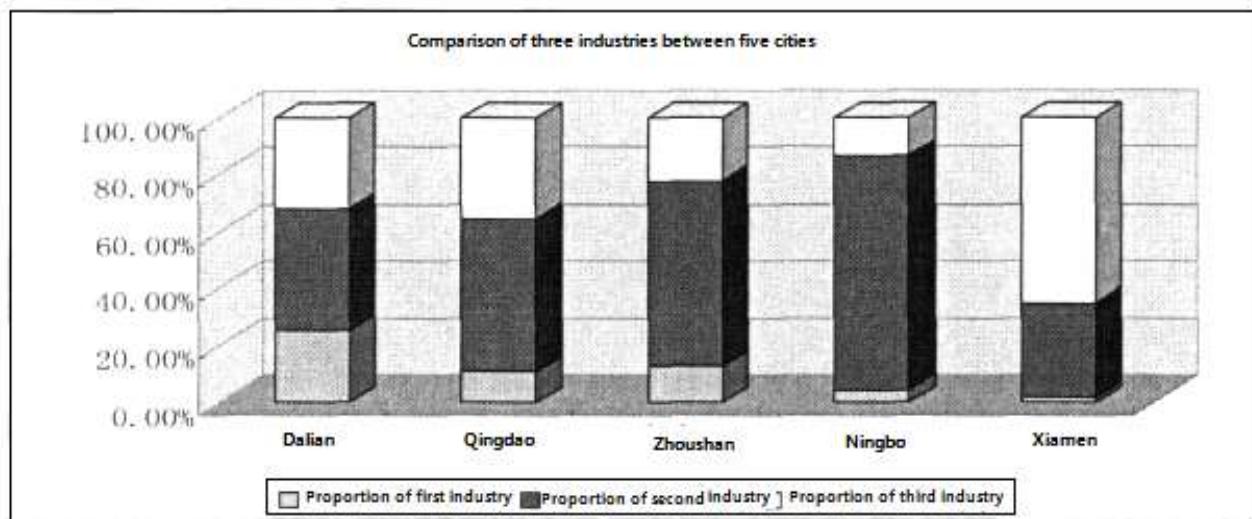
Year	2010	2012	2013	2014	2015
Proportion	8.2: 53.6:38.2	8.0: 52.5:39.5	7.9: 53.2:39.8	7.8: 51.7:40.5	7.7: 51.4:40.9

From the above table information[61], on the one hand, we can see that during 2010-2014, China first marine industry proportion falls from 8.2% to 7.7%, 52% of fluctuations around the second industry, tertiary industry from 38.2% rise to 40.9%, industrial structure showing continuous optimization of the trend.

On the other hand, the first industry in Ningbo City falls from 4.2% to 3.9%, the second industry fell from 55.6% to 51.7% and the third industry rises from 40.2% to

44.4%. Comparing with the general level of our country, the proportion of Ningbo second and third industry is roughly the same, which is better than that of the former. Marine chemical industry, shipbuilding and other second industry is capital and technology intensive, is not conducive to the absorption of employment, the low proportion of the third industry will not be conducive to the expansion of employment, the development of service industry.

From the table above, we can also find the marine oil and gas, marine power, marine construction industry, marine machinery repair and ship manufacturing industry accounts for the marine industry in Ningbo City, the vast majority with the ratio of nearly 63%. And marine and coastal tourism ratio is very low, it only accounts for and 7% in the whole of Chinese marine industry, coastal tourism and marine transportation industry accounts for the proportion of 37%.



Picture 12- Comparison of three industries between five cities

In the entire marine economy, the marine first industry practitioners and the proportion of national income showed a declining trend of the second marine industry to realize the national income should be rising, the proportion of its practitioners will

largely unchanged or increased slightly for marine third industry. The most prominent changes will be the proportion of its practitioners will continue to rise, is the important channel to solve the employment problem.

Through the Picture above, we can also find that the proportion of the second industry in Ningbo City is the highest, reached 82.32%, but the third industry is the lowest, only 13.12%. This is mainly due to the Ningbo City of offshore oil and gas, marine power, involving sea construction industry, marine machinery repair, shipbuilding industry development is faster and its good location advantage also makes the second industry output value of great, but the proportion of the tertiary industry is too low is not conducive to expanding employment. The tourism industry of Xiamen is higher than the proportion of the second industry; the second industry should expand the proportion of. Dalian, Qingdao and Zhoushan are the high proportion of the first industry should reduce the proportion of primary industry to improve efficiency.

### **3.3 Analysis of Marine industry effectiveness**

As I have analyzed the Ningbo City's marine industrial structure above, a reasonable industrial structure is not a simple is a simple combination of several industrial sectors, but the ability to play a higher economic benefit and conducive to economic development. Therefore, whether the industrial structure is good or bad is reasonable or not and there are some indicators or standards to measure and analyze the efficiency of the industrial structure. The main analysis methods have comparative labor productivity, industrial structure growth fluctuation analysis method.

(1) Comparison of production labor rate criterion. Comparing with the labor rate criterion, the proportion of different industrial output value in the whole industry is

compared with the labor force. By comparing the labor rate analysis, it can be analyzed that the following four aspects of the problem:

- a. Composition of marine industry gross output value in various industrial sectors;
- b. Distribution of labor force in the marine industry in the industrial sector;
- c. Growth of labor productivity in various industries;
- d. Mutual relations of labor productivity in different industries.

Meanwhile, by using the comparison of the labor rate criterion, it can be used to measure the level of efficiency of the marine industry sector. For example, by comparing with the average level of labor productivity in a marine industry sector, it can be explained that the industry is in the position of the labor productivity level in the whole marine industry. We can also use this criterion to compare with other marine economically developed regions in order to find out the gap between regions.

The formula for calculating the comparison of labor rate criterion is as follows:

$$K_i = X_i / L_i \quad (1)$$

Among this formula,  $K_i$  means that marine industry in the industrial comparative labor productivity of the marine industry the No. $i$  industry output value accounted for the total output value of marine industries proportion (Output value proportion).  $L_i$  means that the No. $i$  marine industry of labor accounts for less than the proportion of the total number of the marine industry labor force (Labor proportion).[62]

Table 12- Marine industry comparison of labor productivity rate of calculation in 2014

Indicators	Output value proportion	Proportion of employees	Comparison of labor productivity rate
<b>Total output vale of first industry</b>	0.045784049	0.169785328	0.269658453
Typical industry: Marine fishery	0.038344115	0.142195212	0.269658273
<b>Total output vale of second industry</b>	0.822869029	0.481140612	1.710246462
1. Maritime industry	0.719625472	0.332715701	2.162884016

Offshore oil and gas exploration and processing	0.356402837	0.03531179	10.09302667
Coastal ore send	0.000204609	0.000226211	0.90450625
Salt processing	0.000215124	0.001725812	0.124650834
Marine chemical industry	0.029694998	0.005220645	5.687994476
Marine Biopharmaceutics industry	0.00055074	0.000864177	0.637300029
Offshore power	0.165935549	0.024860334	6.67471121
Seawater comprehensive utilization	0.001199067	0.001710562	0.70097853
Ship building	0.026021864	0.019764232	1.316613961
Marine mechanical equipment manufacturing and repairing	0.059561641	0.109679289	0.543062761
Marine fishery-related industry	0.016687363	0.016175357	1.031653446
Others	0.063151624	0.117177293	0.538940794
2. Maritime construction industry	0.103242557	0.148424911	0.695594536
<b>Total output vale of third industry</b>	<b>0.131346922</b>	<b>0.34907406</b>	<b>0.376272365</b>
Marine port transportation industry	0.070642312	0.202395295	0.349031393
Marine tourism	0.002007387	0.007149792	0.280761623
Marine wholesale, retail trade & catering industry	0.020063302	0.045331158	0.442594070
Marine financial insurance	0.027003875	0.012436521	2.171336708
Marine-related information service	0.000439114	0.002241776	0.195877791
Marine education & research	0.000339140	0.015804269	0.021458749
Others	0.010851793	0.064477758	0.168302889

Based on the calculation of comparison of labor productivity rate of Ningbo City's marine economy in 2014, the results are shown in the above table. Data shows that the comparative labor productivity of offshore oil and gas extraction and processing industry, marine electrical, marine chemical industry is relatively high, is higher than the sea related industrial comparative labor productivity 2.1628, especially offshore oil and gas extraction and processing industry reached 10.09 astonishing levels. This shows that the labor value of the industrial sector is of great quality, and the technical level and the level of knowledge is higher. In addition in the second industry of marine shipbuilding industry, marine related to fisheries industry labor productivity also ranking in the industry labor productivity occupies more in front of 5-6, so higher

efficiency of the five industries and secondary industry output value proportion and high proportion of employees is consistent. In the third industry, marine finance and insurance industry's labor productivity is 2.171336708, far higher than the third industry, the overall level of labor productivity is 0.3763, with a strong development potential. And marine fisheries are marine economy in agriculture, is the basic industry of the marine economy, the proportion of its practitioners has accounted for 14%, but output was only 3.8%, labor productivity in general in very low levels of only 0.27, suggesting the marine fisheries technical equipment level is relatively low, the overall level and the development of marine economy, has become a constraining bottleneck Department of Ningbo marine economic development. Therefore, we should increase the marine fisheries structural adjustment efforts, improve the quality of the fishermen, strengthen the fishermen subsidies and improve the contribution of science and technology in the development of ocean fishery.

(2) Analysis of fluctuation of industrial structure growth. Industrial structure growth requires the coordinated development between the industrial sectors, if some of the industrial structure development is fast, some development is very slow, the huge gap is the performance of the structure of low efficiency. If the development level of irrational industrial structure can not coordinate, it will eventually lead to the low level of whole industry economy benefit, the reason is the economic relations between the departments will make development faster industry department received drag to slow the development of the industry, the development of greater volatility. So we can see the level of economic benefit by analyzing the fluctuation of each industry in a region.

We will use the standard deviation and discrete coefficient to measure the volatility of

the growth of industrial structure, the formula is as follows:

$$\delta = [\sum (\omega_i - \omega_0)^2 / N - (\sum (\omega_i - \omega_0) / N)^2]^{1/2} \quad (5)$$

$$W = \omega_0 + \sum (\omega_i - \omega_0) / N$$

$$V = \delta / W \times 100\%$$

Among them,  $\delta$  is the standard deviation,  $\omega_i$  is the period analysis of the year of No.i marine industry growth rate,  $\omega_0$  is analysis of period that the average growth rate in 2010 to 2016 the development of marine industry average growth rate as the average growth rate of  $\omega_0$ . N is the number of items (the years of analysis period); V is discrete coefficient (standard deviation coefficient); W is average growth coefficient.[63]

Table 13- Growth rate of marine industry from 2010-2014

Years	Dalian	Qindao	Zhoushan	Ningbo	Xiamen	Country Domestic
2010	16%	20.3%	27.25%	6.8%	15%	30%
2011	18%	13.1%	24.22%	7.9%	16%	30%
2012	17%	16.4%	24.22%	18.71%	17%	30%
2013	19%	20%	40.05%	25.4%	18%	30%
2014	21%	21%	31.62%	24.2%	20%	30%

Based on the Table 13[64], according to the formula of standard deviation and discrete coefficients, we can obtain the calculation results as follows:

Table 14- Average growth factor of marine industry for five cities

Cities	$\omega_0$	$\delta$	$W$	$V = \delta / W (\%)$
Dalian	0.30000	0.01599	0.18444	8.720%
Qindao	0.30000	0.03572	0.17130	20.853%
Zhoushan	0.30000	0.05997	0.28333	21.167%
Ningbo	0.30000	0.13948	0.54345	25.667%
Xiamen	0.30000	0.02115	0.17833	11.868%

The data shows that there is a big difference of marine industry sector growth stability in the five cities. Dalian's value fluctuation of marine industrial structure system is only 8.720%, which is the lowest among the five cities; secondly, Xiamen's value fluctuation of marine industrial structure system is low too (11.868%). It illustrates that in Dalian and Xiamen, the marine economy industrial growth stability is pretty good. The marine industrial structure growth coefficient value of Qingdao and Zhoushan are 21.167% and 20.853% respectively, significantly higher than those of Dalian and Xiamen. It shows that the stability of these two cities is relatively poor. The growth coefficient of marine industry structure in Ningbo city is 25.667%, which shows that the stability of marine economy industrial structure in Ningbo city is the most unstable in the five cities.

In general, due to the limitation of the region and other objective conditions, the changes of Dalian and Xiamen's marine industrial structure is small, the output value of marine economy changes are also small in Qingdao and Zhoushan because of its superior geographical position and other favorable conditions, the marine industrial

structure change is, output in the medium level and the Ningbo City's marine economy already relatively developed, and due to its proximity to Shanghai, convenient transportation and basic industries developed, coupled with China to increase investment of harbor and marine time, Ningbo City, the output value of marine economy still achieved substantial growth.

### **3.4 Leading industry evaluation index**

The development course of marine economy and the space of economic activity cannot live without the land economic activity system, which belongs to the category of regional economics research. Therefore, when establishing the index system of the marine economy leading industry, we should combine the selection criteria of the leading industry of the current relatively mature regional economy. After fully taking into account the status and proportion of the marine industry in the regional production, there are following evaluation indicators: [65]

(1) Demand income elasticity index. The industry income elasticity is the demand structure changes from the perspective of priming effect on industrial structure and analysis with the per capita national income to improve the degree of the change of the demand for products in various industries, which is to the needs of the industry growth rate and national income growth rate ratio, which is used to measure the demand of national income change of reaction degree. Its formula is:

$$Ei = (dQi / Qi) / (DI / I) \quad (3)$$

In this formula,  $Ei$  refers to demand income elasticity;  $Qi$  is the products demand value of Sector I;  $I$  refer to national income.

(2) Growth rate index. This index reflects the growth rate of an industry development.

Its formula is:

$$X_i^t = X_i^0 (1+R_i)^t \quad (4)$$

$X_i^0$  is the first period output value of No.i industry;  $R_i$  is average growth rate;  $X_i^t$  is No.t period output vale of No.i industry

(3) Comparative labor productivity. The formula is:

$$K_i = X_i / L_i \quad (5)$$

Leading industry should be relative to other industries or related areas of advantage industries.  $K_i$  refers to the comparative labor productivity of marine industry in No.i industry;  $X_i$  refers to marine industry of No.i industry output value accounted for the proportion of total output value of marine industries (the proportion of output value);  $L_i$  refers to the labor force amount of No.i industry accounted for the proportion of the total number of labor force in the marine industry.

(4) Proportion of area added value. Leading industry should have a certain scale, the scale of efficiency; otherwise it is difficult to play its due role. Only a certain proportion of the output value of the industry is likely to be the leading industry in the region. The calculation formula of this index is :

$$WI_{ij} = (G_{ij} / G_i) \times 100\% \quad (6)$$

In this formula,  $WI_{ij}$  refers to the added value proportion of j industry in i area;  $G_{ij}$  refers to the added value of j industry in i area;  $G_i$  refers to the GDP of the whole **i** area.

(5) Production value scale. The formula is:

$$G_i = g_i / \sum g_i \quad (7)$$

This formula reflects the economy scale situation of the target industry.  $g_i$  is the output value of No.i industry,  $G_i$  is the proportion of output value in No.i industry.

(6) Employment scale. The formula is:

$$L_i = I_i / \sum I_i \quad (8)$$

In this formula,  $I_i$  is the amount of employees in the No. $i$  industry,  $L_i$  is the amount of jobs in the No. $i$  industry accounted for the proportion of the number of jobs in all sectors.

Table 15- Growth of added value and growth rate from 2012-2014

Indicator	2012		2013		2014		First 2 years' growth rate (%)	Last 2 years' growth rate (%)	Average growth rate (%)
	Growth value	Proportion (%)	Growth value	Proportion (%)	Growth value	Proportion (%)			
<b>Total: First industry</b>	393052	12.72	427658	12.72	443487	12.83	8.80	3.70	12.83
Marine fishery	337999	10.94	367758	10.94	371420	9.73	8.80	1.00	9.89
<b>Total: Second industry</b>	1870134	52.78	1773956	52.78	2005078	52.53	-5.14	13.03	7.22
1. Maritime industry	1584576	37.33	1254760	37.33	1606093	42.08	-20.81	28.00	1.36
Offshore oil and gas exploration & processing	660000	6.34	213065	6.34	502880	13.17	-67.72	136.02	-23.81
Coastal ore send	833	0.02	584	0.02	520	0.01	-29.89	-10.96	-37.58
Salt processing	1749	0.07	2316	0.07	2400	0.06	32.42	3.63	37.22
Marine chemical industry	70041	1.92	64550	1.92	89276	2.34	-7.84	38.31	27.46
Marine Biopharmaceutics industry	932	0.04	1182	0.04	2592	0.07	26.82	119.29	178.11
Offshore power	498342	16.31	548332	16.31	663268	17.38	10.03	20.96	33.09
Seawater comprehensive utilization	6711	0.23	7711	0.23	9527	0.25	14.90	23.55	41.96
Ship building	21871	2.00	67382	2.00	812709	2.13	208.09	20.62	271.63
Marine mechanical equipment manufacturing & repairing	99718	2.66	89542	2.66	166032	4.35	-10.20	85.42	66.50

Marine fishery-related industry	19892	0.74	24937	0.74	32330	0.85	25.36	29.65	62.53
Others	204486	7.00	235159	7.00	55988	1.47	15.00	-76.19	-72.62
2. Marine construction industry	285558	15.45	519196	15.45	398985	10.45	81.82	-23.15	39.72
<b>Total: Third industry</b>	<b>948231</b>	<b>34.50</b>	<b>1159495</b>	<b>34.50</b>	<b>1368379</b>	<b>35.85</b>	<b>22.28</b>	<b>18.02</b>	<b>44.31</b>
Marine port transportation industry	537122	20.38	684830	20.38	804796	21.08	27.50	17.52	49.83
Marine tourism	8360	0.29	9819	0.29	12017	0.31	17.45	22.39	43.74
Marine wholesale, retail trade & catering industry	122159	4.06	136516	4.06	158267	4.15	11.75	15.93	29.56
Marine financial insurance	206940	7.40	248860	7.40	301575	7.90	20.26	21.18	45.73
Marine-related information service	3910	0.13	4452	0.13	5455	0.14	13.86	22.53	39.51
Marine education & research	2424	0.08	2750	0.08	3161	0.08	13.45	14.95	30.40
Others	67316	2.15	72268	2.15	83108	2.18	7.36	15.00	23.46
<b>Total added value of marine economy</b>	<b>3211471</b>	<b>100</b>	<b>3361000</b>	<b>100</b>	<b>3816944</b>	<b>100</b>	<b>4.66</b>	<b>13.57</b>	<b>18.86</b>

Based on the marine industry proportion, in terms of the marine industrial added value proportion from high to low in 2012 is the ocean shipping port industry, marine industry, marine construction, marine fisheries, marine insurance, marine oil and gas production and processing, wholesale and retail trade, catering industry, ocean marine machinery equipment manufacturing and repairing; In terms of the marine industrial added value of the proportion from high to low in 2013 is marine port transportation, marine electronic power, maritime construction, marine fishery, marine financial insurance, marine oil and gas production and processing, marine wholesale & retail

trade & catering industry, marine machinery equipment manufacturing and repairing; In terms of the marine industry the proportion of the added value from high to low in 2014 are marine industry, marine industry, port industry, offshore oil and gas exploitation and maritime construction, marine fishery, marine financial insurance, marine machinery equipment manufacturing and repairing, wholesale & retail trade & catering. From 2012, 2013 and 2014 these three years of the marine industrial added value of sorting, occupying the top eight industries have not changed, although some changes occurred in the industry ranking, thus leading industry should be from the marine transport and port industry, marine electrical, involving maritime construction, marine fishery, offshore oil and gas extraction and processing, marine financial insurance, marine machinery equipment manufacturing & repairing, marine wholesale & retail trade &catering industry can be chosen.

Based on the each marine industry development of marine industry, according to the growth rate between 2012 and 2013, the top of the list are marine shipbuilding industry, marine medicine, marine machinery equipment manufacturing and repairing, marine fishery, marine port transportation, marine financial insurance, marine tourism, seawater utilization industry, maritime construction. Otherwise, the growth rate of the marine chemical, marine power, marine wholesale & retail trade & catering industry and sea salt processing are far higher than those of marine added value of average growth rate. Meanwhile, in 2014, Ningbo City's marine industry output value in top nine of the list are offshore oil and gas industry, marine electric power industry, maritime construction industry, marine port and transportation industry, marine machinery equipment manufacturing & repairing industry, marine fishery, marine shipbuilding, marine

chemical, marine financial insurance industry.

Through the analysis of industrial comparative labor productivity ( $K_i = X_i / L_i$ ), it can be founded that marine industries in the top of the list are offshore oil and gas extraction and processing industry, marine electronic power industry, marine chemical industry, marine financial insurance, marine shipbuilding industry, maritime fishing industry, coastal sand, seawater utilization industry, maritime construction industry, marine biopharmaceutical, marine machinery equipment manufacturing & repairing industry.

Table 16- The proportion of each industry employment in 2012-2014

Indicators	Proportion in 2012 (%)	Proportion in 2013 (%)	Proportion in 2014 (%)
<b>Total output vale of first industry</b>	19.98	19.35	16.98
Typical industry: Marine fishery	17.18	16.64	14.22
<b>Total output vale of second industry</b>	33.49	40.75	48.11
1. Maritime industry	25.35	25.96	33.27
Offshore oil and gas exploration and processing	3.56	3.57	3.53
Coastal ore send	0.04	0.03	0.02
Salt processing	0.16	0.18	0.17
Marine chemical industry	0.66	0.48	0.52
Marine Biopharmaceutics industry	0.05	0.09	0.09
Offshore power	2.25	2.21	2.49
Seawater comprehensive utilization	0.17	0.17	0.17
Ship building	0.90	1.28	1.98
Marine mechanical equipment manufacturing and repairing	5.15	5.29	10.97
Marine fishery-related industry	0.33	1.20	1.62
Others	11.09	11.46	11.72
2. Maritime construction industry	8.13	14.79	14.84
<b>Total output vale of third industry</b>	34.16	34.78	34.91
Marine port transportation industry	20.74	20.53	20.24
Marine tourism	0.67	0.70	0.71

Marine wholesale, retail trade & catering industry	4.53	4.63	4.53
Marine financial insurance	1.18	1.22	1.24
Marine-related information service	0.15	0.14	0.22
Marine education & research	1.46	1.51	1.58
Others	5.53	6.14	6.45

The next step is analyzing the contribution from each industry for social employment. Through the data information from the table above, in terms of the proportion of marine industry in various industry practitioners, in 2012, jobholders proportion from high to low are marine port transportation industry, marine fishery, maritime construction industry, marine machinery equipment manufacturing and repairing industry, marine wholesale retail trade & catering industry, marine oil and gas extraction and processing industry, marine electronic power industry, marine education & scientific research, marine financial insurance industry respectively. The proportion of employees in 2013 from high to low are in turn is marine port transportation, marine fishery, maritime construction industry, marine machinery equipment manufacturing and repairing industry, marine wholesale & retail trade & catering industry, offshore oil and gas extraction and processing industry, marine electronic power industry, marine education & scientific research, marine financial insurance industry respectively. In 2014, jobholders proportion from high to low are marine port transportation industry, maritime construction industry, marine fishery, marine machinery equipment manufacturing and repairing industry, marine wholesale & retail trade & catering industry, offshore oil and gas extraction and processing industry, marine electronic power industry, marine education & scientific research, marine financial insurance industry respectively. Therefore, through the changes in the proportion of employment in recent years, the

industry employment proportion of the size of the order is quite stable, with the proportion of maritime construction practitioners involved only in 2014 for the first time over the as the employment proportion of the marine economic foundation of marine fishery industry. Therefore, based on the three years' data, the industry on employment contribution size sorting from high to low are marine port transportation industry, maritime construction industry, marine fishery, marine machinery equipment manufacturing and repairing industry, marine wholesale & retail trade & catering industry, offshore oil and gas extraction and processing industry, marine electronic power industry, marine education & scientific research, marine financial insurance industry.

In addition, according to the proportion of marine industry practitioners of the three major industries, the proportion of the first industry basing on marine fishery is decreasing year by year, but the proportion is still as high as 16%, far higher than the national average level; the second industry level increased rapidly. At present, the employment proportion has been nearly 50%; the proportion of marine tertiary industry is relatively stable, accounted for only less than 40%, this ratio is relatively low and it has a larger gap with foreign countries and the development of. The tertiary industry is mainly services, has a great ability to absorb employment and it is the best way to employment increase in the future. Therefore, we should vigorously develop and keep up with the trend of the development of marine economy in the world, and not just to keep such a low proportion.

### **3.5 Main problems of Ningbo City's marine economy development**

(1) Slowly growth of fishermen's income. From 2009 to 2014, fishermen per capita

monthly income growth is only 1961Yuan; the growth rate is only 4.6%, far lower than the same period of the marine economic growth rate and the growth rate of GDP. While in the same period, the price level has been rising, taking into account the growing production and living expenses of the fishermen, such as ship fuel and maintenance costs of the real income growth, eventually fishermen may not fall. Fishermen are the subject of fishery production activities, fishermen real income growth slow or reduce will eventually dampen the fishermen to work actively, thus in fishery production, the development and Fisheries yield stability are adversely affected.

(2) Lag of port infrastructure construction. From 2012 to 2014 years, the port cargo throughput of Ningbo City has increased nearly 43 million tons, the average annual growth rate has reached 5.24%, container throughput from 2012 breakthrough 1.3 million off every year to maintain growth of around 100 million TEUs, and the average annual growth rate arrives 9.8%. But at the same time, the rapid rising of throughput needs higher demands on port infrastructure construction, it is also a big challenge for the port efficiency, customs" clearance of goods, container handling efficiency and service level of port. And although the infrastructures of Ningbo port are generally good, but the rapid growth requires additional port infrastructure construction to achieve international standards in order to adapt to the requirements of the future development of the eastern big port. At present, there is a lack of unified planning and coordination of Ningbo city infrastructure construction, it is difficult to finish the request of fully adapt to the rapid development of marine economy.

(3) Small proportion of marine third industry. Ningbo city is rich in tourism resources, including natural resources and human resources, but in the statistics, it can be found

that the proportion of coastal tourism in Ningbo City is still low. Coastal tourism value of annual growth rate is more than 24%, marine wholesale and retail trade, catering annual growth rate is over 17% far higher than GDP growth rate. But to the seaside tourism, coastal catering as the representative of marine tertiary industry in the marine economy proportion is too low, 2013 is 12.43%, 2014 is only 13.14%.

(4) Decrease of salt production volume. It can be seen from the figure that during the years of 2009-2014, the sea salt production has reduced from 105 thousand tons to 21.1 thousand tons. In addition to the production of salt, sea salt is more used for chemical industry of industrial salt; therefore, the decline of sea salt production will have an important effect on the development of chemical industry. Therefore, while keeping the production volume of sea salt, it should be develop the deep processing at the same time in order to improve the level of value-added products and revitalize the sea salt industry.

(5) Environmental venture causing by Port-centered industry. The second marine industry mainly represented by shipbuilding, petrochemical, involving sea construction mostly belongs to the high input, high energy consumption and high emissions industry which are low marine resources utilization efficiency. And it may lead to the environment deterioration of local sea area. For example, it is difficult to eliminate the pollution caused by offshore oil mining to the sea area.

(6) Irrational marine industry structure. The development trend of Chinese marine industry is that the primary industry proportion should continue to decline, the income of second industry proportion should continue to rise, but the proportion of employees are largely unchanged, the most prominent changes in the third industry should be a substantial increase in the proportion of employees. And it is also the important channel

to solve the employment. However, Ningbo City's marine industry is high degree of concentration, concentrated in the petroleum chemical industry, shipbuilding, sea-related construction industry and so on. The development form of industrial structure tends to a single and its degree of each production sector has more difference, which is not conducive to the overall stability of the industrial development. Through the data analysis, it can be found that to the marine industry structure of Ningbo City, the proportion of the second industry is too large and the third industry is too small, the trend of its development is relatively large different from the Chinese overall trend. Too large proportion of second industry, high energy consumption, high pollution doesn't meet the current economy development trend of energy saving and emission reduction and it is not conductive to absorbing employment.

## **Summary of Chapter2**

Through the front of the marine industry added value proportion, development speed, output, labor productivity, employment contribution size, it can be summed up the following conclusions: Ningbo City is better to regard offshore oil and gas extraction & processing industry, maritime construction industry, marine machinery manufacturing and repairing industry, shipbuilding, marine electronic power industry, marine port transportation industry and marine chemical industry as leading industry to develop. It also can be founded that the marine fishery, maritime fishing industry, comprehensive utilization of seawater, marine medicine, marine tourism, marine financial insurance and marine wholesale & retail trade & catering industry ranking on the front, there are also great advantage, it should be paid more attention to accelerant develop.

# **Chapter3 The feasible measures for Ningbo City's marine economy development**

After analyzing the current situation and main problems of Ningbo City's marine economy based on the data information, here, I will discuss the feasible measures to solve the problems above in this part. Before that, I will take the typical industry (marine logistics) and the typical enterprise Ningbo Port Group Ltd. in Ningbo City as an example in order to get some valuable inspiration and experience by its successful practice of marine economy development.

## **1 Ningbo Port Group Ltd's successful practice of port logistics development**

### **1.1 Current situation of port logistics in Ningbo City**

(1) Construction logistics park. At present, Ningbo City has been completed the construction of Meishan bonded port logistics park, Zhenhai bulk cargo sea rail intermodal logistics hub port, Ningbo Economic and Technological Development Zone of modern international logistics park, Ningbo Airport International Logistics Park, Ninghai logistics park and a number of port logistics park project. In 2011-2013, it has been completed the totaled investment of 56.62 billion Yuan, the investment rate is 78.52%.[66]

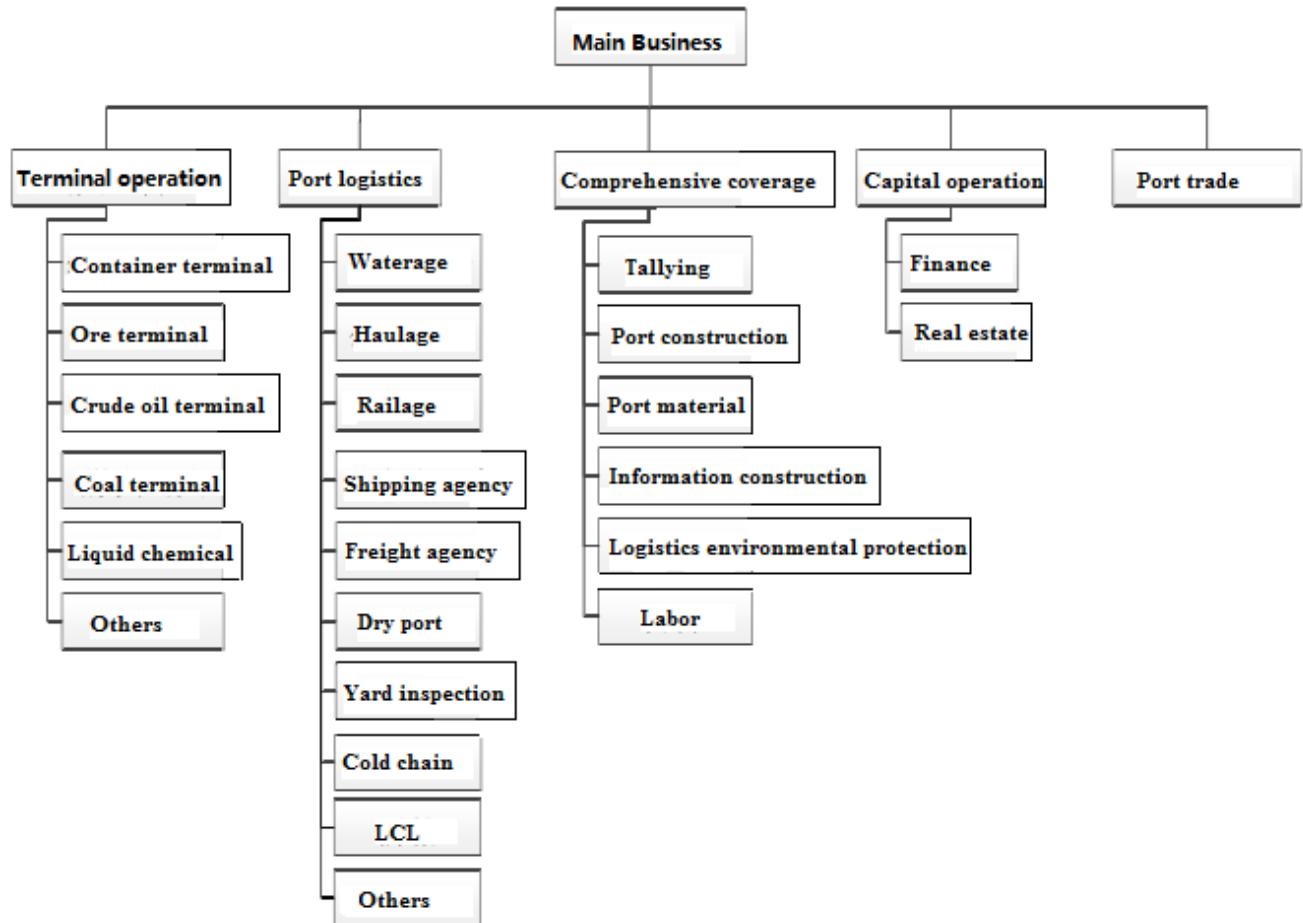
(2) Logistics yard and fleet. The container yard mainly for ship repair, storage, container companies to provide customer service delivery, which is mainly concentrated in the Beilun region. In the yard Association registered a total of 29, mostly private yard, fully market-oriented business industry, total container volume of business accounted

for Ningbo port container throughput (in addition to the international transit box) more than 95% of the volume and yard capacity obviously excessive, yard each other between full highly competitive. Which Ningbo port group, a wholly owned and joint venture operations 7, accounting for 24% of the total. Ningbo port outside the social truck fleet of more than 500, under control. The business in Zhejiang Province, thousands of freight forwarding company, operating trucks over 15000, 96% are private individual enterprises, truck fleet in disorderly competition in the state.[67]

(3) Logistics business enterprise. At the end of 2013, the whole Ningbo City actually engaged in the logistics business enterprise of 5656, 135 have a level of country-A and above the logistics enterprises, which Sinotrans Zhejiang Co., Ltd. for 5A class enterprise; Ningbo total 143 shipping enterprises, which capacity scale top ten shipping companies such as Ningbo Shipping Co., Ltd., has the capacity of the ship up to 311 million deadweight tons, accounting for 54% of the total capacity of the city's; engaged in railway freight transport has nine companies, freight forwarding enterprise engaged in a total of 2448, NVOCC operators have to 351, international shipping agency business for 34. Shipping agency, forwarding, logistics companies, shipping companies, such as all kinds of related enterprises is speeding up the introduction, has formed a large influence, the global ranking the top 20 shipping companies and FedEx, UPS, TNT, DHL and other renowned the world logistics giants have successively settled in Ningbo, brought together a group of influential logistics branch of the corporate headquarters and multinational companies.[68]

## **1.2 Overall of Ningbo Port Group Ltd.**

Ningbo Port Group Ltd is developed by the Ningbo Port Authority. Ningbo Port Authority was established in 1979, in 1987 was renamed to Ningbo Harbor Bureau. In 2004, in accordance with national call and the relevant provisions of the will separate the management of the work of management and business, the establishment of the now of Ningbo port group. Ningbo Port Group is a public terminal management and major business segments include operation of wharf, port logistics, security, capital operation of four major categories, its business scope from crude oil, iron ore and other bulk cargo handling to the container business, from tug parking assist to shipping agents, and other services are a full range of coverage, reflected in very good port integrated, comprehensive, China has a greater influence on the port operators to the role of Ningbo public wharf business entities. Of Ningbo City, has attracted the attention of enterprises, Ningbo Port Group in recent years, won numerous awards, such as the top 500 enterprises of China, top 500 enterprises of the service industry in China, listed companies in China the most investment value of the top 100 and so on, influence enterprise continues to expand, port service satisfaction degree is gradually improving, has received the title of world container “Top5 Port”, which is only a Chinese finalist for the award port.[69]



Picture 13- Ningbo port group main business sectors

After several years of development and construction, Ningbo Port Group Ltd formed in port production business collaborative management platform (CBOs) as the core, the port EDI center based, covering AIS monitoring, video surveillance, container terminal control system N-TOS, scattered grocery operations management system, port intelligent gate, integrated management of container yard, container fleet management system, the basic formation of the set production, video monitoring, enterprise management, integrated management, information service in one of the information system, the whole information system, digital level in domestic coastal ports in the leading ranks. In 2010, the Ningbo port logistics information online line, integrated port service, terminal services, EDI service, a one-stop service, station service module, for customers to bring continuous improvement of logistics information inquiry service.

### **1.3 Port logistics current situation of Ningbo Port Group Ltd**

(1) Dry port operation. Dry port is an important branch of Ningbo Port Group Ltd to expand the hinterland of the market. Orders of Ningbo Port Group and local government cooperation set up 13 dry port, Hangzhou and Shaoxing of Xiaoshan, Shaoxing, Keqiao, Xinchang, and Zhejiang, Western Zhejiang region, Yiwu, Jinhua, Quzhou, Jiangxi Shangrao, Yingtan, Xinyu. Recently, is promoting the construction of Lishui, Xiangyang water port.

Dry port has the box, storage, distribution and other functions, through the double transport and swing hanging transport, significantly reduce the cost of land transport. In 2011, the Ningbo Port anhydrous Hong total business completed 21.8 million TEUs, in 2012 reached 29.8 million TEUs, in 2013 reached 47.64 million TEUs, in 2014, the volume of business has reached 55.6 million TEUs, reflect the important role in the development of logistics business, provides high quality, efficient and convenient, “seamless” logistics service for the owner.[70]



Picture 14- Container Drop and Pull Transport Schematic

Table 17- Ningbo Port Group Ltd mainly dry port traffic summary in 2011-2014

Years	2011	2012	2013	2014
<b>Business Volume (Thousands TEUs)</b>	218.2	298.0	476.4	556.3
<b>Growth rate</b>	/	36.71%	59.87%	16.72%

(2) Waterage. Ningbo Port Group Ltd is mainly through Ningbo Ocean Shipping Co, Ltd. to carry out water transport business. In 2013, Ningbo Ocean Shipping Co, Ltd. has completed the container volume of 1 million 310 thousand TEUs with the growth rate of 15.83%; Complete bulk cargo transport volume of 3 million and 290 thousand tons. At present, Ningbo Port Group's inside and outside the container liner routes amounted to nearly 20 weeks flights above 70 classes, monthly container transport volume is stable at about 14 million TEUs, operates mainly in Japan, China and South Korea routes and

flights to Taiwan, the domestic branch line includes line of Qingdao, Zhapu line, Wen Tai line, the domestic branch line to port of Yingkou, Tianjin, Huangpu container ship. At the end of August in 2014, it has its own ship 23, the capacity is 200 thousand tons.

(3) Railage. Ningbo Port Group Ltd is mainly through Ningbo Port Railway Co, Ltd to carry out railway transportation service and railway station services carried out by China Railway United International Container Beilun Co., Ltd. In 2012, Ningbo Port Railway Co., Ltd. completed 20 million 100 thousand tons of cargo. Among them, set port cargo tonnage of 1606 million, in such goods, including 868 million tons of iron ore, 482 million tons of coal, 338 million tons of refined oil container to volume completed 66 million TEU (molten iron transport container volume 5.95 million TEUs).In 2013, Ningbo Port Railway Co., Ltd., the volume of transport for the first time exceeded 100 thousand TEUs, sea rail transport business volume exceeded with an increase of 76.5%. [71]

Table 18- Ningbo Port Group Ltd. rail transport container in 2010-2014

<b>Years</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>Container Volume (Thousands TEUs)</b>	28.0	47.1	59.5	105.3	135.2
<b>Growth rate</b>	/	67.9%	26.6%	76.5%	28.6%

(4) Haulage. Ningbo Port Group Ltd is mainly through the Ningbo Port Container Transport Co., Ltd., Ningbo port bell and Logistics Co., Ltd. and other road transport operations. Ningbo Port Container Transport Co. Ltd has vehicles more than 1000 vehicles, road transport enterprises in Zhejiang province's largest container. In 2013, the

Ningbo Port Container Transport Co., Ltd. completed total transportation amount of over 17 million TEUs, an increase of 27%; in double transport operations, with the provided box point platform resources, Xiao Shaoti also box point complete pure export container volume 3.87 million TEUs, and through the strengthening of the imported contact box freight forwarding, complete the boxes of imported 2.56 million TEUs, dual carriage matching rate reached 89%. In the first half of 2014, Ningbo Port Container Transport Co., Ltd. completed container volume of TEUs, an increase of 14.41%. In 2013, the Ningbo Port bell and Logistics Co., Ltd. around Hangzhou Xiaoshao anhydrous Hong dry port and further increase double left hanging in the quantity and quality, complete dual carriage 4.5 million TEUs, and with the same period of last year than 26.2% growth.[72]

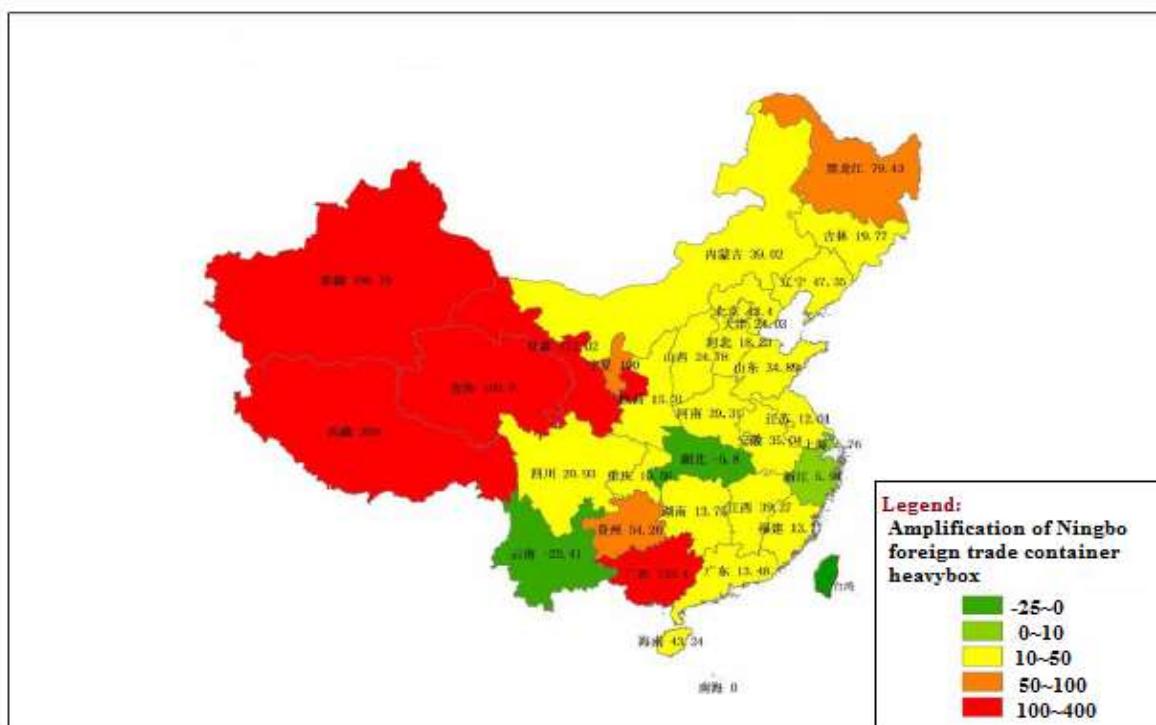
(5) Shipping and freight forwarding. Ningbo Port Group Ltd is mainly by Ningbo Xing Hong International Shipping Agency Co., Ltd., Ningbo Ocean Shipping Agency Co., Ltd. is engaged in the foreign trade shipping agency business; by Zhejiang Xing Hong Kong International Freight Agency Co., Ltd., Ningbo Port southeast Logistics Co., Ltd. and other enterprises engaged in foreign trade freight agency business; by the Ningbo port shipping freight agency Co., Ltd. to carry out domestic shipping, freight forwarding business. During the year of 2013, the Ningbo port group, the amount of nearly 1.8 tons, compared with the previous year, the growth rate is 6%. [73]

(6) Principal commodity.

A. Container. At present, the container transportation of Ningbo Port Group Ltd. has formed a “one body -two wings-three line” development pattern, namely to the port of Ningbo as the main body, to inland waterless port for the extension, to the north and

along the Yangtze River in Zhapu, Taicang, Nanjing and the southern Wenzhou, Taizhou for the two wings, to highway, railway, waterway channel container logistics system.

In 2011-2014, Ningbo port group completed container throughput were 15.23 million TEUs, 1735 million TEUs, 1878 million TEUs and 2091 million TEUs respectively, with an average annual growth rate of 11%, of which domestic container growth rate is rapid, import container growth is slightly higher than that of exports.[74] According to the 2013 foreign trade container Ningbo customs import and export statistics, Ningbo Port Container hinterland of the main in Zhejiang Province and Jiangxi, Jiangsu and other places, Zhejiang Province main hinterland for Ningbo, Taizhou, Jinhua, Shaoxing. On the growth rate, the increase is faster in the northwest, southwest and northeast regions, Ningbo port on the inland areas of foreign trade container attractive gradually enhanced, especially in the railway area.



## Picture 15- Ningbo Customs District trade growth in heavy container source schematic in 2013

B. Ore. In 2011 and 2013, Ningbo Port Group Ltd has completed unloaded quantity of iron ore were 59.96 million tons, 7096 million tons, 78.94 million tons respectively which keeps a high growth rate. Major iron ore unloading port Beilun ore dock, Chuanshan house wharf, weapons Taicang port, formed to Beilun Ore Terminal Company as the main body, to weapons Taicang port, Nanjing Mingzhou port transshipment base, and along the Yangtze River to the terminal effective docking combo ore transportation service system, enhance the Ningbo port in domestic iron Ore Transshipment market position.

C. Crude oil. Singce 1998, Crude oil transfer anchorage lightering began, after decades of development, has experienced from scratch, from the simple to the whole development process, from crude oil port anchorage barge to construction and joint terminal, anchorage lightering output technology development process, the terminal services enterprises are mainly affiliated belongs to Sinopec, Petro China, CNOOC and other oil giants.

Ningbo Port Group Ltd. anchorage lightering volume has declined each year since reaching a peak in 2004, crude oil transfer transportation rely mainly on pipeline transportation, water transfer, forming a Daxie port crude oil terminal as the main body, the Beilun port, Qinzhou Port anchorage a barge, supplemented by crude oil logistics service system. Ningbo port group has a joint venture oil terminal operating three, has 450 thousand 1 tons of crude oil terminal, 300 thousand 2 tons of crude oil terminal, 1 tons of tons of crude oil terminals, 80 thousand 1 tons of crude oil terminal. In the anchorage barge technology output, was established in Qinzhou crude oil barge company. Group 2012-2014, the completion of crude oil transfer volume of 38269

thousand tons, 40360 thousands tons and 42697 tons respectively.

D. Coal. In 2011-2013, Ningbo Port Group Ltd. coal loading and unloading capacity to grow across the 50 million tons, 60 million and 70 million tons respectively which achieves steady improvement. At present, the main supply of coal through the Ningbo port three directions, one is the local Ningbo, two is Xiaoshao area, three is the Jiangxi area. Coal port for the belt conveyor, waterways, railways and highways, including belt machine and water amount accounted for than on the decline, the railway stability in winter, and the highway remained basically unchanged. At present, the coal logistics group formed coal logistics service system with “Zhenhai + Beilun + Zhapu” as the main body.

E. Others. In the aspect of liquefied cargo transport, Ningbo Port Group in 2013 has completed the throughput of chemical products mainly rely on pipeline transport, road transport and water transfer and its hinterland scope mainly for Ningbo, Xiaoshao area and along the Yangtze River chemical enterprises, Ningbo Zhenhai building national chemical industry park.

In the aspect of Ro-ro transport, Beilun second port company in February 2010 for the first time to export Automobile Ro-ro ship. In 2012, Ningbo port car Ro-ro export volume exceeded 10 thousand units in 2013 on the basis of growth of 14.6%. At present, Meishan port Ro-ro berths in the construction stage.

In 2014, with 8 million cubic meters of capacity of Ningbo Port cold chain logistics center in Beilun Xiapu enabled, to provide customers with integrated storage (bonded warehouse, storage, cold storage and cold storage), low temperature inspection, port feeder, warehouse financing, low temperature distribution, information tracing, customs

inspection, multimodal transport, import and export agents, sorting and packaging and other value-added services, marking the group in the port logistics industry chain extension has taken a big step. In 2013, Taicang Wanfang international terminal also carried out wood loading unloading business, completed 1 million 600 thousand cubic meters of timber throughput.

### **1.3 Achievement of Ningbo Port Group Ltd economy development**

(1) Rising operating profit level. Recent years, with the price of oil, land and labor partially abate, the cost of terminal operation service has been declined, the rate of port Ningbo Port Group Ltd showed an upward trend. In 2011 - 2013, its gross margin are 35.91, 46.48%, 48.23% respectively, showing a trend of gradually rising. It has a beneficial effect on the healthy and sustainable development of port logistics.[75]

Table 19- Ningbo Port Group Ltd. bond rating report tracking in 2011-2013

<b>Indicators</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>Owner's Equity (Billion Yuan)</b>	32.588	35.606	38.542
<b>Total Assets (Billion Yuan)</b>	41.227	45.816	51.647
<b>Total Liabilities (Billion Yuan)</b>	5.250	6.155	7.859
<b>Total Operating Revenue (Billion Yuan)</b>	7.006	7.953	11.980
<b>Gross Margin (%)</b>	35.91	46.48	48.23
<b>EBITDA (Billion Yuan)</b>	39.68	44.18	49.16

<b>Owner Equity Yield (%)</b>	7.55	9.77	7.73
<b>Asset-Liability Ratio (%)</b>	20.95	22.29	25.37
<b>Total Assets/ EBITDA</b>	1.32	1.04	1.60
<b>EBITDA Times-interest-earned Ration</b>	19.15	30.70	20.17

(2) High level of port infrastructure. Ningbo port consists of eight ports which is a multifunctional fully meet the needs of the harbor berth. In nearly a hundred years of good harbor line, all kinds of berth is more than 330, which million tons and above large deep-water berths have 97 (more than 50000 ton deep-water berths 62), dubbed China, large and extra large deepwater berths up to port. Statistics show that in Ningbo City, the different grades of rivers as many as 73. At the end of 2013, a total of 683 business transport ships, the total capacity of 632 tons of cargo ships, including marine vessels, cargo ships, 51 tons of inland waterway, heavy truck tonnage. The operation of the ship average tonnage continued to maintain growth, coastal cargo ship average tonnage 9525 tons in weight, the ship is average boat age of 7.9 years; 173 large shipping vessels, 489.64 million deadweight tons of, an increase of 0.35 percentage points; container and multi-purpose ship 36 boats, box 15647TEUs; dangerous liquid goods ship 148 ships, 4.65 million deadweight tons, compared to the same period increased 4.88 million deadweight tons. [76]



Picture 16- Distribution maps of Ningbo port

(3) Perfect logistics channel network. Ningbo port has formed a perfect logistics system which combines the land transport and shipping as the main body and maritime shipping. Ningbo not only has excellent port, also has in the economically developed Yangtze River Delta ports the convenience of intensive railway transportation system, railway transportation system has covered the main port and important national line connection together, greatly increased the freight and timeliness and of. In the country's medium and long term railway network planning", Ningbo has been positioned as an important hub of the national railway network, but also to be included in the state of the country one of the eighteen container terminal. With the increase of cargo throughput of Ningbo port in recent years, Ningbo has been established as a national comprehensive transportation hub city, which has a great degree of promotion for the port freight industry in Ningbo city. During the period of 2013, the Ningbo port container already had as many as 235 lines, has been integrated to form a network covering all over the world transport system. At the same time, Ningbo's highway mileage has reached 496

kilometers, the basic form of a point as the center, multi way radiation of the highway network. According to the plan, but also on the basis of this increase a surround of the urban area of Ningbo Expressway, the formation of ring shooting ten quadruple four port highway network system. Ningbo Lishe Airport as the area within the main airport, has a number of routes, which leads to the outside, for freight provides convenient conditions, it has more than 50 of the flight route, established, leading to the major cities of Beijing, Guangzhou, Shenzhen and other domestic and Hong Kong, Macau, Taiwan, Singapore, South Korea, Thailand, the Philippines and other countries and regions of the international route network.

(4) Expansion of port logistics scale. In 2014, Ningbo freight volume of whole society completed 404 million tons with the growth rate of 6.2%, the highways, waterways, civil aviation respectively complete freight volume are 219 million tons, 1.61 million tons and 9.49 million tons, the completion of the railway capacity to 2364.1 million tons. Ningbo port for the whole year freight volume has reached 5.26 tons of with an increase of 6.2%. Which foreign trade cargo throughput of the completion of 2.97 million tons; three main bulk goods appeared two increase one minus "posture, the complete iron ore throughput 1.02 million tons, growth of 15.2%, the oil throughput 6152.7 million tons, growth of 0.5%, the completion of coal throughput of 7412.8 million tons with a decrease of 6.5%.

From 2004 to 2014, cargo throughput of Ningbo port rose from 2.25 million tons to 526 million tons, with an average annual growth rate of 9.2%, annual transport volume ranked China inland port in the third, fourth in the world; container traffic from 400 million TEUs rose to 2091 million TEUs, of foreign trade cargo transportation volume

from 1.02 million tons increased to 2.97 million tons, with an average annual growth rate of 11.7%. Water transfer business is developing rapidly, the 2013 Ningbo port water boxes and complete 3.566 million TEUs, an increase of 13.2%; 2014 molten iron transport container volume for the first time exceeded 13 million TEUs, an increase of 28.4%, an increase of column 6 national demonstration channels in the first place.[77]

(5) Clear port hinterland pattern. Ningbo port container port hinterland including direct hinterland and indirect hinterland outside the province. Direct hinterland province including Ningbo, Hangshao, in the north of Zhejiang, Zhoushan area; outside the indirect hinterland including water transport through the channel radiation area of Taicang, Nanjing and Lianyungang, Xiamen, Fuzhou and other and Yingtan, Xiangyang, Xian, Chengdu and Xinjiang by rail transport channel radiation region.

The crude oil business in Ningbo, Shanghai, the hinterland of Nanjing enterprises, Sinopec and Shandong local refineries as enterprises along the Yangtze river. Iron ore supply hinterland mainly concentrated in the surrounding areas along the Yangtze River, the Zhegan railway line to the west of Zhejiang and Jiangxi Province and Ningbo local and Xiaoshao area. Coal resources are mainly concentrated in Ningbo and the hinterland of the local area, the Zhejiang Jiangxi railway Xiaoshao line and surrounding areas along the Yangtze river. The liquefied products mainly for Hangzhou Bay hinterland area to the south, especially in Ningbo area, Shaoxing, Xiaoshan and other chemical enterprises.

## **1.4 Experience and enlightenment of Ningbo Port model**

From the successful port logistics industry development practice of Ningbo Port Group Ltd in recent years, we can sum up the following experience:

First, In the mode of development, Ningbo City can learn from foreign advanced port most attention characteristics of the development of Port Logistics Center to develop scale, specialization, circulation processing, distribution and other business and key goods class production, storage, trading, distribution and other integrated functions of the industrial chain of logistics service, providing quality of key goods logistics chain solutions, develop high additional value added logistics service, port, logistics enterprises have also actively involved in land development and infrastructure construction, the development of a logistics real estate developers and reap the benefits.

Second, When selecting the right port strategy in large ports, the types of goods are closely related to the local area or related industries. At present, Ningbo City has formed a stretch more than 20 kilometers of coastal port industrial zone, the formation of the petrochemical, energy, steel, paper, transportation equipment manufacturing, equipment manufacturing and other industries. According to the characteristics of the Ningbo City Industrial Development, Ningbo Port Group in the terminal building and future logistics development direction should also be emphasized and industrial docking, the port industry and port and promote each other, closely integrated with the common development of good posture.

Third, Ningbo port logistics should be with the surrounding Shanghai, Zhoushan and other ports to form a differentiated development, in the management of goods on each other, each has its characteristics. For the operation of the key goods category, to take the path of specialization and refinement. Positive development related value-added services and value-added services, to pay attention to the application of new technology and supply chain on the lower end of the enterprises to establish contacts, expansion of

the port in the supply of goods in the function and role of, vigorously building dry port to provide more convenient service for the owner or the relevant enterprise.

## **2 The feasible measures of Ningbo City's marine economy development**

Combining with the typical example above, according to the problems in the development of marine economy in Ningbo City and the choice of the leading industries, the paper puts forward the following based on the comprehensive development of Ningbo City's marine economy.

(1) Transformation and upgrading for marine fishery. Marine fishery is the basic industry of marine economy, although its position in the entire national economy has declined significantly, but the marine fishery is still an important industry related to the national economy and the people's livelihood. From the analysis above suggests that marine fishing yield stability, marine aquaculture production has a larger growth, but fishermen income growth slowly which is not conducive to the stability of the fishermen's income and fisheries. Therefore, we should make adjustment on fisheries strategic structure.

First of all, vigorously develop the marine fishery, encouraging deep-sea backbone enterprises to establish production, transportation facilities in the foreign fishery base, further improve the technology and equipment, improve operation mode, improve the ocean vessel freezing technology, through the reform of the nets, lamps, and a series of comprehensive production technology application the introduction of the fishery and navigation equipment, new technology to improve the level of purse seine fishing boat, improve efficiency, improve the fishing efficiency; secondly, developing aquaculture,

for serious degradation of current fishery resources, vigorously promote the factory farming and large deep - sea cage culture, and vigorously develop ecological the scale, intensive, standardized breeding; thirdly, the application of cutting-edge technology in the fishing industry, relying on scientific and technological progress and innovation to cultivate brand varieties, breeding, In the original varieties rejuvenation and rare species of breeding and upgrading, improve the added value of marine fishery.

Transformation and upgrading of marine fishery is bound to promote the increase of fishermen's income, improve the enthusiasm of fishermen's labor, and realize the healthy and fast sustainable development of marine fishery.

(2) Strengthening the port infrastructure construction. Rapid rising of port cargo and container throughput puts forward higher request on port infrastructure construction, to the port of the efficiency of customs clearance of goods, container handling efficiency and service level of port are put forward severe challenges. First, in the container as the main direction, accelerate the construction of port infrastructure, for the formation of layout optimization, perfect function, supporting advanced line system. Adapt to the need of raw materials of economic development, its scale, deep-water berths, information management and the function of the port diversification as the goal, the construction of large container, ores, crude oil transportation system, to accelerate the construction of container berths and perfect the system of container transport, and constantly open up new container flights; secondly, vigorously develop the ocean and container transport, and the establishment of a mainly large ocean going ships, combined with the ocean, large, medium and small accessories, with competitive modern transport fleet, and strive to improve the ability of marine transportation.

Marine capacity on quality, focus on the development of container ships, liquefied gas carrier and Ro-ro, to further promote the coastal ships to develop towards the direction of large-scale, specialization and modernization. Maritime passenger transport should focus on the development of tourism, comfort, high speed, regional development to encourage the development of roads, railways, waterways and other transportation, integrate transport resources and improve transport efficiency and efficiency.

(3) Facilitating the development of coastal tourism. Aiming at the problems of Ningbo City in coastal tourism and marine wholesale and retail trade, catering industry of the third industry proportion is too low, first of all, we should give full play to the East Chittagong, Hemudu Du culture, hometown of celebrities, in Gold Coast Tourism Resources, and promote the development of coastal tourism industry, tourism management system, set up tourism group, tourism investment and development company should be to the tourist attractions of the depth development and investment as the focus, increase investment in tourism projects. To speed up the Xiangshan pine Lanshan, Chinese village, Chinese Fishing Festival as the main content of the East China Sea coastal tourism zone layout of the implementation of the plan, strengthen the coastal tourism resources development, tourism product planning, infrastructure construction and tourist market development; secondly, the further integration of coastal tourism resources, strengthen the coastal tourism concept, breaking the barriers in the resource area development, facilities, marketing and other aspects, strengthen the combination with writing, and gradually realize the barrier free tourism throughout the region, go big union, big development, big market of the road, the formation of competitive international and domestic tourist attractions, outstanding waterfront

scenery, historical culture and marine characteristics, in line with the development of modern ecological tourism demand tourism, leisure, business and exhibition, industrial visits and culture, exploration, and fishing boats, fishing village tourism, to highlight its own characteristics, To avoid duplication of construction, and gradually realize the tourism industry from the low level to high level, from a single product to the transformation of tourism products to enhance the level of tourism.

(4) Cultivating and expanding the shipbuilding industry and marine machinery. Ningbo City shipbuilding industry output value rise from 4578 million 420 thousand Yuan in 2001 to 442 million 360 thousand Yuan in 2006 with the annual growth rate of nearly 190%. Ocean shipping is a capital, technology intensive and labor intensive industry, industry related degree is high, is a modern marine economy in the support of the industry. From the world ocean ship manufacturing center from Western Europe to the United States and transferred to Japan and South Korea, we can see, Ningbo City in labor, cost and resources with a certain competitive advantage, should seize the important opportunity of the industry transfer to undertake. At present, Ningbo shipbuilding industry has made great progress, but Shanghai and Dalian still have a large gap, so the next step should be the focus of further expand the scale, improve the level of technical equipment, ship repair first, use at the geographical advantage of the Yangtze River Delta, relying on the existing shipbuilding and ship repairing enterprises, increase the technological transformation efforts seize the good opportunity of world shipbuilding industry transfer, adhere to independent development, the introduction of technology and technology innovation combined, to end the development and industrial cooperation, strengthen the overall planning layout of communication industry, the

positive development of modern assembly shipbuilding, accelerate the construction of a number of major shipbuilding projects; secondly, the government should strengthen the guidance, accelerate Ningbo port linkage Beilun, Hong Kong, Daxie port, improve industrial concentration, extend the product chain, to expand the scale, focus on the development of the large oil container and bulk cargo ship, natural Gas ship; thirdly, guide SMEs actively involved in supporting the production of shipyard, and vigorously develop steel plate for ship, diesel engine, boiler, anchor chain, hardware, instrumentation, chemical industry, building materials, computer, application software supporting industries, development ocean environment monitoring technology, ocean remote sensing technology related technologies and products, efforts to form a unique characteristics of marine monitoring instrument manufacturing industry, formed in the shipbuilding industry is the core of industrial clusters and new materials production and supply base, improve the shipbuilding industry concentration.

(5) Developing oil and gas processing and marine chemical industry. Ningbo City is located in the East China Sea coast where there is rich in oil resources should be well offshore oil and gas resources exploration, exploitation and utilization, focus on the development of deep processing products, rely on scientific and technological progress the implementation of large-scale, intensive production, improve the market competitiveness of products, especially the continental shelf in the East China Sea oil and gas development, such as the Chunxiao oil and gas field, at the same time, increasing in oil and gas development in shallow sea island, stable oil production; accelerate the construction of the national oil reserve base in Zhenhai, improve its own oil reserves and processing capacity.

Marine petroleum chemical industry adapts to the development trends of the world petrochemical industry, the key to large-scale, intensive, integrated development, to refining and ethylene project as the support, to liquid chemical wharf relying on, construction of three synthetic materials and petrochemical processing base, at the same time to organize experts on chemical area for evaluation of the overall environment, to prevent pollution of the environment.

Salt industry should speed up technological innovation and product upgrading, improve product added value, expand the scale of production, improve the level of production, key production of pharmaceutical intermediates, fuel intermediates and photosensitive material chemical products and salt series products.

(6) Speeding up the development of Marine electricity and construction industry. The added value proportion, developing speed, output value, labor productivity and employment contribution of marine electric industry accounts for a place in the city of marine economy. Therefore, we should fully use at the geographic location of the coast of the East China Sea, using rich tidal energy, the monsoon effect, along the sea and island wind, large and stable characteristics, can use clean and pollution-free tidal, wind power generation.

Marine construction industry occupies a large proportion in Ningbo marine economy, fast development, such as the Jintang Bridge, Xiangshan Wushashan power plant. These projects related to the protection of the marine environment, therefore, should strengthen the verification of the use of the sea area, the environmental impact assessment of the project involved in the sea, and strictly control the negative impact on the marine environment.

(7) Paying more attention to the marine high-tech industry. Accelerate developing seawater desalination industry and actively promoting the comprehensive utilization of seawater, expanding marine biotechnology and medicine and other emerging industries. In particular, desalination and comprehensive utilization, is the most potential areas, because there are a large number of chemical resources in the sea to be developed and utilized. Ningbo City in seawater desalination technology development faster, this is a to solve water shortage problems in an important way, is also a contains a huge potential economic growth. Therefore, Ningbo city should rely on the technical strength, make full use of the advanced achievements and vigorously developing seawater desalination.

Developing marine monitoring technology information service. Integrating the whole city's marine information technology and resources, fostering marine information services, marine information services to achieve social and industrial. Establishment of marine illustrations make access, marine logistics data exchange, marine environmental monitoring, marine disasters forecast warning, marine engineering projects evaluated by the sea, marine engineering consulting services information service system.

Implement the funds tilt for the development of marine high-tech industry. Strengthening the cultivation and introduction of marine professional talents, building marine personnel education and training base and establishing talent exchange mechanism and incentive mechanism.

### **3 The safeguards for Ningbo City's marine economy development**

After the proposal of the marine economic development, the local government and relevant administrative institutions in Ningbo City still need to take scientific and effective safeguards to control the security. The specific recommendations are as

follows.

(1) Strengthening the universal education and professional education of marine knowledge. It can promote public participation in marine affairs, and enhance people's awareness of the ocean, is the whole society care and understanding of the important status and role of the ocean in the national economy, consciously establish consciousness of marine land resources protection, lay a good foundation of society to improve the marine development and management.

(2) Adhering the principle of sustainable development. Changing the concept of ocean development, doing overall marine planning and fully considering a variety of functions and resources utilization of the conflict and balance, formulated in a certain period of time, a certain area with things of marine resources development and environmental goals, form the development and use of environmentally benign interaction. And according to the division of marine functional donation, marine development and protection planning, through the integrated and coordinated, guide the marine industry to follow the principle of sustainable development, equitable distribution of marine resources and space, to prevent the development of disorder and repeated construction and waste of resources, maximize to improve resource utilization.

(3) Promoting the development and utilization of marine resources and the marine environment supervision system construction. It can make the legalization of the management utilization, development, environmental protection and other laws to, in the realization of the rule of law of the sea. Gradually form a comprehensive decision-making mechanism for marine development and management, the

implementation of integrated management. To formulate a unified marine development policy, technical policy and protection policy, improve the quality of law enforcement personnel, intensify law enforcement, and improve the efficiency of comprehensive development.

(4) Strengthening the protection and management of the marine environment. Carrying out the policy of “prevention first, combining prevention with control”, and implement the relevant national environmental impact assessment system. Conscientiously implement the state promulgated the 《Law of marine environmental protection》, 《Law of sea area utilization management》 and other laws and regulations, to accelerate the development of the marine regional development, marine ecological protection, pollution prevention, coastal zone management involving sea system of laws and regulations on the establishment and perfection. Strengthen to land-based pollution, dumping waste into the ocean, offshore oil exploration and exploitation, control and management of ship sewage, curb the marine environment deterioration momentum; carry out focus on coastal environment remediation and restoration work, and gradually improve the marine environment monitoring network, the sound of ocean stereo monitoring system.

(5) Strengthening the comprehensive management and guidance of the ocean. Improving the marine management system, strengthening coordination and cooperation between departments, forming the multi-sectoral cooperation in the marine law enforcement system. Improving the consciousness and initiative of the whole society to exploit and protect the ocean, to improve the social and economic benefits of the

development and utilization of the ocean and realize the sustainable development of the marine economy.

(6) Sounding marine public service system. Establishing marine geographic information system, strengthening coastal ocean monitoring station and establishing a multifunctional monitoring system to improve the monitoring capacity and monitoring level. Strengthening the coastal seawater intrusion, land subsidence, red tide, storm surges and typhoon, marine disaster prevention and control, the establishment of marine disaster early warning and defense system and maritime salvage mechanism, improve the response to the disaster weather and sudden shipwreck events ability.

(7) Establishing a global consciousness and carrying out international cooperation. Our humans has only one earth, sharing a marine, solve ocean problems requires the joint efforts of all countries in the world, we should actively promote multilateral cooperation, learn lessons from foreign marine resources comprehensive utilization and environmental protection technology, to improve the ability and level of the advantages of marine resources exploitation and utilization in the future.

## **Summary of Chapter3**

In this chapter, by taking the typical example of Ningbo Port successful operation experience, I put forward several feasible measures for each leading industry of Ningbo City's marine economy. The main perspective is strengthening and upgrading leading industries' advantages and forming the regional core competitive power of Ningbo City's marine economy. Meanwhile, suiting the measures to local conditions to develop distinctive economy and forming the differentiation development with the neighboring

regions so that strengthening linkage and complementary advantages, finally, forming the virtuous circle pattern of marine economy development.

Conclusions of specific ideas for each leading industries of Ningbo City are as follows:

- (1) Transformation and upgrading for marine fishery
- (2) Strengthening the port infrastructure construction
- (3) Facilitating the development of coastal tourism
- (4) Cultivating the shipbuilding industry and marine machinery manufacturing
- (5) Developing oil and gas processing and marine chemical industry
- (6) Speeding up the development of Marine electricity and construction industry
- (7) Paying more attention to the marine high-tech industry

## **Discussion & Results**

Before summarizing the conclusions of this paper, I will firstly discuss the reason why I choose “Leading industry selection theory”.

(1) As for its status, leading industry occupies the most prominent position in the industry system.

(2) From the aspect of improving the quality of industrial structure, in certain stage, leading industry can constantly rapid develop and absorb new technology and advanced industrial structure to successfully promote the effective industrial sector.

(3) From the aspect of promoting the characteristics and performance of national economy development, leading industry accounts for the large amount proportion of GDP and plays an leading-chain role in the national economy.

(4) As for its influence, leading industry is the pillar that take the lead role in the national economy, it can promote the development of whole national economy and industrial structure upgrading.

(5) Leading industry is a kind of industrial sector which is able to absorb more advanced technology, maintaining a high growth rate and having a strong leading impaction for other industries while facing large increase of demand.

Therefore, leading industry as an object with the advantages of accounting for a certain proportion in output value, occupying a control status, developing rapidly, high technical absorption/progress rate and playing the leading-chain role in the economy development of other industries and entire region is a reasonable and necessary choice.

Secondly, I will discuss why I take developing experience of Ningbo Port Ltd. as an example. On the one hand, marine logistics belongs to marine transportation industry

system which is accounts for a large amount of marine economy proportion in Ningbo City as a pillar industry. Ningbo Port Ltd. is mainly operating port logistics business and it has a very successful developing achievements in recent years which provide a lot of valuable experience and enlighten for me.

On the other hand, Ningbo Port is the most typical one to represent the Ningbo City's future direction of marine economy development. The reasons are as follows: Ningbo Port is China Coast key development and construction of deep-water hub port with the prominent advantages of channel depth, shoreline resources and development potential etc. As the operating main body of Ningbo Port public wharf, in the main business of harbor handing, it has accumulated a wealth of experience, built a high-quality of service brand and a great relationship with government, port unit, shipping company, owners and agents which form the internal advantages for Ningbo City's port logistics development.

After that, I will summarize the following conclusions which are worthwhile to pay more attention to:

The innovation of this paper is that the past analysis of marine economy in Ningbo City was limited to qualitative analysis, lacked of convincing evidence and data, but this article use lots of objective data and indicators of economic analysis of marine economy, to analyze it by quantitative methods: Secondly, in the past, the marine industry analysis lacks of analysis of contributions from the employment, this article analyzed the influence of the industrial employment of the marine economy on the choice of the leading industries, there by expanding the perspective of the choice of leading industry in marine economy.

The most prominent characteristic of paper is that by horizontal and vertical data comparison of Ningbo City's marine economy development and other domestic marine economy city, accurately analyzing the pros and cons during the process of Ningbo City's marine economy development so that it can make the solutions and safeguards more targeted.

The most prominent discovery of this paper is by choosing the leading industrial selection theory, through the comparison of the Ningbo City's each marine economy industries' development contribution to the regional GDP in the past years, it can be concluded that offshore oil and gas extraction and processing industry, coastal ship manufacturing industry, marine chemical industry, maritime construction industry and marine port transportation industry are the most appropriate marine industry for Ningbo City to strengthen investment and development.

The main perspective of this paper is strengthening and upgrading leading industries' advantages and forming the regional core competitive power of Ningbo City's marine economy. Meanwhile, suiting the measures to local conditions to develop distinctive economy and forming the differentiation development with the neighboring regions so that strengthening linkage and complementary advantages, finally, forming the virtuous circle pattern of marine economy development.

Finally, of course, due to the limited level of mine, the analysis of current situation and issues of Ningbo City's marine economy development is not specific, the understanding of leading industry selection theory and research method is not sufficient, there are lots of shortcomings in my conclusions. Here, I really hope each professors to criticize and give some valuable suggestions for me.

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