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## Port development under the background of One Belt One Road

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**WORLD MARITIME UNIVERSITY**

Malmö, Sweden

**Port development under the background of One Belt  
One Road**

By

**Lin Shiao**

A dissertation submitted to the World Maritime University in partial  
Fulfilment of the requirements for the award of the degree of

**MASTER OF SCIENCE**

**In**

**MARITIME AFFAIRS**

**(THE NAME OF THE SPECIALIZATION)**

2021

## DECLARATION

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

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

(Signature): .....

(Date): .....

Supervised by Professor Shi Xin

Supervisor's affiliation: Shanghai Maritime University

## **Acknowledgements**

The study in ITL project is coming to an end. Looking back on this learning experience, I have too many feelings. Although I have paid a lot of hard efforts, I deeply feel that all the efforts are worthwhile. After this period of learning, I have learned a lot both in life and work, and I have also learned a lot of valuable knowledge and experience from teachers and classmates around me.

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Unusual to thank my parents, they for my upbringing grace, silently in the life, study for me to provide all possible help.

During my study, I was grateful to my classmates for their help.

## **ABSTRACT**

Title of research paper: **Port development under the background of One Belt One Road**

Degree: **Master of Science**

In 2013, President Xi Jinping put forward the great national initiative of "building the Silk Road Economic Belt and the 21st Century Maritime Silk Road through regional cooperation, from lines to pieces." One Belt One Road initiative plays a role in promoting global trade and regional cooperation. As an important node and hub in the comprehensive transportation network, port plays an important role in it.

Based on the research data, this paper first interprets the relevant concepts of One Belt One Road initiative. Secondly, the paper analyzes the status quo of important overseas ports and domestic ports under the One Belt One Road initiative through data and facts. Then analyze the port development opportunities brought by One Belt One Road mainly include increased trade volume, increased port investment and increased port cooperation opportunities. At last, it points out that there are still some deficiencies in port development, such as lack of unified deployment, severe disorderly competition and low level of port function. According to the analysis, the development direction of the port is to unify planning and strengthen cooperation; Improve the port service function, expand the network of land and sea combined transport; To realize the digital transformation of ports.

**KEYWORDS** : One Belt One Road, Port development

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## **1. Introduction**

### **1.1.Thesis Topic Background**

One Belt One Road is China's top-level national cooperation initiative. Since it was put forward, it has greatly promoted the economic development of the region along the line. It can be said that the One Belt One Road initiative has also brought great opportunities and challenges to the Port market. The theme of this paper is " Port development under the background of One Belt One Road ". One Belt One Road initiative is a long-term and positive way to promote the economic and development of cooperative areas. For the port, its positive effect is great. Most of the research on One Belt One Road port development is conducted by Chinese scholars. Some scholars believe that one belt one road initiative has positive effects on port development. While some scholars believe one belt one road initiative, has negative effects on port development, and its development is not as good as that of non-node ports and port city. Most scholars analyze the current situation of port development and think that most ports respond positively to the One Belt One Road initiative, but there are also some problems. On this basis, they give suggestions for port development.

### **1.2. Purpose of Paper**

Research Objectives and Methods: One Belt One Road Initiative brings new opportunities and challenges to ports. One Belt One Road initiative plays a promoting role in port development. The purpose of this paper is to summarize and analyze the specific performance, explore the position and deficiencies of ports in One Belt One Road initiative, and then put forward development suggestions so as to make the port industry develop better. It focuses not only on domestic ports, but also analyzes foreign ports and the actions of win-win cooperation between China and foreign countries, and can thoroughly analyze the positive role One Belt One Road initiative has brought to port development. The first part is about One Belt One Road Initiative, and analyzes its relationship with port development. The second part is the construction of important overseas ports along the One Belt One Road. Using the method of literature to make a statement of facts. And study what China has done in its overseas ports. The third part focuses on several important domestic ports such as Pearl River Delta Port Area and Yangtze River Delta Port Area to explore the substantive progress made in port development since the One Belt One Road initiative was put forward. This part uses data analysis and historical comparison methods to explore. From the port cargo (container) throughput, container terminal and the increase number of berths, port berth efficiency three aspects are analyzed. Port investment and transportation opportunities brought by the One Belt One Road Initiative. This paper mainly analyzes the increase of trade volume, port enterprises' going out (investment) and port alliance by case analysis method. The fifth part points out the problems existing in port development, and the sixth part puts forward some suggestions for strengthening port development according to the problems in the fifth part. To better fit the One Belt One Road initiative for port development.

### **1.3. Literature review**

One Belt One Road is an initiative proposed by China in 2013 to promote regional cooperation, which has brought political, economic and cultural benefits. One Belt One Road plays a positive role in the conclusion of trade contracts, and also plays a driving role in shipping and port business. In the past time, Chinese ports have gradually occupied the world container port list. Port development under the background of One Belt One Road has become a hot topic.

Most of the researches on port development under the background of One Belt One Road are completed by Chinese scholars. However, the research conclusion is controversial. In the area along the initiative role of port development, Lu Bo & Qiu Weiquan (2020) by PSM - DID model found that under the condition of considering all factors, One Belt One Road initiative to coastal node significant role in promoting regional economic development, but after eliminating other factors such as common trend and impact, One Belt One Road initiative to node in the coastal areas in economic development has a negative net effect. This indicates that although the economic development speed and quality of coastal nodal areas are generally better than other non-nodal areas, the advantages are not brought by One Belt One Road. One Belt One Road, instead, weakens the advantages of ports and hinders the development of ports. But there are different points of view. Liu Jie & Wang Lingfeng (2015) believed that ports, as an important node of logistics chain, have great opportunities for development under the One Belt One Road initiative. Its good performance in the port throughput increases and international docking function. Gao Ti peng (2020) believes that from 2013 to 2018, the efficiency of major coastal ports in China has an obvious improvement trend under the One Belt One Road initiative, but there are great

differences among different ports. In general, the One Belt One Road initiative has promoted the port development, but the effect may not be reflected in the port economy, but in the improvement of function and efficiency.

Zhao Yu (2017) has viewed about the Melaka Gateway. Melaka Gateway is of great significance to One Belt One Road, mainly in the following aspects: 1. It is conducive to promoting the construction of international logistics channel and meeting the needs of international shipping development. 2. Conform to the development vision of "One Belt One Road" and consolidate China's strategic position in Southeast Asia. Zhou Taidong (2020) proposed that after the acquisition of Piraeus Port, COSCO Marine vigorously implemented localized management. While the global shipping situation continues to slump and the overall economic environment of Greece continues to deteriorate, the throughput of Piraeus Port 's container port still achieved double-digit growth. The Piraeus Port project has laid the foundation for Chinese companies to invest in Greece. It can bring enlightenment to promote the construction of One Belt One Road.

From a narrow perspective, on the topic of "One Belt, One Road" and port areas, Yang Sumei(2017) proposed that the Pearl River Delta is the core area of the One Belt One Road initiative. At present, the Pearl River Delta port and shipping industry has more advantages than disadvantages in going global and faces more external opportunities than threats. The paper also puts forward suggestions to improve relevant supporting policies, integrate resources, form joint forces, identify the basis points of cooperation, further enhance the soft power of the port and shipping industry, and actively carry out cultural exchanges with countries along the Belt and Road. One Belt One Road also brings new opportunities for the development of the port and shipping market in the Yangtze River Delta. Wang Chuanxu (2017) pointed out that there are still various

problems in the development of the Yangtze River Delta, such as the increasing uncertainty faced by shipping, the incomplete release of functions, and the shortcomings of multimodal transport infrastructure. Therefore, the Yangtze River Delta should perfect the mechanism, establish the risk prevention mechanism of One Belt One Road, and promote the regional integration of the Yangtze River Delta.

Ruan Hongwei, Li Xiaojing & Lai Xiuyun (2016) divided the competitiveness of 15 coastal port cities by factor analysis. The first competitive level is Shanghai. Second level city competitiveness: Tianjin, Guangzhou, Shenzhen; Third-level city competitiveness: Ningbo, Qingdao, Yantai, Dalian, Fuzhou, Xiamen and Quanzhou; The last four: Zhanjiang, Shantou, Haikou and Sanya. Suggestions are put forward that the port city alliance should be formed to strengthen the leading role of the head city. Furthermore, the port development under the background of One Belt One Road is analyzed by taking specific ports as individual cases. The main research focuses on popular ports such as Tianjin Port. Zhu Peide (2014) proposed that Lianyungang could take advantage of its advantageous geographical position and seize the opportunity to carry out port and shipping cooperation at home and abroad. Wu Wenling. (2018) judged that from 2012 to 2016, the improvement of the scale efficiency of major coastal ports promoted the continuous improvement of the comprehensive technical efficiency of ports, indicating that the scale efficiency of major coastal ports in China has improved under the background of One Belt One Road through model establishment. The efficiency level of the port industry is closely related to the domestic and foreign macro economy. As an important strategy of China's comprehensive opening up, the "One Belt One Road" strategy will promote the rapid development of domestic import and export trade, thus playing a certain role in promoting the efficiency improvement of the port industry.

Chinese ports go out and carry out international cooperation, which plays an important role in establishing the fulcrum of international shipping in One Belt One Road region, developing international shipping lines stably and enhancing the global competitiveness of ports. Chen Zhaomeng (2016) established the model of international cooperation of Chinese ports. The model construction of port cooperation is divided into three steps. The first step is to determine the function orientation of ports in different regions. The second step is to sort out the conditions of ports in corresponding regions and select target objects according to their geographical conditions, economic conditions and supporting traffic. The third step is to propose the specific mode of port cooperation according to the corresponding port situation.

Although One Belt One Road brings a lot of opportunities to the port development, at the same time, the port industry is also facing a lot of challenges. The port must constantly explore many ways to develop. Li Kewu (2019) proposed that digital transformation is an important starting point for port reform and an effective way for transformation, upgrading and high-quality development.

## **2. Interpretation of One Belt One Road initiative**

### **2.1.Related concepts of One Belt One Road initiative**

The earliest Silk Road started in ancient China. It was a land trade route between Asia, Africa and Europe, mainly dealing in silk, spices, porcelain and other goods. Then the

Maritime Silk Road came out, which started from the coastal cities of China and was divided into two routes, the East China Sea route and the South China Sea route, ending in the Arabian Sea and the east coast of Africa. The land Silk Road and the maritime Silk Road were important channels for trade and cultural exchanges in ancient China.

Chinese leader Xi Jinping proposed the cooperation initiative of building the "New Silk Road Economic Belt" and the "21st Century Maritime Silk Road" during his visit to Central Asia and Southeast Asia in September 2013. The two initiatives have drawn extensive attention from the international community. One Belt One Road is an economic concept of trans-regional cooperation. With the help of bilateral and multilateral mechanisms of China and other countries, One Belt One Road plays an important role in developing economy, improving people's livelihood and strengthening cooperation and exchanges between countries. The One Belt One Road initiative is aimed at promoting regional cooperation, mainly involving countries in Asia, Europe and Africa. At one end of One Belt One Road route is the East Asian Economic Circle, at the other end is the European Economic Zone, and in the middle runs the Eurasian and African continents with great development potential. The One Belt One Road initiative relies on the international passage on land and takes the central cities along the route as the support. Maritime routes take important ports as nodes to jointly create safe and efficient transport channels.

The background of One Belt One Road initiative is divided into three aspects: economic, cultural and political. In the context of economic globalization, more and more countries choose to complement each other in resources. The unbalanced development of regional economy is also an urgent problem to be solved. Cooperation between countries and regions became the theme. Since the financial crisis, the global

economy also needs stimulus to recover. For economy of China, it also needs a new source of stimulating growth. Excess capacity also needs more trade opportunities. In terms of culture, the world culture is diversified and there are cultural conflicts in different regions, so culture needs to communicate and cooperate. In terms of politics, the Asia-Pacific region is generally peaceful, but there are still uncertain situations. It is very important to enhance the voice of international discourse through multilateral cooperation.

By April 27, 2021, China had signed more than 200 cooperation documents on One Belt One Road cooperation with 140 countries and 31 international organizations. The Belt and Road cooperation projects have gradually covered all regions along the routes. Among them, infrastructure projects are mainly railways, ports and bridges, such as China-Europe Railway Express, Jakarta-Bandung high-speed railway in Indonesia, Moskva - Kazan high-speed railway, Gwadar Port in Pakistan, Piraeus Port in Greece, Padma Bridge in Bangladesh and so on. Industrial projects include China-Myanmar oil and gas pipeline project, power transmission line project in Egypt and Yanbu refinery in Saudi Arabia. Industrial Park projects include China-Belarus Industrial Park and Malaysia-China Kuantan Industrial Park. Humanities projects include the Silk Book Project, which mainly focuses on the translation of books from countries along the One Belt One Road route.

## **2.2. The relationship between One Belt One Road and port development**

As an important node and hub in the comprehensive transportation network, ports play an important role in promoting the development of global trade. Port efficiency



determines whether economic and trade flows are unimpeded or not. The proposal of the national initiative of "Silk Road Economic Belt" and "21st Century Maritime Silk Road" makes the port become the hot spot of the new round of development and opening up of maritime transportation and the focus of attention at home and abroad, which brings new opportunities for the open development of foreign transportation in China, Silk Road Economic Belt region and countries. Port enterprises, port engineering construction enterprises and port equipment manufacturing enterprises are all indispensable participants in One Belt One Road port construction. It can be said that the implementation of One Belt One Road is inseparable from the support of the port, and the One Belt One Road initiative also brings more development opportunities to the port. For China's ports, under the dual impetus of national policy and trade growth, construction and development are necessary. For foreign ports, the economic development brought by One Belt One Road initiative is also an important link in the trade route.

With the rapid development of manufacturing industry in Asian countries, the center of gravity of port shipping industry is gradually shifting to the east. The 21st Century Maritime Silk Road initiative can be a driving force for the development of the global port shipping industry. Since the inception of the Initiative, maritime transport routes have become increasingly smooth, bringing tangible benefits to the development of all countries and unleashing broader potential for economic and trade cooperation.

### **3. Development status of important overseas ports along the One Belt One Road region**

#### **3.1. Basic condition of ports**

There are many important overseas ports involved in the One Belt One Road initiative. This paper mainly analyzes the Chabahar Port in Iran, the Royal Port in Malaysia and the Piraeus Port in Greece.

Chabahar Port is an important port in Iran, located at the intersection of West Asia, South Asia, Central Asia and the Indian Ocean, with a very advantageous geographical location. Chabahar Port has a very high strategic position in Iran because it is expected to expand its surrounding radiation power and influence through Chabahar Port. For the international situation, Iran has a large number of mineral resources, through the investment development of Chabahar Port is also of great economic and political significance.

Located in the city of Malacca between Kuala Lumpur and Singapore, in the middle of the Strait of Malacca, the Royal Port consists of three man-made islands and one natural island. The main shipping lanes in the Indian Ocean are the Strait of Mandeb, the Strait of Hormuz and the Strait of Malacca, through which ships carry 40% of the world's cargo and commodity trade. King Port belongs to the cooperation project initiated by China One Belt One Road initiative. Previously, the status of the Royal Port was not obvious among Malaysia's many ports. Subsequently, the deep-water port

project was established to replace the port of Singapore as the largest deep-water port in Malacca.

Greece is the meeting point of the land Silk Road and the maritime Silk Road. Piraeus Port is located in the city of Piraeus in Greece, with a total coastline of 24 kilometers and a total area of 2.725 million square meters. It is the largest port in Greece and one of the largest ports in the eastern Mediterranean region. Shipping can be radiated to the whole Mediterranean Sea, the Black Sea, North Africa and other surrounding areas, so the location is very important. Piraeus Port is a major port after the One Belt One Road trade route into Europe, which can be connected with the Silk Road Economic Belt by the Central European Land and Sea Express Line.

### **3.2.The major construction projects in which China is involved**

The development of China's global trade and One Belt One Road initiative is the backdrop to China's increasing involvement in overseas port projects. China is a country highly dependent on maritime trade. With the development of its economy, China's demand for maritime trade and the security of energy channels is gradually increasing. Many countries also see China as an opportunity for their own development and are willing to cooperate with China on port projects.

China's investment in Chabahar Port is reflected in both infrastructure and operational facilities. In 2016, the Iranian government signed an agreement with China to build a nuclear power plant in Chabahar port. At present, Chabahar Port has established a number of commodity wholesale and storage facilities. The addition of Chinese

shipping companies to Chabahar Port will link 45 major ports around the world with 162 countries with trade relations.

At the same time, the participation of Chinese enterprises in the construction of Chabahar Port can bring benefits to Iran in many aspects, such as promoting the development of Iran's iron ore and copper resources.

As the largest user of the Malacca Strait, it is of great significance for China to cooperate in the construction of the Royal Port. China and Malaysia jointly build the Royal Port, and the deep-water terminal will be under general contract and directly managed. When the project is completed, China will have a 99-year concession and ownership of the land on the artificial islands in the Royal Port. This will help China win the initiative in the Malacca region and stabilize economic and trade development.

In April 2016, COSCO Shipping Group and the Development Fund of the Republic of Greece officially signed the Equity Transfer Agreement and Shareholders Agreement of the Piraeus Port Authority, marking a milestone in COSCO Shipping Group's acquisition of 67% equity in the Piraeus Port project. After COSCO Shipping acquired the Piraeus Port, it overcame many difficulties and took various measures to turn it from loss to profit. At the same time, with the help of the superior geographical location of the Piraeus Port, Cosco actively expand the scope of business. Cosco already uses the Piraeus Port as a transshipment hub for Chinese container ship exports from Asia to Europe. The Shanghai Port of China also signed a new cooperation agreement with the management of the Piraeus Port of Greece to further strengthen the cooperation between the two ports in economy, trade and other fields and jointly promote the construction of the One Belt One Road. According to Wang Chunzhi's research (2018), "the goods imported and exported from China to Europe are directly transported to the hinterland of Europe via Greek-Macedonia-Serbia-Hungary railway

through the sea route with Piraeus Port as the transit station. The new route opens up the shortest sea route between China and Europe, shortening the shipping time for Chinese goods to reach Europe by 7-11 days." In 2017, the throughput of Piraeus Port exceeded 4 million TEUs and its global ranking continued to rise. According to Greek media, since COSCO acquired Piraeus Port, it has directly provided and created more than 2,600 jobs and indirectly provided and created more than 8,000 jobs. According to the benefits of Piraeus Port, the benefits of cooperation between COSCO and Piraeus Port are two-way, which is in line with the purpose of win-win cooperation of One Belt One Road. Piraeus Port has become the European "One Belt One Road" construction project promoted by Chinese policy makers in the past two years.

Among the world's top 200 overseas ports in terms of throughput, more than 20 are operated by Chinese enterprises. Chinese companies have supported ports in more than a dozen countries, including Greece, Myanmar, Israel, Djibouti, Morocco, Spain, Italy, Belgium, Cote d'Ivoire and Egypt. The layout of China's ports overseas has achieved a full coverage of six continents. With the deepening of economic cooperation between China and countries along the "One Belt One Road" initiative, the number of cooperation projects in port will continue to increase, and the space for cooperation in shipping and land logistics will gradually open up.

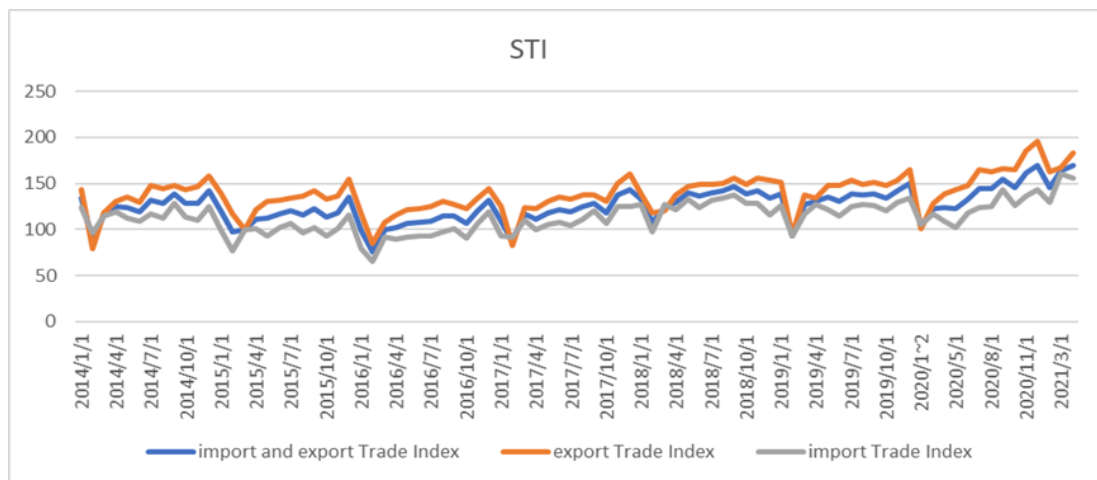
#### **4. Port investment and transportation opportunities brought by One Belt One Road initiatives**

#### **4.1. An increase in the volume of trade and cargo**

According to the Maritime Silk Road Trade Index, "One Belt One Road" Shipping Trade index and the Import and Export Trade Index, we can analyze the growth of China's trade since the One Belt One Road initiative was put forward. Maritime Silk Road Trade Index (STI) is developed and compiled by Ningbo Shipping Exchange. The data comes from the monthly import and export Trade data of the customs, which is composed of export Trade Index, import Trade Index and import and export Trade Index. And from the overall trade index, regional trade index, special trade index and other different aspects to measure the development level of China's foreign trade and reflect the development trend of China's foreign trade. The index is released monthly with a base period of 100 basis points in March 2015. The "One Belt One Road" Shipping Trade Index is developed and compiled by the Shanghai Maritime Exchange. The index consists of three categories: "One Belt One Road" Trade Volume Index, "One Belt One Road" Container Shipping Volume Index and "Maritime Silk Road" Freight Rate Index. The index covers not only containers, but also bulk commodities such as coal, iron ore and crude oil. It directly reflects the change and interrelationship among trade volume, cargo volume and transportation price. The base period of the index is January 2015, and the base period index is 100 points. The China Export Leading Index, is issued by the General Administration of Customs. The index contains processing trade import, foreign direct investment, and investment in major economies consumption seven macroeconomic indicators, such as orders, faith, cost three microscopic index of the questionnaire survey to obtain information through the network, statistical processing of synthetic monthly comprehensive index, can be used to predict warning export market of our country's future two or three months. According to international practice, the index is expressed by numerical value, and its

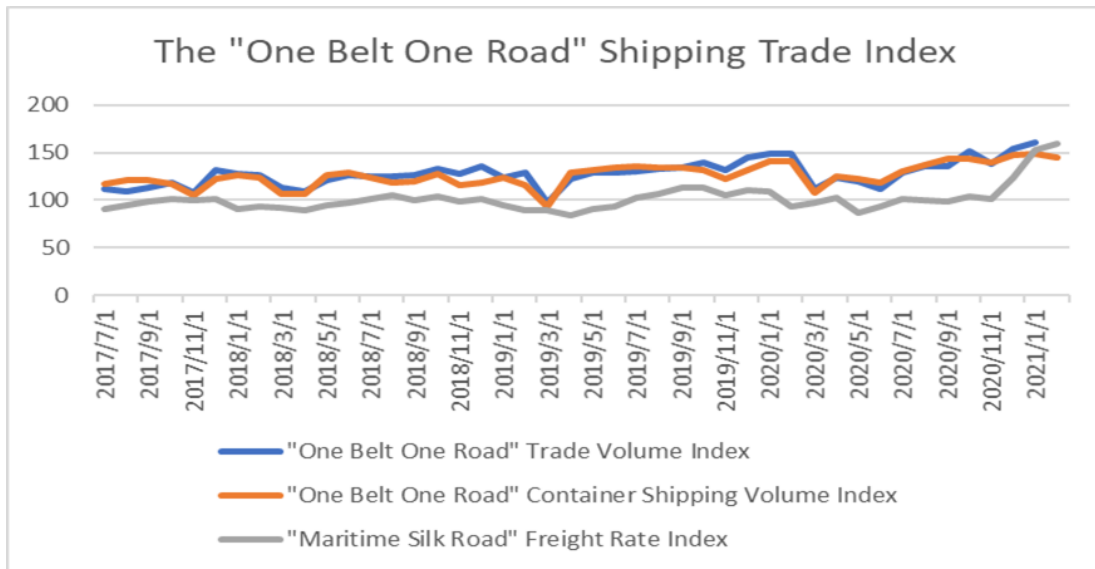
value is positively correlated with the rise and fall of the export situation. The expansion of its value indicates that the export situation in the next 2-3 months tends to be optimistic. On the contrary, it indicates that the export will face a certain downward pressure.

**Figure 1** China's Maritime Silk Road Trade Index from January 2014 to April 2021



The chart above shows China's Maritime Silk Road Trade Index from January 2014 to April 2021. The minimum value of the Export Trade Index was 79.07 in February 2014. The minimum values of Import and Export Trade Index and Import and Export Trade Index were 66.02 and 75.28 respectively, both in February 2016. The maximum values of Export Trade Index, Import Trade Index and Import and Export Trade Index were 195.46, 160.42 and 169.85, respectively, which were all in 2021. It can be concluded that the maritime Silk Road trade has indeed been well promoted, and the latest data show that the import and export trade in 2021 started well with significant growth, and the sustainability of trade has been effectively guaranteed.

**Figure 2** The "One Belt One Road" Shipping Trade Index from July 2017 to February 2021



The above chart shows the "One Belt One Road" Shipping Trade Index from July 2017 to February 2021. In April 2019, "Maritime Silk Road" Freight Rate Index reached its lowest at 84.29. The "One Belt One Road" Trade Volume Index and the "One Belt One Road" Container Shipping Volume Index formed the minimum values in March 2019, which were 96.57 and 93.76 respectively. Similar to the Maritime Silk Road Trade Index, the three indexes reached the maximum value in 2021: the "One Belt One Road" Trade Volume Index was 161.07, the "One Belt One Road" Container Shipping Volume Index was 148.25, and the "Maritime Silk Road" Freight Rate Index was 159. As can be seen from the figure above, the trade volume, trade value and transportation price change almost synchronously, and the overall state is rising. This is also a positive reflection of the One Belt One Road initiative.



**Figure 3** The China Export Leading Index from July 2014 to April 2018



The chart above shows The China Export Leading Index from July 2014 to April 2018. From the index trend, from 2014 to December 2015, the export index of foreign trade declined, indicating that we are facing export pressure. However, from 2015 to 2018, the export index of foreign trade showed an upward trend, indicating that the future export form is optimistic. The remaining indices are the actual reflection of the volume of change in foreign trade.

In conclusion, it can be seen from the big data of One Belt One Road that this initiative has played a positive role in promoting intra-Chinese trade. According to the data of the National Bureau of Statistics of China, under the background of One Belt One Road, the trade volume between China and the One Belt One Road countries along the route has gradually increased in proportion to the total foreign trade, from 25% in 2013 to 27.4% in 2018, bringing huge multilateral benefits.

According to the Statistics Bulletin of the People's Republic of China on National Economic and Social Development in 2020, the cargo throughput of China's ports in 2020 was 14.5 billion tons, an increase of 4.3% over the previous year, and the container throughput of China's ports was 264.3 million TEUs, an increase of 1.2% over the previous year. The total import and export volume of One Belt One Road countries was 9,369.6 billion yuan, an increase of 1.0 % over the previous year. Of this, exports amounted to 5426.3 billion yuan, up 3.2%; Imports were 3.943.3 trillion yuan, down 1.8%. Judging from the trade data and cargo volume, port development is at a favorable stage.

#### **4.2. Policy support**

The implementation of the One Belt One Road national initiative is a great opportunity for the construction and development of coastal ports. The Ministry of Transport of China has formulated the Implementation Plan for the Implementation of One Belt One Road Strategic Plan, and introduced a series of measures to accelerate transport infrastructure connectivity, promote international transport facilitation, and encourage transport enterprises to be global. On the one hand, domestic ports will expand foreign trade and participate in the construction and operation of foreign ports. On the other hand, they will extend the hinterland to the west and speed up the construction of international and domestic "waterless ports". The rational planning and layout of "waterless port" and the planning and construction of the east-west sea-rail combined transport channel are becoming more and more important. The two plans, Vision and Actions for Joint-building the Silk Road Economic Belt and the 21st Century Maritime Silk Road, and the Development Plan for the Construction of China-Europe Express

Trains (2016-2020), cover a total of 18 ports along China's coast. These ports are responsible for 64% of the cargo throughput of coastal ports, 71% of the foreign trade throughput, and 90% of the container throughput and 97% of the international shipping line container throughput.

The national development strategy of the Yangtze River Economic Belt is another major strategic deployment made by the Chinese government, which provides development opportunities not only for inland river ports, but also for ports in the lower reaches of the Yangtze River and its surrounding coastal areas. According to the Plan for the Comprehensive Three-dimensional Transport Corridor of the Yangtze River Economic Belt, by 2020, a convenient and efficient comprehensive three-dimensional transport corridor of the Yangtze River Economic Belt will be built that traverse the east and west, connect the north and south, and connect the Yangtze River and the sea. The golden waterway of the Yangtze River, with Shanghai International Shipping Center as its leader and the Yangtze River trunk as its backbone, with its trunk and branch networks connected and its transportation system complete, will boost the development of the coastal ports in the lower reaches of the Yangtze River and the Yangtze River Delta.

For port enterprises, under the guidance of policies, they can more directly and accurately understand the government's guidance, and also understand the market to a large extent, so as to develop into a port more in line with the market demand.

### **4.3. Port investment**

Since the One Belt One Road initiative was put forward, not only has the total amount of China's outbound investment increased year by year, but also the total amount of foreign investment has also been on the rise because of the greatly relaxed market access and the strong attraction of the investment environment. In the One Belt One Road initiative and the new development pattern, China has maintained good economic and trade relations with countries along the One Belt One Road and ASEAN, and has become an important support for "stabilizing foreign investment" and "stabilizing foreign trade".

According to the "Investment Analysis and Prospect Forecast Report of China Port and Wharf Industry in 2016-2020" released by CIC Consultant, the total investment of port water conservancy projects planned to be started in the future will reach 176.592 billion yuan, accounting for 16.95% of the total investment of "One Belt One Road" plan. It shows the importance of port and shipping investment. For domestic port investment, the Bohai Rim port group has the highest investment enthusiasm, followed by the Pearl River Delta port group and the Yangtze River Delta port group. But the financing method of Chinese ports is relatively simple. In addition, the investment capital of the port is huge, and the investment capital is irreversible and the payback period of the port is long, which is not conducive to the sustainable development of the port. The financing method of some ports adopts "landlord port", which can give consideration to the interests of the government and enterprises, improve the efficiency of the port, avoid a large amount of capital input from port investors, improve the utilization rate of limited land, and adapt to the development trend of international port management.

Chinese enterprises have invested in ports overseas, and their long-term investment returns are substantial, which brings mutual benefit and win-win results to China and the host countries. Two central shipping companies, COSCO Shipping Group and

China Merchants Group, have both set up professional international terminal operating companies, which have achieved stable business performance and increasing strength over the years and achieved good economic and political benefits. Overseas investment in ports helps to improve China's shipping network and promote the development of China's foreign trade. Through China's overseas investment ports, Chinese shipping and logistics enterprises have gained convenient conditions to enter the local market, and expanded the maritime connectivity between China and the investing countries. In the geographical distribution of investment in countries, China is still dominated by underdeveloped countries and developing countries, but developed economies such as the United States and the European Union are also investment hotspots. According to statistics, more than 80 percent of overseas port investment projects are directed by central enterprises, while local SOEs and private enterprises account for less than 20 percent.

#### **4.4. Port cooperation**

In order to meet the needs of freight transportation in the new era and to better meet the development needs of One Belt One Road Initiative, ports are also developing and various cooperation modes are emerging. Since the end of the 20th century, in order to reduce operating costs, improve economies of scale, expand service scope and redistribute surplus resources, shipping companies began to adopt international shipping strategic alliances. Port integration is under the way. International shipping alliances are represented by 2M, Ocean Alliance and The Alliance.

One Belt One Road Initiative has also promoted the establishment and development of a number of port alliances. The port alliance between China and One Belt One Road countries along the route has greatly promoted the development of maritime interconnection and brought multilateral benefits to the alliance members. The essence of port alliance is to promote the flow and integration of resources among countries and regions. The establishment of port alliances mainly involves policy communication, economic and trade exchanges, benefit distribution, infrastructure, information sharing and financial services. The most important forms are alliances between ports and ports, as well as alliances between ports and railways. At present, the port alliance cooperation of the countries along the "One Belt One Road" is faced with the reality that there are significant differences in the system, economic development, religious belief and cultural mainstream of each country. To form an effective and stable port alliance, it is necessary to coordinate the differences between countries and regions and establish a reasonable resource allocation system. Policy communication is the first effective approach.

"Silk Road Shipping" Alliance is the first "One Belt One Road" international integrated logistics service brand and platform with shipping as the theme. By January 2021, the 70 Silk Road shipping routes had made 4,510 voyages, with a container throughput of 4,243,100 TEUs. With more than 200 members, the "Silk Road Shipping" Alliance has formed a cooperation platform covering ports, shipping, logistics, trade, investment, finance, information as well as universities and research institutions. In 2019, the "One Belt One Road" land-sea linkage development alliance was established, with 40 members in the first batch, covering ports, railways, shipping, logistics, industry, government and other representatives of the "One Belt One Road" international cooperation platform.

Port cooperation is not only embodied in the domestic port alliance, but also the "going out" of Chinese ports. Chen Zhaomeng (2016) proposed that "building a port network with close cooperative relations is one of the important ways to implement One Belt One Road initiative. Chinese ports going out will help bring into play the role of shipping in promoting the coordinated development of regional economy. In port cooperation, the choice of fulcrum ports should firstly divide the function orientation of ports in different regions, secondly select target objects, and finally put forward the specific mode of port cooperation according to the corresponding situation of ports. "

## **5. Development of important domestic ports along the One Belt One Road region**

China is rich in water transport resources, with a mainland coastline of 18,400 kilometers and an island coastline of 14,000 kilometers. There are 61 coastal ports. China's ports enjoy good conditions for development because of its large population and developed trade. Among the world's top ten ports in terms of port cargo throughput, Chinese ports account for 7. The National Coastal Port Plan divides China's coastal ports into five port groups: the Bohai Rim port group, the Yangtze River Delta port group, the Southeast Coast port group, the Pearl River Delta port group and the Southwest Coast port group, which highlight the main role of comprehensive large ports within the port group and form the layout of eight transport systems for iron ore, oil, coal, containers and grain. China's ports show a trend of specialization, large scale and deep water. The following mainly introduces the Pearl River Delta port group,

the Yangtze River Delta port group and the Bohai Rim port group of the basic port situation.

### **5.1.The introduction of the Pearl River Delta port group, the Yangtze River Delta port group and the Bohai Rim port group**

The Yangtze River Delta port group is the most densely distributed and the largest throughput port group in China. Led by Shanghai, the ports along the Yangtze River are grouped to serve the economic development and freight transportation of the Yangtze River Delta and the regions along the river. The key ports supporting the implementation of "One Belt One Road" initiative in the Yangtze River Delta include Shanghai Port, Ningbo Zhoushan Port and Lianyungang Port.

Located at the mouth of the Yangtze River, Shanghai Port connects the Yangtze River of China, the north and south coasts and the oceans of the world. Its port supporting facilities and route network are very mature, and it is also the port with the largest number of routes in the world, covering Asia-Europe routes, Middle East routes, Africa routes and Southeast Asia routes.

Ningbo Zhoushan Port is located in the middle of the coastline of mainland China. Ningbo Zhoushan Port is an important container ocean trunk port in the world, also it is one of the major ports along China's coast and an important hub of China's national comprehensive transportation system. Ningbo Zhoushan Port is a comprehensive deep-water port integrating inland river port, estuary port and seaport. The function,



positioning and layout of the port meet the docking requirements of "One Belt One Road".

Lianyungang Port, located at the starting point of the Central Line of One Belt One Road, is the port of Lianyungang City, Jiangsu Province in China. It is located on the west coast of the Pacific Ocean and the coast of the Yellow Sea. It finally connects to Europe through Xinjiang, and is an important transit port for international container land and water transport between the Eurasian continent.

Located in the central and southern part of Guangdong Province of China, the Pearl River Delta is an important economic center of China with convenient transportation by sea and land. It is also the world's largest urban agglomeration with the largest population and area. The main ports in the Pearl River Delta are Guangzhou Port, Shenzhen Port and Zhuhai Port. The Pearl River Delta is located in the core zone of "One Belt One Road". As the starting point of the construction of the Maritime Silk Road, the Pearl River Delta port group plays a very important role.

Guangzhou Port has developed hinterland economy and superior natural conditions of deep-water channel, and it has legal ship transaction service organizations. In recent years, it has actively explored ways to enhance the soft power of shipping. Based on Nansha, Guangzhou Port is fully connected with One Belt One Road Initiative.

Shenzhen Port is located in the southern part of the Pearl River Delta in Guangdong Province, at the mouth of the Pearl River. Shenzhen Port's international container liner routes cover all 12 major shipping areas in the world and reach more than 100 countries and regions. Its port comprehensive production efficiency and port contribution

efficiency are leading among all port cities. Besides, it is located in Shenzhen, a well-established financial market, so the port has obvious economic advantages.

Zhuhai Port is located on the west side of the Pearl River Estuary in the southern coast of the Pearl River Delta in Guangdong Province. It is the main hub port in the coastal areas of South China and one of the major ports in the coastal areas of China. With the jurisdiction of Zhuhai City and the western area of the Pearl River Delta as the economic hinterland, Zhuhai Port serves the export-oriented economy and port-adjacent industrial development of Zhuhai City. As the mouth of the Xijiang River, Zhuhai Port will comprehensively promote the differentiation strategy, Xijiang strategy, New Silk Road strategy, key customer strategy and whole-process logistics strategy, and give full play to the role of an important node of the 21st Century Maritime Silk Road.

The Bohai Rim Port Area is located in the western part of the Bohai Sea and serves the social and economic development of the coastal and inland areas in northern China. The key ports supporting the One Belt One Road initiative in Bohai Rim area are Tianjin Port, Dalian Port and Qingdao Port.

Tianjin Port is located in the Binhai New Area of Tianjin City, China, at the western end of the Bohai Bay, which extends to the inland hinterland of Northeast China, North China and Northwest China, connects Northeast Asia with Central and West Asia, and has trade contacts with more than 180 countries and more than 500 ports in the world. Although Tianjin Port is an artificial port, it is relatively weak in geographical conditions, but its economic hinterland has strong vitality and a large total volume. In 2020, the container throughput of Tianjin Port completed 18.35 million TEUs, with a year-on-year growth of 6.1%.

Dalian Port, located in Dalian Bay at the southern end of Liaodong Peninsula, is the maritime gateway of the region to the Pacific Ocean and the world. Mainly engaged in crude oil, refined oil and liquid chemicals loading, unloading, storage and transportation services, passenger services and other aspects of the business. Starting with the construction of the international logistics channel, Dalian Port is also vigorously developing the specialized logistics of containers such as cold chain, automobiles and timber to drive the accumulation of industrial elements and resources in Dalian. Dalian Port has become one of the largest refrigerated products trade ports in China.

Qingdao Port is the port of Qingdao City, Shandong Province, China, near the Yellow Sea, is China's international trade port and transit hub along the Yellow River Basin and the west coast of the Pacific Ocean. The business of Qingdao Port covers Shandong Province, radiates along the Yellow Sea and reaches Central Asia.

## **5.2.Strategic connection between Pearl River Delta Port group, Yangtze River Delta Port group, Bohai Rim Port group and One Belt One Road**

The One Belt One Road initiative brings new opportunities and new requirements for the development of shipping in the Pearl River Delta Port group, Yangtze River Delta Port group, Bohai Rim Port group.

Wang Chuanxu (2013) points out that One Belt One Road brings new opportunities to shipping centers in the Yangtze River Delta Port Area in the following aspects:

economic growth can help the development of shipping industry; Policies to promote the integration of shipping resources; Unimpeded trade expands the market space of shipping industry; The construction of various infrastructure can also promote the development of the port and shipping market; Financing is conducive to the expansion of shipping finance and shipping overseas investment. At the same time, he pointed out that the new requirements lie in the multidimensional coordination of various modes of transportation; The spatial layout of the shipping industry chain still needs to be optimized; The shipping supply chain system needs to be constructed. The Shanghai Pilot Free Trade Zone and the One Belt One Road initiative need to be effectively connected. Shipping environmental protection needs to conform to the standards of countries along the Belt and Road.

Shanghai Port is the port with the largest number of shipping routes in the world. The vast majority of shipping routes from Shanghai Port are on the track of the Maritime Silk Road, covering Asia-Europe, Middle East, Africa and Southeast Asia. Shanghai Yangshan Port Phase IV Terminal is currently the largest and most automated terminal in the world, with an annual container throughput exceeding 40 million TEUs. This is not only of great significance to the development of Shanghai as an international shipping center, but also better serves the Yangtze River Economic Belt strategy and the One Belt One Road Initiative.

By the end of 2016, Ningbo Zhoushan Port has increased to 82 routes, 4,412 flights and 9.08 million TEUs for the "21st Century Maritime Silk Road". Zhoushan Port has become a international hub port of the "21st Century Maritime Silk Road". Ningbo Zhoushan Port develops sea-railway combined transportation business for the "Silk Road Economic Belt", and its business scope has covered more than 20 cities in 12 provinces such as Shaanxi, Gansu, Xinjiang and Xizang, and then extended to Central

Asia, North Asia and Eastern Europe countries. In accordance with the concept of extensive consultation, joint construction and sharing, Ningbo Zhoushan Port works with ports and shipping partners of countries and regions along the "One Belt One Road" to create the best cooperation point.

Lianyungang Port, as the earliest port in China to carry out sea and land combined transport of goods and container, iron and water combined transport, has more than 50 container routes, among which the most typical ones are the "Ocean Alliance" southwest route of the United States and the Middle East Persian Gulf route. In addition, Lianyungang Port has also opened domestic and international railway freight trains. The total number of China-Europe freight trains has accounted for 38% of the national competitive market, covering more than 200 stations in five Central Asian countries. In 2017, the Chinese government proposed to make the new Asia-Europe land-sea combined transport channel connected by Lianyungang and Horgos as a benchmark and demonstration project of the One Belt One Road initiative.

Yang Sumei (2017) pointed out that the Pearl River Delta Port Area is the core area of "One Belt One Road". Based on SWOT analysis, the Pearl River Delta port and maritime industry has more advantages than disadvantages in going global and faces more external opportunities than threats. In order for the Pearl River Delta Port Area to be connected with One Belt One Road Initiative, it is necessary to improve relevant supporting policies, integrate resources, form joint forces, identify the basis point of cooperation, take the development of shipping finance as a breakthrough, further enhance the soft power of port and shipping industry, and actively carry out cultural exchanges with One Belt One Road countries along the route.

In the implementation of One Belt One Road Initiative, Guangzhou Port has established friendly port cooperation relations with 52 ports. "One Belt One Road" container volume increased significantly. As of July 2020, the total number of container liner routes of Guangzhou Port Group has reached 163, and the number of foreign trade container liner routes has reached 119, mainly leading to Africa and Southeast Asia. The proportion of foreign trade routes has been increasing continuously. At the same time, Guangzhou Port cooperates with railway departments to open a sea-railway freight channel linking Guangzhou Port - Yingkou Port - Europe. In addition, Guangzhou Port is building the first fully automated terminal in the Guangdong-Hong Kong-Macao Greater Bay Area to promote the construction of a 5G smart port application system.

As of June 2016, there are a total of 248 international liner routes in Shenzhen port. Shenzhen Port is speeding up the planning and construction of super-sized berths, deep-water channels and deep-water anchorage in the western port area in order to cope with the development of large-scale vessels. At the same time, in order to enhance the capacity of sea-railway intermodal transport and strengthen the role of Shenzhen as a strategic hub connecting "One Belt One Road", Shenzhen is innovating the operation mode of sea-railway intermodal transport and actively promoting the sea-railway intermodal transport business between Dongguan, Shilong and Guangdong intermodal transport bases and the eastern and western port areas of Shenzhen. International freight trains such as Guangdong-Xinjiang-Europe and Guangdong-Monggol-Russia will be used to gradually form a collection and distribution channel to countries and inland provinces along the "One Belt One Road" routes.

By virtue of its own geographical advantages and relying on Zhuhai Marine Engineering Equipment Manufacturing Base, Zhuhai Port has continuously deepened

its strategic partnership with shipping companies, shared resources and complemented each other's advantages, so as to provide good services for many well-known Marine engineering equipment manufacturing enterprises at home and abroad to connect "One Belt One Road" projects and jointly expand the international market. As of May 2019, Zhuhai Port Group has established sea routes with more than 30 countries in 6 continents of the world, with 64 container routes, including 17 foreign trade routes and 47 domestic trade routes. 21 multimodal transport channels.

The group of ports around Bohai Sea is typical northern ports. Northern ports have the natural disadvantage of having fewer international routes due to higher latitudes. However, the ports around the Bohai Sea have their particularity in geographical location, and the land direction is the outlet of the countries along the "Belt" in Northeast Asia. The sea direction connection the "Road" forms the radiation effect.

Tianjin Port strengthened the communication and cooperation with the countries along the "One Belt One Road" with the link of sea railway combined transportation and land bridge transportation, and the service radiation capacity of the port was significantly improved. As of November 2020, Tianjin Port has more than 30 container routes covering Southeast Asia. The operation of the shipping line has provided strong support for the implementation of the national initiative of One Belt One Road and the acceleration of the construction of the northern international shipping core area in Tianjin.

Dalian Port actively integrates into the One Belt One Road construction and cooperates with key enterprises such as Russia Railway, Germany Railway, China Railway General Company and COSCO Shipping, greatly reducing transportation costs and improving competitiveness. More than 20 routes, including China-Europe freight train

and Kazakhstan-European international freight train, have been opened. At the same time, it further strengthened the cooperation with key ports of Japan and South Korea and improved the comprehensive coverage of the logistics transit network around the Bohai Sea.

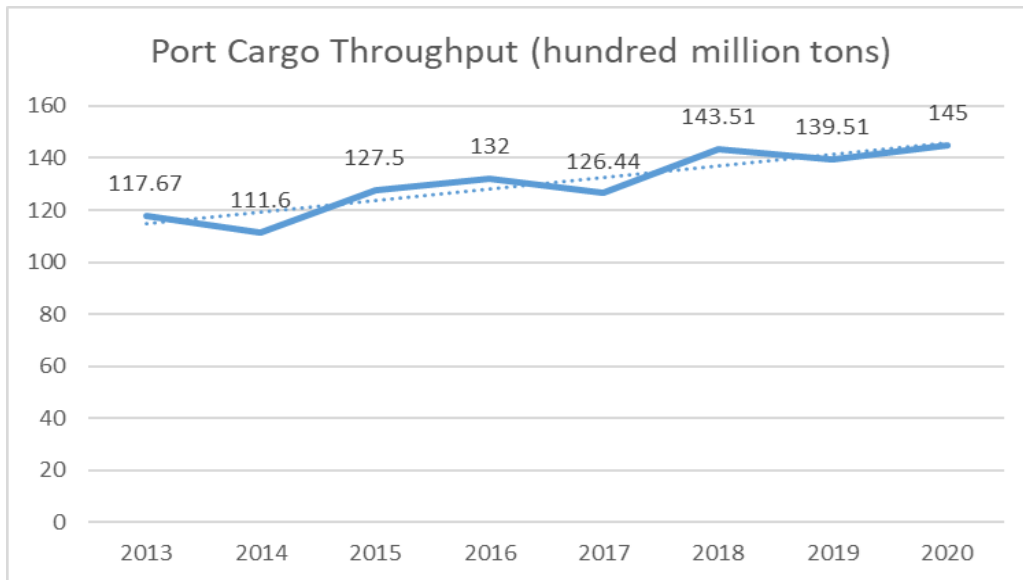
Qingdao Port has 136 foreign trade routes, including more than 70 direct routes to Southeast Asia, the Middle East, the Mediterranean Sea, Europe, the Black Sea, Russia, Africa and Australia. By January 2021, Qingdao Port has opened three One Belt One Road and RCEP routes, and Shandong Port will fully build an international transit channel that "radiates Japan and South Korea, connects Southeast Asia, India and Pakistan, the Middle East and connects Europe and the West".

### **5.3. Port cargo throughput**

The cargo throughput of a port is the quantity of cargo transported into and out of the port area by water, which is an important index to directly measure the production capacity of a port. The factors affecting port cargo throughput are very complex, which involve objective regional factors, port construction conditions and port development level. The objective factors include the level of production development, the state of economic development, the quantity of import and export commodities and the size of the hinterland. The construction conditions of the port itself include natural conditions and social and economic factors. The development level of the port includes the level of labor organization and management, the number and technical level of loading and unloading machinery and the size of berth capacity.



**Figure 4** Port Cargo Throughput from 2013 to 2020



The chart above shows the cargo throughput of Chinese ports from 2013 to 2020. The quantity trend line is increasing upward, which indicates that the viability of Chinese ports has been on the rise since 2013. It is obvious that there was a trough of cargo throughput in 2014. That is because in 2014, under the dual downward pressure of global economic downturn and China's economic structural adjustment, the production situation of Chinese ports was further depressed and the port throughput declined. The factors affecting port throughput include objective factors, such as the level of production development, the size of the hinterland, the development of export-oriented economy and the quantity of import and export commodities. Another is the conditions of the port itself, including natural conditions and social and economic factors. However, the most direct and critical factor is the size of berth capacity, which is consistent with the number trend line of berths. The increase of port cargo throughput can represent the development of the port and the progress of production capacity, and can even represent the quantitative reference index of the development of a region.

In 2020, the cargo throughput of China's ports was 14.5 billion tons, an increase of 4.3% over the previous year. The Foreign-trade cargo throughputs of China's ports was 4.5 billion tons, and the container throughput was 264.3 million TEUs. In terms of the throughput of a single port, Ningbo Zhoushan Port has the largest cargo throughput, up to 1.1 billion tons. In terms of container throughput, Shanghai port is number one, even in the world, reaching 43.5 million TEUs. Because of the strong shipping potential of the Pearl River, Guangdong Province has become the strongest port city in China, with a container throughput generally higher than that of other cities. Shenzhen Port and Guangzhou Port are both super ports with over 20 million TEUs. The performance of cargo throughput of ports is not only reflected in Chinese ports. With the further implementation of "One Belt One Road" initiative, "One Belt One Road" will certainly be the biggest bright spot in the future trade growth point, and the growth of container throughput of the routes of countries along the routes will further accelerate.

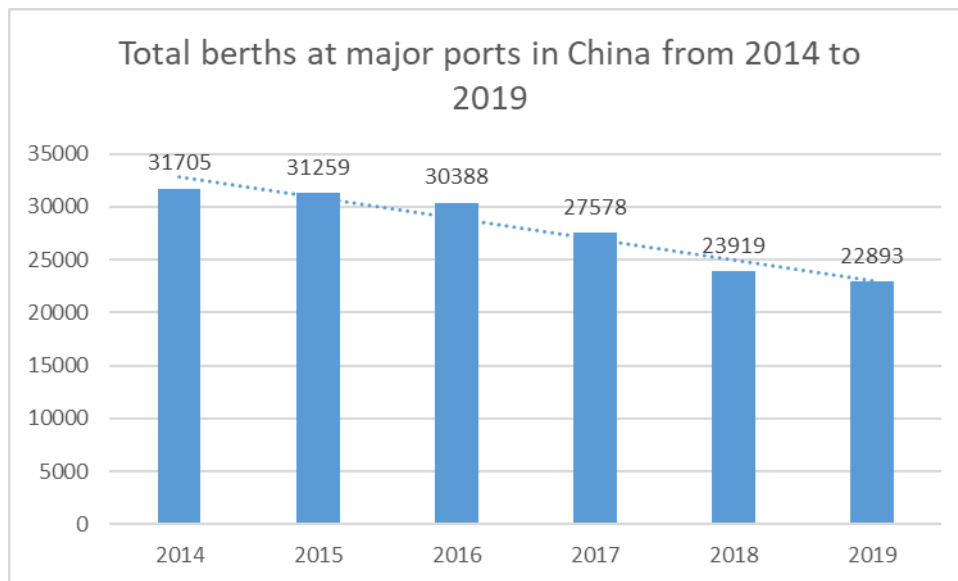
Influenced by COVID-19 in 2020, more and more countries have adopted strict quarantine measures, which in turn has a direct or indirect impact on regional production, consumption, transportation and other links, and has an increasingly prominent impact on global trade and shipping industry. The COVID-19 has dampened international demand and multilateral trade. Dry bulk and container trade has been negatively affected, while bulk carriers and container ships spend the highest share of global active time in Chinese ports, at 10% and 9% respectively, so the COVID-19 has had a negative impact on ports. But in the long term, the impetus for China's economic and trade growth remains. The epidemic had a neutral or negative impact on port cargo throughput in January and February, but a small impact on the whole year. In April 2020, the cargo throughput of major coastal hub ports was basically the same as that

of the same period last year, and the cargo throughput of Yangtze River hub ports decreased 12.5 percent compared with last year. And the highway transportation with low cost advantage diverts part of the source of goods, the source of goods competition between ports is also more intense.

#### 5.4.Increased number of berths

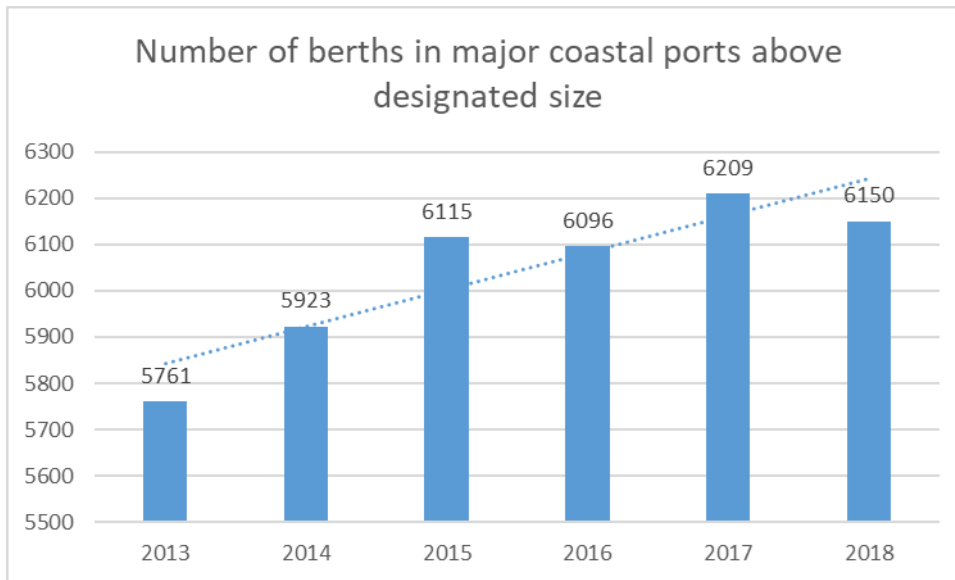
Berth refers to the position within the port area where ships can berth. The number and size of berths is an important sign to measure the scale of a port or wharf.

**Figure 5** Total berths of major ports in China from 2014 to 2019



The figure above shows the total berths of major ports in China from 2014 to 2019. It can be seen that the number of berths showed a decreasing trend from 2014 to 2019, and the largest decrease occurred in 2018, with a decrease of 3,659 berths compared with 2017.

**Figure 6** Number of berths at major coastal ports above designated size from 2013 to 2018



The figure above shows the number of berths at major coastal ports above designated size from 2013 to 2018. It can be seen from the figure that the number of berths at major coastal ports above designated size is on the rise, reaching the maximum in 2017. This is the opposite of the overall berth trend.

The reason for the decline in the total berths is that since 2013, the amount of investment in China's coastal construction has been on a downward trend, due to the adverse effects of near saturation of port construction, excess capacity in the industry and insufficient investment by local governments. Traditional water transport construction market space is limited. However, the continuous integration of advantages and the concentrated construction of major ports have brought about a trend of growth in the number of berths in ports above the major scale in coastal areas. This means that ports are expanding its opening degree, which is conducive to further

giving play to the ports' regional advantages, forming a large industrial group near the port and port economic belt, and laying a good foundation for the port to seize the "One Belt One Road" development opportunity.

As of 2019, China's ports have 2,520 berths with tonnage or above, including 859 berths with tonnage of 10,000 to 30,000 tons, 421 berths with tonnage of 30,000 to 50,000 tons and 418 berths with tonnage of 50,000 to 100,000 tons or above. Among them, the largest proportion is 10,000-30,000 ton berths and 50,000-100,000 ton berths, which account for 66.71%. In terms of use, there are 1,332 specialized berths of 10,000-ton class and above in Chinese ports, accounting for 58.0% of the total, and 559 general bulk berths, accounting for 24.4%. The number of general cargo berths was 403, accounting for 17.6% of the total. Among the specialized berths, container berths account for the highest proportion, followed by coal berths and liquid chemical berths.

## **6. Problems existing in port development**

Although One Belt One Road initiative has brought an increase in trade volume and cargo volume, China's ports have developed rapidly, and the international competitiveness and international status of ports have also been improved. After China's accession to the WTO in 2001, the era of rapid growth in ports, shipping and port-vicinity industries was generally over, and a period of slow growth followed, bringing pressure to new development. Compared with the modern port development requirements, there is still a certain gap. China's port development has the following problems.

### **6.1. Lack of unified deployment, serious disorderly competition**

Under the One Belt One Road initiative, the development of ports needs to involve a wide range of departments, and it is often difficult for administrative departments to coordinate due to inconsistent policies. Moreover, port management is divided according to administrative regions and mainly managed by local governments, which leads to the lack of unified and reasonable regional planning and scientific division of labor in China's maritime port construction. China has a large land area and a large number of coastal cities, and there are many locations that meet the requirements for port construction. Port construction after the key project was listed in the national economic construction, plus the shipping benefits of area along the One Belt One Road initiative, the provinces ignore the regional differentiation function, stepping up the port construction scale of shipping, lead to a sharp rise in the Chinese port number in a short period of time. The phenomenon of redundant construction and waste of resources is serious. With the large increase in the number of ports and the lack of clear division of labor, there are a lot of disordered and homogeneous competition among ports.

Although the overall tone of port development is clear under the promotion of One Belt One Road initiative, there are also inconsistencies between the general route and local policies, resulting in internal frictional competition of ports. Taking the ports in the Yangtze River Delta region as an example, Huang Yong (2020) pointed out that "The benefit sharing mechanism of port cooperation has not been established, and the port cooperation in the Yangtze River Delta region is still at the level of single project

and spontaneous cooperation, and there is a lack of systematic cooperation mechanism. The government is "hot outside but cold inside", and the administrative promotion role is not obvious, while most enterprises take a wait-and-see attitude, the benefit sharing mechanism of coordinated development is still being explored, and there are still many obstacles in cooperation. "

## **6.2. The function level of the port is low**

According to statistics, the proportion of loading and unloading services in most Chinese ports is less than 50%, while the proportion in developed countries is generally more than 70%. The function of ports is relatively simple, makes the profits of enterprises greatly reduced in the case of slowing down the increase of throughput and increasing operating costs, which seriously hinders the further growth of ports.

Ports are an important part of the transport chain. To match the transport demand brought by the One Belt One Road initiative, the service capacity of ports needs to be strengthened. Taking the cold chain service capacity of ports as an example, China's export of agricultural products to "One Belt One Road" countries totaled 222.66 billion US dollars in 2016, accounting for 31.2% of China's export of agricultural products to the world. In 2017, the trade volume between China and 61 countries along the "One Belt One Road" routes reached 7.4 trillion yuan. In 2017, trade between China and ASEAN exceeded US \$500 billion for the first time. The sudden increase of agricultural trade volume will bring huge development space to cold chain logistics. However, the service function of the port cold chain has not yet reached the optimal level. For example, several major cold storage projects under construction in Tianjin

Port are all large or medium-sized cold storage projects, most of which are refrigerated storage projects with low temperature range. They have similar functions, similar cargo types and similar cargo sources. Port cold storage and other infrastructure construction needs to have a certain degree of forward-looking, port logistics services and information services should not only be in the exploration stage, but also be applied to port construction.

## **7. Proposals to strengthen port development**

### **7.1. Unify planning and strengthen cooperation**

Facing the new opportunities brought by One Belt One Road initiative, ports should build a scientific and reasonable benefit sharing mechanism, make full cooperation, and realize cooperative operation. On the one hand, efforts should be made to build an operation cooperation mechanism to strengthen the comprehensive communication between shipping ports by sharing goods sources, increasing branch line business within shipping ports, and improving value-added transportation services. On the other hand, we should make full use of market mechanisms such as capital cooperation and equity investment to promote capital integration among shipping ports, and share the benefits of development through mutual shareholding, capital and share increase, and cooperative investment at home and abroad.



Replace competition with cooperation. Different ports have different advantages and disadvantages, and there is a big gap between the hardware conditions of ports. Moreover, the port's location advantage, function orientation, industrial base, and market structure are not the same. In order to better cooperate with the One Belt One Road initiative, it is necessary to further deepen the international port and shipping cooperation. The cooperation between ports can complement each other and prevent vicious competition.

One of the forms of international port cooperation is to form port alliance. Port alliance means that port enterprises, on the basis of maintaining their independence, establish long-term and stable relations with other port enterprises through contractual relations in order to achieve a common goal, cooperate with each other and complement each other in resources. The advantages of port alliance are as follows: 1. Forge scale advantages and enhance the discourse power of ports in the international market. 2. Restrict vicious competition, establish a standardized market order, and replace competition with cooperation. 3. Enhance the regional competitive advantage by concentrating the advantages of port geographical location and infrastructure to form an excellent port alliance. 4. Members of the port alliance can share new technologies, reduce research and development expenses and save costs. 5. Promote information sharing, improve the port informatization service level, and realize mutual benefit of the alliance members. To form a port alliance, we can first integrate all kinds of port resources within the province and a domestic, and then combine ports, railways and inland port stations of countries along the "One Belt One Road" to build a normalized exchange and cooperation mechanism and cooperation service network, so as to further enhance the comprehensive competitiveness and international influence of Chinese ports.

Wang Zhenzhen (2018) pointed out: "China and the area all the way along the One Belt One Road route's port alliance refers to the Shanghai port, Tianjin port, China Ningbo Zhoushan port, Guangzhou port, Shenzhen port, Zhanjiang port, Shantou port, Qingdao port, Yantai port, Dalian port, Fuzhou port, Xiamen port, Quanzhou port, Haikou port and Sanya port. The total 15 port or port enterprise and the port or port enterprise involved in the One Belt One Road initiative in order to achieve the goal of sharing market resources, through the signing of a friendly port or letter of intent for cooperation and other forms of cooperation, to realize a cooperation mode of complementary advantages and risk sharing. " Major cases include: Shanghai Port has formed cooperation agreements with Israel's Haifa Bay New Port and Greece's Piraeus Port, mainly involving the fields of port operation and construction, port, shipping services and finance; Tianjin Port signed a memorandum of cooperation with Russia's Vladivostok Trade Port, mainly covering loading and unloading, sea-rail combined transportation and facility construction; Fuzhou Port signed Memorandum of Understanding on Friendly Port Cooperation with Port Klang and Port Malacca, covering the fields of port project research, transportation exchange, port safety, operation management, business training, technology and information technology exchange, etc. Most of these port alliances between China and countries along the One Belt One Road economic zone are limited to the cooperation between the two ports, and the cooperation is not close enough. The future direction of cooperation is to continue to deepen cooperation, increase the alliance of multilateral cooperation, and enhance the stability and closeness of cooperation.

Another form of cooperation is the Port and Shipping Alliance. Port and shipping alliance refers to the alliance between port enterprises and shipping enterprises, which realizes the cooperation form of complementary functions of transportation functional departments at the vertical level of logistics. The ports and shipping alliances between

China and countries along the One Belt One Road economic zone include the establishment of joint ventures between Qingdao Port and Maersk Terminal Company in Southeast Asia and the Mediterranean region, which are mainly responsible for port construction and operation management. COSCO Shipping Group acquired 67% of the shares of the Port Authority of the Piraeus Port of Greece, built the China-Europe Land and Sea Express Line, and opened up logistics distribution centers in Central Europe and the Balkans. The Dalian Port has reached strategic cooperation with the Russian Railway Container Corporation to build the first China-Russia refrigerated container transit train. The Chinese port has carried out extensive cooperation with the upstream and downstream enterprises or departments of the cross-border supply chain, and the cooperation partners have been extended to all links such as shipping, sea-railway combined transportation, logistics transportation, supply demand, investment and financing, and all regions along the One Belt One Road economic zone. However, the cooperation depth of port and shipping alliance is not enough and the number of alliances is small. Therefore, China should develop more port and shipping alliances to form deep cooperative relationships and extend the supply chain longer.

Strengthening cooperation with ports along the Maritime Silk Road, realizing regional port interaction and promoting the comprehensive competitiveness of regional ports are the focus and hotspot of port and navigation cooperation. We should actively respond to the development trend of large ships and strengthen the cooperation between large shipping enterprises at home and abroad as well as between shipping enterprises and port enterprises, so as to jointly improve the risk resistance ability with large-scale development. International port and shipping cooperation can make the port and shipping market develop more actively and healthily, and the optimization of the port and shipping market can bring more convenience and economic benefits to the neighboring countries of One Belt One Road economic zone.

## **7.2. Improve the port service function, expand the network of land and sea combined transport**

Ports should actively build a good port function system, change the traditional single loading and unloading service mode, improve the whole-process logistics service and transportation function, strengthen the loading and unloading, warehousing service capacity, and constantly promote the communication with the regional industries. The port needs to improve its service function to meet the transport demand brought about by the One Belt One Road initiative. The function of ports should meet the needs of special trade goods, such as agricultural products and frozen goods.

One Belt One Road trade route involves the land and sea transportation network. The transportation routes can be improved through ocean, railway and air transportation, and the logistics network can be more comprehensive by going deep into the inland hinterland. The further promotion of One Belt One Road should first connect the Eurasian and African continents to build a sea passageway with ports as nodes. Secondly, it should promote waterless ports, railways and other transportation facilities in the inland hinterland and optimize the layout of inland railway lines, which can speed up the flow of goods. Finally, reduce logistics costs and complete supporting facilities and services. A collection and distribution network based on spatial distribution and shipping needs will make transportation more efficient.

Optimizing the traffic network can make the logistics network more comprehensive. At the same time, in the international multimodal transportation, the port should

improve the efficiency of container loading and unloading and speed up the turnover of freight trains in the port area by constructing the special automation equipment and information management system for sea-railway intermodal transportation.

### **7.3. Digital transformation of ports**

The implementation of One Belt One Road initiative requires not only the connection of transport modes, transport nodes and transport networks between ports, but also the realization of data sharing in the aspect of transport information and the connection of information technology. The current era is the era of digital economy. As the rapid development and update of global information technology, digitization is the most popular topic at present. Infrastructure cannot be built without digital infrastructure. The One Belt One Road initiative has brought more opportunities for trade cooperation, partly reflected in the significant increase in trade volume, and thus in the volume of shipping. This creates higher requirements for ports. Ports can do business more efficiently and quickly through digital transformation. In 2019, affected by COVID-19, more and more enterprises have turned their services and business to digitalization, which has played a role in promoting growth and stability to the port digitization in a certain extent. In the future, the digital transformation of ports along the One Belt One Road route is an inevitable trend. The digital transformation of port is a deep reform and reconstruction of port production operation, management mode and business mode driven by the new generation of information technology. Digital transformation is essentially a business transformation. At present, most ports rely on continuous input of hardware resources to achieve port development and business growth. But resources are always limited, and the healthiest way is to achieve endogenous port growth.

After the digital transformation of ports, ports can be open and shared, changing from logistics nodes to ecological systems. For example, the smart port built by big data and cloud computing can realize remote control, automatic control, automatic driving, intelligent monitoring and other technologies, thus improving the operation efficiency of the port. The visualization of the digital port can also make the port in the state of monitoring at any time, greatly improving the security and reduce labor costs.

## **Conclusions and Prospects**

Since Xi Jinping proposed to jointly build the "Silk Road Economic Belt" and the "21st Century Maritime Silk Road", China's economy has been further stimulated and trade volume increased. Integration into globalization requires external windows, in which ports and water transport are crucial, so the development of ports has also played a positive role. The One Belt One Road initiative has created more trade opportunities and space for cooperation in the pressure of low trade growth and economic downturn.

After the One Belt One Road initiative was put forward, the cargo throughput of China's ports increased, which also brought opportunities for port investment and port cooperation. The port has been deeply integrated into the implementation and promotion of One Belt One Road national initiatives at regional, domestic and international levels. The role of port as an important support for One Belt One Road appears.

At present, the One Belt One Road initiative has brought many opportunities for cooperation and development, and the development of the port is also ongoing. According to the current situation, in the future development of ports, there will be more and more cooperation, and further development will be made on the alliance of port and port, the alliance of ports and shipping, and the alliance of port and railway. At the same time, while seeing opportunities, we should not forget the existence of unexpected risks. The impact of COVID-19 has revealed that automation and intelligence are the direction of port transformation. China will further promote the "One Belt One Road" international port logistics information interconnection and sharing, and the smart port upgrades will be made, so that ports not only rely on infrastructure, but also achieve higher added value. At the same time, the port personnel training system under One Belt One Road Initiative should be promoted. The port is not only the hub of logistics and trade, but also will be transformed into a "four-in-one" service system: integrating information flow, capital flow, logistics and commercial flow, and actively contribute new and greater "port power" to the construction of "One Belt One Road" service.

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