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Analysis of Financing Issues in China's Port Infrastructure Construction under the Background of Intelligence

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Abstract: With the continuous development of technology, traditional ports are also facing pressure to transform towards intelligence. Due to the large investment amount, long payback period, and unclear direct economic benefits of port construction, how to obtain construction funds has become a key issue restricting the intelligent transformation of ports. This article analyzes various feasible financing models and successful cases for the current management mode of Chinese ports, and provides countermeasures and suggestions for the various practical limitations of investment and financing in Chinese port construction.

Keywords: Chinese ports, Intelligent, Financing.

1. Introduction

As a transportation hub for both land and water transportation, ports play a strategic role in the development of the national economy. In economically developed regions around the world, world-class ports are at the center. With the continuous development of technology, the world economy has entered a stage of intelligent driven development, and port development is no exception. Among them, the smart port is a port ecosystem that relies on technological innovation, integrates automation, intelligence, digitization and other technologies, and has multiple boundary attributes, representing the development direction of modern ports. Smart port is an innovative technological concept. The construction of smart ports relies on the development of information technology. With the continuous improvement of the theory of smart ports by researchers, smart ports have been fully integrated into the Internet of Things and cloud computing. By analyzing port resources, achieve intelligent operation of port management; And further realize the intelligent and information-based development of the port.

In 2018, the world economy and port throughput continued to maintain moderate growth. The demand for port throughput is increasing with the development of the global economy. At the same time, research on port intelligence will continue to deepen, and port construction and public demand will also interact with each other. Bottasso [1] and Deng [2] studied the correlation between ports and local economies. The study estimated the direct and indirect (i.e. spillover) effects related to port activities. The results indicate that ports may have an undeniable impact on local GDP: interestingly, a significant portion of the impact occurs outside the region where the port is located. Hargono [3] confirmed that the larger the port's terminals, storage facilities, and transportation network, the higher its attractiveness to users. Furthermore, this in turn will affect economic growth and increase the capital income of the surrounding population. In addition, Tovar et al. [4] studied the competition and accessibility of major ports in the Canary Islands, demonstrating that smart port construction is the correct way to address competitive disadvantages. Cepholina et al [5]. studied the impact of communication infrastructure on port strategy. He pointed out the necessity of information technology construction for smart ports.

With the landing of automated terminals such as Xiamen Far Sea and Shanghai Yangshan, relevant technologies have gradually matured. In addition, with resource protection policies, the approval process for the development of shorelines and terminal construction in China has become stricter, making the construction of coastal ports in China mainly focused on the construction of new automated terminals and the automation transformation of traditional terminals. Port construction has the characteristics of large investment amount, long payback period, and unclear direct economic benefits. Solving the huge funding for port construction is an important issue faced by investors and organizers. At present, there are various management models for ports in China, and different management models correspond to different asset ownership compositions, so their financing channels also have certain differences.

2. Current Management Mode of Chinese Ports

The focus of port management mode is on the operation and management of ports, that is, under the supervision and management of corresponding government agencies, comprehensive management of port operations is carried out through certain forms of management mode, and a reasonable management system is defined to ensure the coordinated and efficient operation of ports, and to promote the full play of the driving role of ports in national economic development and international trade exchanges [6]. At present, there are several main types of port management models in China.

(1) Service ports, also known as operational ports, service ports, and public utility ports by some scholars, are all implemented by the public sector in terms of operational functions, port land resource ownership functions, and port planning functions. The public sector not only provides land and infrastructure equipment, but also provides services for ships and goods.

(2) Tool ports have port regulatory and landowner functions implemented by the public sector, but operational

functions are implemented by the private sector, which owns land, infrastructure, and fixed equipment, provides berths for public users, and leases equipment and related sites to loading and unloading companies and other users.

(3) The public sector is responsible for all regulatory functions and infrastructure supply functions in the land port, while the supply and operation functions of the superstructure are implemented by the private sector. The ownership of land and infrastructure belongs to the public sector, but the operation of leasing berths and rear areas through capital leasing or concession agreements by the private sector is allowed by local governments. Other port facilities, machinery, equipment, and labor are invested, owned, and employed by the private sector, and the port authority management plays the role of landlord or landlord.

3. Analysis of Port Financing Models

The Chinese government has established a system through legislation to ensure the rational utilization of port resources through port planning, shoreline management, and rational layout; Established a system for diversified investment and operation entities to construct and operate ports. The following text mainly analyzes the financing models currently adopted in China's port construction.

3.1. Equity Financing Model

3.1.1. Government Financial Funds

It mainly includes funds from the national budget, special funds from the transportation department, and government financial appropriations. Since 1997, the special funds of the Ministry of Transport have been included in the budget management of the Ministry of Finance, and are strictly used in accordance with the direction and scope stipulated by the state. China levies port construction fees on all goods entering and leaving ports under the dual leadership of the central and local governments, which are used as funds for port construction and provided to port construction projects that comply with national planning. The funds obtained from government investment are mainly used for the construction of public infrastructure in port projects. The transportation vehicles such as trains, ships, and airplanes are closely integrated with people's daily lives, and their development process is similar to that of automobiles. These transportation vehicles have undergone several sudden changes in appearance brought about by technological advancements during their development process. Trains have evolved from steam locomotives to diesel locomotives and then to electric locomotives; Ships evolved from sailboats to oil tankers and then to electric propulsion; Aircraft have evolved from propellers to jet propulsion. In the process of these changes in appearance, the shape of transportation vehicles always develops from rough to coordinated and exquisite, reflecting the designer's unchanged aesthetic pursuit.

3.1.2. Issuance of Stocks

After being approved by the state, a joint-stock company can raise a large amount of funds from the capital market by issuing stocks to the public. For example, in September 2006, Rizhao Port issued 230 million A-shares, raising 1.081 billion yuan. After the IPO, in November 2007, it successfully issued 880 million yuan of convertible bonds with separate transactions. In 2009, Rizhao Port completed its second round of refinancing by issuing non-public shares in August, raising a total of 1.28 billion yuan. The total financing scale reached 3.2 billion yuan. Currently, there are 17 port companies listed domestically in China. Listing is beneficial for companies to establish healthy, standardized, and transparent financial systems, improve credit ratings, expand competitiveness, and increase visibility.

3.1.3. Investment by Domestic and Foreign Investors

Jointly investing funds with investors, managing projects together, and sharing risks not only solves the problem of funding needs, but also achieves complementary advantages, expands business channels outward, and exchanges advanced technology and management experience. For a long time, China has encouraged foreign companies to participate in port infrastructure construction and operation in various forms, and provided certain preferential treatment. Port companies attract shippers, shipping companies, as well as industrial and raw material mining and processing enterprises to invest, which is conducive to the long-term development of the port and improves its internationalization level. After Maersk invested in Qingdao Qianwan Port Area, Qingdao Port became the fastest port for exporting goods to Europe in the north, which is the best example.

3.2. Debt Financing Model

3.2.1. Domestic bank loans

Domestic credit methods include commercial bank loans, policy bank loans, non bank financial institution loans, etc. Non bank financial institutions include trust and investment companies, finance companies, financial leasing companies, etc. At present, bank loan financing is still the main way of financing for port construction in China.

3.2.2. Foreign Bank Loans

Foreign credit methods include international commercial bank loans, foreign government loans, international financial organization loans, export credit, etc. In 1985, Shanghai Port, Tianjin Port, and Guangzhou Port applied for the first installment of loans from the World Bank to build container terminals; The construction of port projects such as Dalian Port and Yantian Port, as well as loans provided by institutions such as the World Bank and the Asian Development Bank, have played a significant role. By the end of 1998 alone, the number of coastal port berths built by China using foreign credit loans had reached nearly 140. At present, foreign credit has entered various levels of port construction in China.

3.2.3. Issuance of bonds

On July 5, 2024, Beibu Gulf Port Group successfully issued corporate bonds on the Shanghai Stock Exchange, with an issuance scale of 1 billion yuan. On August 23, 2024, Shanghai International Port (Group) Co., Ltd. successfully issued a 10-year medium-term note worth 2 billion yuan, raising funds mainly for the construction of the container terminal and supporting projects in the Xiaoyangshan North operating area of the Yangshan Deepwater Port Area of the Shanghai International Shipping Center.

3.3. Financing Model of the Project

The current financing models for port construction projects mainly include: franchise operation model, private financing model, public-private partnership model, asset securitization model, financing leasing model, and landlord port model.

3.3.1. Franchise operation financing model

The franchise financing model is a general term for project financing methods such as BOT, BOO, BT, TOT, etc. It is mainly used for public infrastructure construction. The

government of the country where the project is located and the project company sign a franchise agreement to agree on the investment, operation, and maintenance rights and responsibilities of the project. Franchise is the core of this model.

The BT project with the largest investment scale in Hainan Province (estimated to be 8.92 billion yuan), the Haikou New Port Terminal Project, was funded, designed, procured, and constructed by China Communications Fourth Navigation Bureau in 2012. After completion and acceptance, it was transferred to Hainan Port and Shipping Holdings Co., Ltd; There is also the BT project for the hydraulic structure and ancillary facilities of the first phase of the Hangzhou Toumen operation area dock.

3.3.2. Private Financing Model

The private financing model, also known as PFI. Public infrastructure projects to be built are proposed by government departments based on social needs, and private capital is used for construction and operation. The government can purchase products and services provided by the private sector, or grant fee concessions to the private sector, or operate in partnership with the private sector. The ownership of the final project is retained or transferred according to the contract agreement. The Hong Kong region of China, following the free port policy, is a representative port of private investment, construction, and management. The Kwai Chung Container Terminal is the main container logistics processing center in Hong Kong, jointly operating and managing multiple berths with companies such as Hutchison Whampoa, COSCO, and Wharf Group.

3.3.3. Public Private Partnership Model

The so-called public-private partnership model refers to the project financing model in which the public and private sectors, as well as the government and private enterprises, cooperate and participate, commonly known as the PPP (Public Private Partnership) model. In this model, the government and private enterprises form a partnership to provide public projects or services, jointly assuming responsibility and financing risks. Private enterprises raise funds and the government provides loan guarantees; The goal of private enterprises is to obtain economic benefits and receive returns, while the goal of the government is to bring comprehensive benefits to society. Through this cooperation, a win-win situation is achieved.

Fuzhou Port Group Co., Ltd. and Huaneng International Power Co., Ltd. jointly develop, construct and operate a large-scale deep-water public dock berth at the north bank port of Luoyuan Bay, with a total investment of 6 billion yuan; Ningbo Port and Maersk Group jointly invested in the establishment of Ningbo Meishan Bonded Port Meilong Terminal Operation Co., Ltd. with a registered capital of 500 million yuan. The two parties will jointly invest and operate berths 3-5 of Meilong Terminal in accordance with the agreement, with a total investment scale of approximately 4.3 billion yuan.

3.3.4. Asset securitization model

The asset securitization model, also known as the ABS model, is based on the assets of a project, guaranteed by the expected returns of the project, and raises funds through the issuance of bonds in the capital market. In 2005, known as the first year of asset securitization in China, the China Development Bank issued 4.177 billion yuan of credit assets to support securities products. In 2012, Dalian Port returned to the A-share market and its core assets were listed as a whole, and the asset securitization rate increased from 27% to 43%, an increase of 16 percentage points.

3.3.5. Financial leasing model

The financing leasing model is that the lessor invests in purchasing equipment according to the specific requirements of the lessee, and then leases it to the lessee for use. During the lease period, the ownership of the equipment belongs to the lessor, and the lessee has the right to use it. After the lease term ends, the lessee can choose to keep, renew or return the equipment to the lessor according to the contract provisions.

In 2012, Shanghai Bank of Communications launched a new business called "Dock Berth Leasing", in which port enterprises adopt a "post-sale leaseback" model to sell completed and operational infrastructure (such as dock berths) as leased items to leasing companies, and then leaseback them back to continue using them. This innovative business breaks through the limitation of only treating mechanical equipment as a single leased item in previous port project financing, broadens the financing channels for port companies, and helps port enterprises activate fixed assets and obtain subsequent construction funds for projects.

3.3.6. Landlord Port Mode

At present, there is an international promotion of a landlord port model that integrates financing functions and port management. This model is entrusted by the government to franchise institutions on behalf of the country to own the property rights of the port area and a certain range of land, coastline, and infrastructure in the rear. The land, coastline, waterways, etc. within this range are uniformly developed, and the port terminals are leased to domestic and foreign port operating enterprises or shipping companies for operation, implementing the separation of property rights and operating rights. Franchise institutions charge a certain rent for the rolling development of port construction.

4. Countermeasures and Suggestions

In response to the various practical limitations of investment and financing in China's port construction, it is necessary to study how to enhance the degree of marketization in the new national policy environment, scientifically and reasonably allocate funds from various sources to port construction projects, and form a new investment and financing combination plan.

4.1. Government Funding

The arrangement of China's port management system determines that the government has always been the fundamental subject of investment in port construction. Especially for infrastructure with strong public welfare, it is more in line with the direction of government funding investment. Although the amount of government investment is not large, it will play a role in stabilizing and promoting other investment channels in port construction. At the same time, it is emphasized that the role of government departments in port construction needs to be accurately positioned, only serving public infrastructure.

4.2. Bank Credit Funds

After years of exploration and development, Chinese port enterprises have formed a diversified financing model that combines multiple financing channels. Bank credit funds have the advantages of relatively low capital costs, fast

acquisition speed, and not affecting company control. They have always been a financing method that various enterprises can use, and port enterprises are no exception. In the new economic situation, the Chinese government has been adjusting its economic structure in recent years with the goals of reducing inventory, overcapacity, and leverage. It is a difficult problem for port enterprises to use bank credit funds reasonably to control risks within a controllable range.

4.3. Private Capital

The introduction of private capital can be divided into two types: one is for private enterprises to invest private funds in operational infrastructure projects through loans; The second is for private enterprises to invest private capital through equity investment by establishing companies. The specific ways to introduce private capital include BT, BOT, TOT, financial leasing, and landlord port models. According to statistics, the average investment return period for global port infrastructure construction is 30-50 years, with an annual average return rate of about 2% -3%. Private capital has the characteristics of pursuing high investment returns, weak social responsibility, strong liquidity for industry entry and exit, and insufficient risk resistance.

Based on the characteristics of private capital, it is necessary to first establish detailed process standards for whether private capital participates in investment projects through equity participation, joint ventures, or joint ventures, in order to unify the management of investment projects in which private capital participates; In addition, it is advisable for local governments to introduce incentive policies such as preferential tax and fee collection for enterprises investing in port operational infrastructure projects, financial subsidies, and support measures for some government investments to eliminate the operational risks of private capital; Finally, it is recommended to improve the mechanism for private capital to exit port infrastructure construction and implement protective exit policies for private enterprises to eliminate their concerns before entering.

4.4. Capital Market

To promote investment and financing in port infrastructure and connect with the capital market, and to facilitate the rational flow of funds, it is necessary to encourage rational financial innovation and absorb social capital to promote infrastructure construction and transformation. Establish a trading market that complies with government regulations, enhance the liquidity of project ownership through securitization, and fully tap into market value. Fully consider the monetization of the social value of infrastructure projects, package and sell infrastructure projects and their radiating areas, allowing investors to enjoy project spillover value and stimulate investment vitality.

5. Conclusion

The Chinese port industry is based on the new development stage, implementing the new development concept, constructing a new development pattern, achieving continuous improvement of comprehensive port service capabilities, facing the construction of smart ports and green ports, optimizing port structure, and promoting port transformation and upgrading are the contents of the development of the port industry. Chinese ports should address the issue of port construction funding based on the differences in economic development levels and hinterland economic development levels of the regions they are located in, as well as the limitations of the port's own conditions. Efforts should be made to adapt to local conditions, actively expand financing channels, and design diversified financing plans.

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