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Analysis on the Development Status and Trend of Global Bonded Ship Fuel Supply Port

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ABSTRACT. *Based on the analysis of the development status of the world's top ten bonded ship fuel supply ports, this paper points out the challenges faced by the development of the current bonded ship fuel supply ports, and puts forward the development trend and suggestions for the bonded ship fuel supply ports in future.*

KEYWORDS:*Bonded ship fuel, Port, Challenge, Development trend*

1. Introduction

From the perspective of ship operation cost, fuel consumption accounts for 30%~ 40%, and is directly managed by ship owners or shipping operators. Fuel supply is a fixed demand generated in the process of ship navigation. It is not difficult to see from the cases of Singapore, Zhoushan and other international airline supply bases that bonded oil supply is a crucial service content. Moreover, because bonded oil is a fuel commodity with the highest degree of marketization in the international market, the international route supply base selected by international shipowners is also a bonded oil supply base with good brand and reputation.

In addition, the bonded oil market for international navigation ships is an important indicator to measure the strength of port supporting services, which directly affects the berthing of ships and the length of berthing time, and determines the realization of subsequent derivative service functions [1], which can effectively promote the full agglomeration of international shipping elements such as logistics, capital flow, information flow, etc.

2. Development status of global bonded oil filling port

In 2018, the global consumption of marine fuel oil is about 280 million tons. As one of the five largest consumer markets of marine oil (see Table 1), the Asian

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market accounts for over 40% of the world's total, including Singapore, Busan, China, Chinese mainland and Hongkong, which occupy almost half of the entire Asian consumer market.

Table 1 Global top five marine fuel oil markets

region	Global share
Asia	40%
Europe	21%
Saudi Arabia	17%
America	13%
Mediterranean	9%

Source: CNFC

In the world's top 10 oil supply ports (see Figure 1), Singapore, as the world's largest port of bonded oil supply, accounts for 18% of the global marine fuel market. In addition to Singapore, Rotterdam port has always been ranked in the top three with its 10 million ton level. Hong Kong and Busan have also ranked among the top five in the world in recent years. It is gratifying to see that Zhoushan, for the first time ranked among the top 10 oil supply ports in the world with an annual supply of 3.59 million tons in 2018. It is expected that Zhoushan will again rank on the list with a supply of 4.1 million tons in 2019, and successfully embark on the road of building an international supply base in Northeast Asia through refueling business. In China, except Zhoushan, the annual supply of other ports, such as Shanghai port and Qingdao port, is less than 2 million tons. The annual supply of Guangzhou port and Qinhuangdao port, Tianjin port and Dalian port of Bohai Bay Port Group is not more than 100 (see Figure 2).

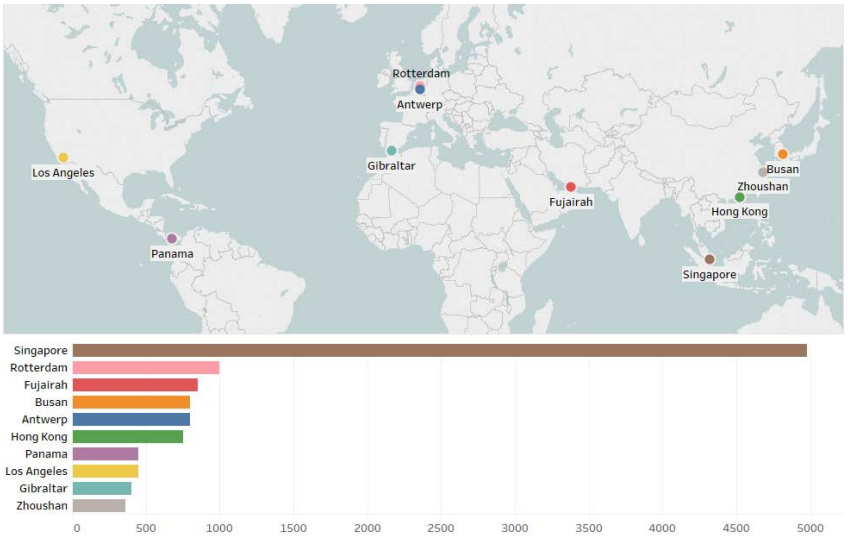

Figure. 1 Location of the world's top ten ship fuel supply ports and fuel supply in 2018

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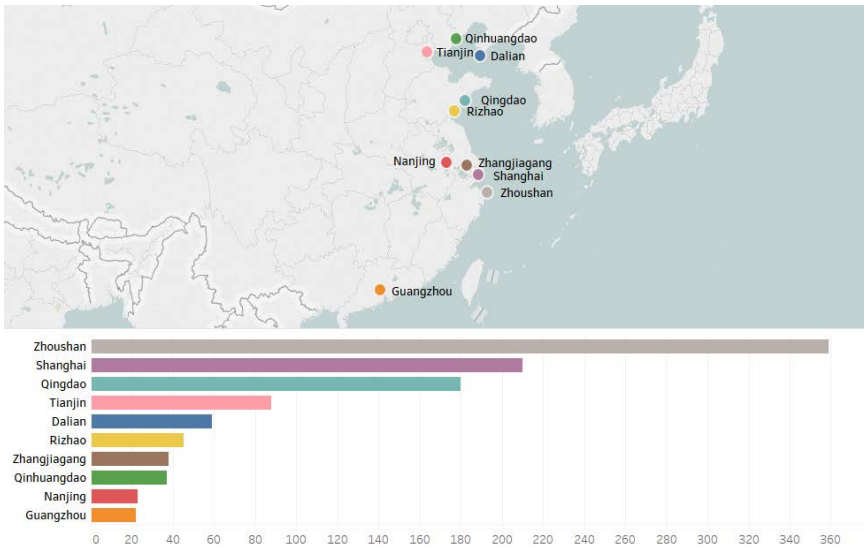

Figure. 2 Location of the top ten ship fuel supply ports in China and fuel supply in 2018

Source: COFCO futures

2.1 Development status of bonded fuel filling in Singapore

As the world's largest bonded oil filling port, Singapore's bonded oil supply business has developed into a mature industry. According to the port authority of Singapore (MPA), in recent years, the supply of international bonded oil in Singapore has increased greatly, from 36.39 million tons in 2009 to 50.64 million tons in 2017, and slightly decreased in 2018 and 2019 to 49.8 million tons and 47.5 million tons respectively (see Figure 3).

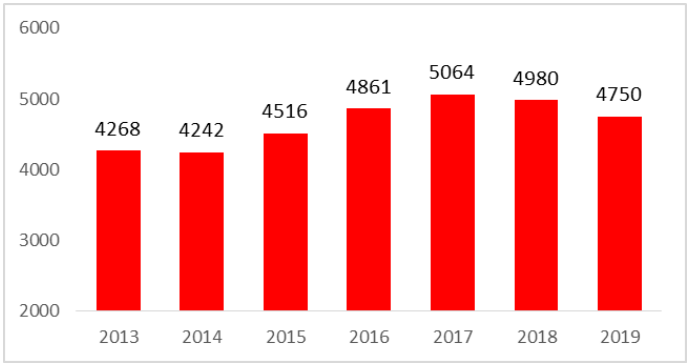

Figure. 3 Supply of bonded oil in Singapore in recent 7 years (10000 tons)

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Source: MPA

In addition, Singapore provides a rich variety of bonded marine oil, such asMGO, MDO, MFO 180cst, MFO380cst, MFO 500cst, LSMGO, LSFO 180cst, LSFO 380cst, LSFO 500cst, etc. [2]; there are a complete set of fuel filling enterprise chain in the region, including 47 oil suppliers, 44 oil filling operation companies and 45 refueling inspection companies; international standards and standards for marine fuel oil filling, such as SS-600 (2014), (TR-48) business specification, Singapore fuel supply chain quality management standard specification (SS 524), etc.

2.2 Development status of Zhoushan bonded fuel filling

Since the construction of the marine bonded fuel oil filling center was started in 2014, the oil supply of Zhoushan port has increased year by year. In 2014, the direct supply of bonded oil was 665000 tons, 942000 tons in 2015, 1064000 tons in 2016, 1.8 million tons in 2017, 3.593 million tons in 2018, and 4 million tons in 2019 for the first time (see Figure 4). At present, Zhoushan has become the largest bonded oil filling port in China. Besides infrastructure construction, Zhoushan has always led the development trend of domestic bonded fuel oil filling port with effective policies, efficient services, flexible supervision and coordinated protection.

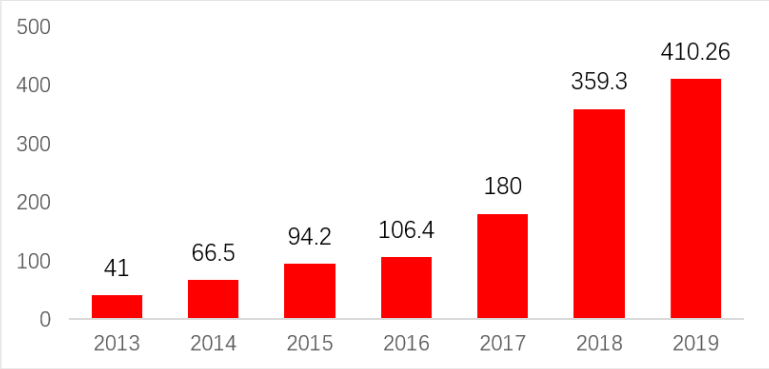

Figure. 4 Supply of bonded oil in Zhoushan in recent 7 years (10000 tons)

Source: Hangzhou Customs

In addition, Zhoushan region has 5 oil supply enterprises with national operation qualification and 9 oil supply enterprises with operation qualification in the free trade zone; independently develop bonded marine fuel oil filling system; build a "one port acceptance" platform for bonded oil filling, so as to realize the integrated services of customs, maritime affairs, border inspection and quarantine departments [3]; and issue international standards and specifications for bonded oil filling, such as the issuing country It is the first "operation specification for bonded oil supply

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business of international navigation ships" and "technical specification for measurement of ship fuel oil filling system".

2.3 Development status of other international bonded fuel filling ports

As we all know, the main ports of global marine fuel oil supply include Singapore, fuchaila, Rotterdam, Antwerp, gibraltarian, Panama, Hong Kong, Busan, Los Angeles, Houston, etc., while the core ports are mostly concentrated on the Asia Europe routes [4], which gather 85% of the global demand for ship fuel oil. With the exception of Singapore, the annual supply of other bonded oil filling ports in the world is basically below 10 million tons (see Figure 5).

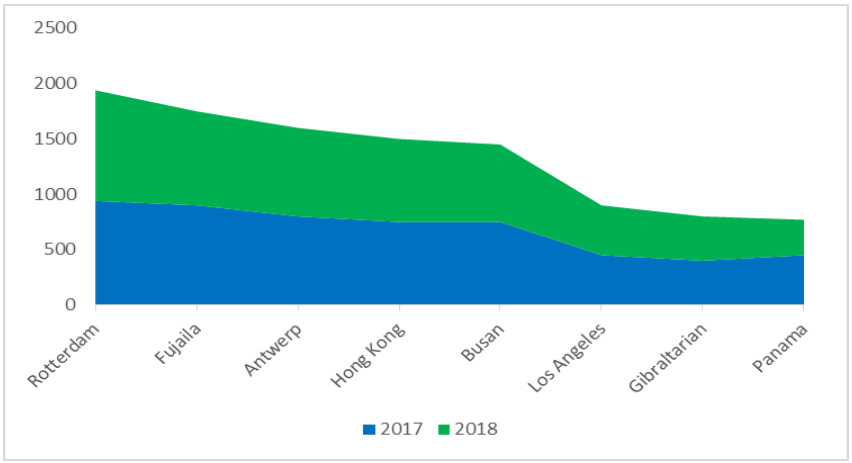

Figure. 5 Oil supply of other international bonded oil filling ports in recent two years (10000 tons)

Source: COFCO futures

(1) Rotterdam

As an important shipping hub of the North Sea, Rotterdam has 9.4 million tons of bonded oil in 2017 and 10 million tons in 2018. In addition to the advanced ect container automation terminal and professional liquid bulk cargo terminal, Rotterdam also has 5 refineries, 45 chemical and petrochemical companies, 3 industrial gas suppliers and 1500 km long oil pipeline.

(2) Fujaila

Located between the three major oil ports in the world, the transportation and storage of oil and gas are developing rapidly. In 2017, the supply of bonded oil was 9 million tons, and that in 2018 was 8.5 million tons, slightly lower than that of the previous year, but it still remained the top three oil supply ports in the world. At

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present, the oil storage capacity of Fujaila has reached 8.8 million cubic meters, which is 200% higher than that of 3 million cubic meters in 2010. It is the second largest oil storage hub in the world after Singapore.

(3) Antwerp

Antwerp Port has more than 500 berths and is the European foreign trade center with Rotterdam. Now it has more than 300 routes and has more than 800 ports around the world. The oil supply in 2017 was 8 million tons, and that in 2018 was 8 million tons, which was the same as that of the previous year. In addition, Antwerp Port is strategically located in Europe, with the largest and most diversified comprehensive marine chemical industry in the world. Seven of the top ten chemical enterprises in the world have their own factories in Antwerp Port.

(4) Hong Kong

As the most competitive bonded oil supply base in Southeast China, Hong Kong of China has maintained a stable supply of 7.5 million tons of bonded oil in 2017 and 2018. In order to improve the quality of bonded oil supply service, expand the range of oil customers, Hong Kong actively cultivates fuel oil suppliers in Hong Kong. In the context of the overall poor state of the shipping industry, Hong Kong chooses to increase the sales volume of marine oil as the entry point for the sustainable development of the port. In order to cope with the low price impact of other ports, fuel oil suppliers in Hong Kong have taken measures such as significantly reducing the price of ship oil supply to attract some demand backflow.

(5) Busan

As the leading bonded oil supply port in Northeast Asia, Pusan port supplied 7 million tons of bonded oil in 2017 and 8 million tons in 2018, an increase of 14% over the previous year. Under the implementation of the "sulfur restriction order" in 2020, Busan actively arranges low sulfur industries, such as SK energy, S-oil, GS and Hyundai, which can supply 0.1% sulfur marine oil.

(6) Los Angeles

As the Western bridgehead of the Santa Fe Railway, the main east-west trunk line of the United States, Los Angeles is also the largest industrial city on the west coast of the United States, with famous industrial aircraft manufacturing industry and oil industry. As the largest and busiest container port in the United States, Los Angeles port supplied 4.5 million tons of bonded oil in 2017 and 4.5 million tons of bonded oil in 2018, which was the same as last year. In addition, the California oil field is located near Los Angeles, which provides a strong source of raw materials for the port of Los Angeles to develop its marine oil supply business.

(7) Gibraltarian

As an important sea port between the Atlantic Ocean and the Mediterranean Sea, and the throat of the connection between Asia, Africa and Europe, it is a seaport of great strategic significance. In 2017, the supply of bonded oil was 4 million tons, and that in 2018 was 4 million tons, which was the same as that of the previous year.

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In addition, it is not only a cargo distribution center, but also an important port for the supply of marine fuel oil. As the "lifeline" of energy transportation in Western Europe, ships carrying oil from the Persian Gulf can only be transported to Western Europe and Northern Europe through the Strait of Gibraltar.

(8) Panama

Panama port is located on the Bank of the Panama Canal, with 3.2 million tons of bonded oil in 2017 and 4.5 million tons in 2018, an increase of 40% over the previous year. The Panama Canal, known as the "golden waterway", is regarded as a barometer of world trade. The average annual total transportation volume is about 3 trillion tons, and the cargo transportation volume accounts for about 5% of the total world trade. The corresponding port service industry plays an important role, including the supply of marine fuel oil.

3. Challenges faced by bonded oil supply ports

3.1 Seriously unbalanced cargo and oil ratio

This paper selects Singapore, Hong Kong, Busan, Zhoushan, Qingdao, Shanghai, Tianjin, Rizhao, Dalian and Guangzhou as bonded shipping fuel supply ports at home and abroad, and compares the cargo throughput, container throughput and oil supply volume of each port. It is found that, except Singapore, other ports have obvious gradient difference. Hong Kong and Busan are in the second tier, Zhoushan, Rizhao, Dalian and Guangzhou are in the second tier Shanghai is in the third echelon; the rest is in the fourth echelon, with a serious magnitude difference (see Figure 6).

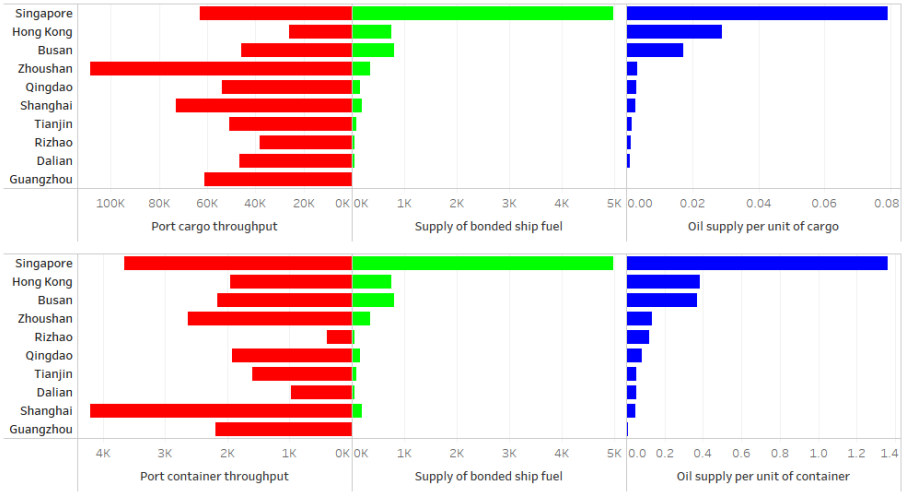

Figure. 6 Ratio of cargo and container throughput to oil supply

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Source: Port official website

3.2 Implementation of "sulfur restriction order"

According to the forecast of EIA and other institutions, the global shipping industry will consume 320 million tons of fuel annually in 2020. With the implementation of the "sulfur restriction order" in 2020, the supply of low sulfur heavy oil below 0.5% will probably not exceed 50 million tons in the world in 2020. In the short term, shipping companies will choose light diesel oil and install desulfurization tower to make up for the lack of demand, but the mainstream market in the future will still be low sulfur oil. At the same time, the marine oil market will enter a period of transition from high sulfur to low sulfur gradually. Therefore, it is very important for each oil supply port to grasp the supply-demand relationship of low sulfur market. Whether the supply port can quickly make up for the low sulfur gap in its original market model and seize the market becomes the main competition point of each oil supply port in the next stage.

3.3 Efficient service efficiency

Ships usually choose to arrange port berthing and purchasing, such as declaration, berthing, inspection and quarantine, declaration and filling, fuel filling and unberthing, which have smooth connection, simple procedures, short time-consuming and high efficiency. Firstly, in order to improve the navigation efficiency, especially when the market is good, the efficiency factor accounts for a considerable proportion of the fuel oil purchased by customers; secondly, to save money Daily operation cost: the cost of berthing a ship at the wharf can reach 70000-80000 RMB per day. Most of the oil supply ports are in the critical position of shipping, and there are a large number of ships. How to efficiently and quickly promote and coordinate the acceptance of a large number of oil supply orders has become the bottleneck of port oil supply efficiency.

3.4 Low price competition

There is a gap in the price of bonded oil between ports. Most customers think that the price of oil products is a key factor for shipping companies to consider in addition to the routes. Due to the complete refining and chemical industry chain, some oil supply ports have natural advantages in price. Even some ports are located in the origin of raw materials, which not only eliminates the price difference of refined oil import, but also eliminates the cost of crude oil transportation, which has become a world-class oil hub port. It can be seen that the fuel price difference existing in various oil supply ports will continue to widen due to natural advantages in the following period, resulting in "barrel effect" in some oil supply ports.

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3.5 Rich supporting services

When a ship chooses a port to refuel, it often considers other supporting services provided by the port, such as ship supply, ship / equipment maintenance, ship / crew management, ship brokerage, and whether the finance, insurance and laws are sound and perfect. The supply of ship fuel can also be regarded as the cut-off of comprehensive maritime supply in a region. Only when the related industries are gathered and enabled can the scale effect be brought about. Therefore, the perfect maritime supporting service of each ship fuel supply port will become the inexhaustible power for the port's rapid development in the future, and it is also the "soft environment" necessary for the construction of the regional shipping center.

4. Future development trend of bonded oil supply base

4.1 Global energy structure changes and energy demand flows shift

With the increasing attention to ecological and environmental protection, the global energy structure is also changing. The International Maritime Organization (IMO) has continuously introduced new rules to reduce air and marine pollution factors. Ships are facing a series of environmental protection needs such as "low sulfur" and "decarbonization". In this context, the demand of ship power is turning to low sulfur oil, LNG and other new energy. Singapore launched the "LNG refueling pilot program" in 2017, and established a LNG refueling permit system from the beginning, and provided financial subsidies for LNG powered ships and LNG bunkering ships; and tax exemption and preferential treatment were given to ships using LNG fuel and service objects of LNG fuel power port. In addition, Singapore has established "LNG filling port alliance" with Antwerp Port, Rotterdam port and Zeebrugge port, and Ningbo Zhoushan port has joined the alliance in 2017. In order to meet the market demand, Busan began to cultivate low sulfur oil suppliers in the early stage. Many suppliers already have 0.1% sulfur content of marine oil. Low sulfur and new energy are the main trend of marine fuel demand in the future. Today, developing countries have become the main body of global energy consumption, and the global energy consumption center is shifting to Asia. It is estimated that by 2040, Asia's share in global oil and gas trade will increase from about one-half to two-thirds. As the main gathering place of trade development routes, Asia is the main inflow of fuel oil resources. From the perspective of consumption demand, China is still the largest consumer of marine fuel oil in Asia.

4.2 The policy dividend is gradually expanded and the business environment is continuously optimized

Ship fuel filling service is a comprehensive business. From the operation point of view, it involves many related parties, such as refueling suppliers, tanker operators, refueling inspectors, etc.; from the perspective of management, it involves the competent departments of maritime affairs, commerce, taxation, customs, standards,

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metrology, environmental protection, emergency, etc. In the face of such a complex business relationship, the port authority of Singapore (MPA) is based on the leading position and cooperates with relevant government departments and enterprises, as well as industry associations and international organizations related to fuel filling to jointly carry out the business [5], and jointly create a good business environment. Take a look at Zhoushan in China, give full play to the institutional advantages of the new customs after institutional integration, innovate the supervision measures of bonded oil business, and let customers enjoy convenient and efficient services to the greatest extent. As a rigid means for the smooth development of bonded oil business, port financial subsidies and tax and fee relief have strong attraction to ship owners and other maritime service related industries. Singapore, Zhoushan and other ports have made full use of this measure to give different degrees of preferential treatment to oil supply enterprises, shipping companies and enterprises related to maritime services. In addition, the restrictions on the production and blending of bonded oil by local governments have also been liberalized.

4.3 The supply structure is continuously optimized to drive the development of regional maritime and other industries

Ship replenishment is a comprehensive industry, from crew to supplies, from fuel oil to fresh water, food, and then to marine parts and accessories. Therefore, the development of bonded ship fuel supply business is only a beginning. It can be used as a gateway to open the door of comprehensive maritime supply service, innovate "one ship multi supply" into "one ship comprehensive supply", drive the development of shipbuilding industry chain, form industrial agglomeration, highlight the scale efficiency, so as to promote the development of logistics, service, finance and other industries in the region and the whole regional economy It is the fundamental purpose of developing the bonded ship fuel supply business. From January to October 2019, the value of Zhoushan's foreign ships supply will reach 1.589 billion US dollars (including: 1.227 billion US dollars for marine fuel oil and 362 million US dollars for materials), with a year-on-year increase of 28.35%; a total of 49 enterprises and institutions have been introduced, with a total of more than 150, initially forming a cluster effect. In terms of inspection and testing, international shipping agency and legal services, three of the top four inspection and testing institutions in the world have been established, including Swiss general standard, French BV and Holland Shibao; a number of internationally famous high-energy maritime service enterprises and institutions, such as Shihua Nanyou, Wilson Huayang and Haibo, have been established and carried out business; the Maritime Arbitration Center of Zhejiang free trade zone has been in normal operation, with a total of 6 cases.

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4.4 Use information technology to create intelligent refueling and digital management mode

Bonded oil filling business involves many links such as document declaration and approval, anchorage arrangement, customs supervision, data recording, and even transaction disputes, which greatly reduces the fuel filling rate, especially for the busy ports. Therefore, all ports should make full use of information technology, introduce digital management, and create a smart refueling mode. Singapore and Rotterdam began to invest in the construction of smart filling system very early, and have been in the process of research and development and continuous improvement. Based on the "single window" of international trade, Zhoushan of China has built a "one port acceptance" platform for bonded oil filling, which can centralize the declaration subjects involved in filling, such as warehousing, oil supply and freight forwarding, into one electronic declaration platform for processing; meanwhile, Zhoushan's independent research and development has such functions as plan declaration approval, intelligent anchorage arrangement, process real-time monitoring, real-time data recording, abnormal information reminding, etc In addition, Hangzhou Customs has promoted the automatic identification system, wireless video monitoring system, flowmeter, liquid level monitoring system and other information means to realize the real-time remote supervision of oil loading and receiving ships and the process of oil supply; Zhoushan has also issued Measures for the management of marine fuel oil supply for international ships, and started the construction of bonded electronics The e-BDN system of fuel delivery order aims to take the lead in fully implementing the delivery of mass flowmeter in domestic ports; and officially launch the fast processing platform for fueling disputes of bonded marine fuel oil in China (Zhejiang) pilot Free Trade Zone, complete the development of app for rapid mediation and arbitration procedures in the bonded fuel oil supply industry, and improve the efficiency of dealing with trade disputes.

5. Conclusion

In terms of the development status of the business volume and infrastructure construction of the world's top ten bonded ship fuel supply ports, the current bonded ship fuel market has the phenomenon of "one dominant company with wide supply gap". The world's largest bonded ship fuel supply port, led by Singapore, occupies half of the Asian market. From the development experience of Singapore and Zhoushan, a good bonded ship fuel market needs strong government policy support, sufficient preferential subsidies at ports and information-based fuel supply means.

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