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Impact of the belt and road initiative on port the route

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IMPACT OF THE BELT AND ROAD INITIATIVE ON PORT THE ROUTE

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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.

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ABSTRACT

Title of Dissertation: **Impact of the belt and road initiative on port the route**

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In late March 2015, the Chinese government launched the vision and actions for jointly building the Silk Road Economic Belt and Maritime Silk Road (hereafter as the Belt and Road Initiative, BRI), with the aiming of deepening the opening and cooperation, making full use of the economic complementarity, and accelerating the connectivity of regional infrastructure to form a smooth, safe and efficient transport corridor. This is reflected in the promotion of port infrastructure construction, smooth land-water intermodal transport channels, promote port cooperation, increase maritime routes and frequency, strengthen maritime logistics information cooperation and other tasks. From the current trend of trade cooperation and the active participation of the international community, the Belt and Road Initiative (BRI) extends from the South China Sea to the Indian Ocean and from Europe to the South Pacific along the ports involving Southeast Asia, South Asia, West Asia (Middle East), Africa, Europe and Oceania Plate. Currently, China has signed BRI cooperation documents with 138 countries and 30 international organizations. With the development of economy and society, our country has paid more and more attention to all kinds of industries and enterprises. The Belt and Road policy, which China advocates, has received widespread attention, propelled the growth of businesses and injected the new vigor for the enterprise's innovation. But at this stage, the Belt and Road Initiative is also driven by industry based interests. It not only plays a positive role for the countries along the BRI, but also promotes China's enterprises to open up foreign trade. The strengthening of links with other countries is of practical relevance. This paper studies and analyzes the changes of container throughput in several key ports of Belt and Road Initiative, and puts forward its own meager strength in the future.

KEYWORDS: BRI; Container throughput; Port optimization

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AHP	Analytic Hierarchy Process
AIIB	Asia Infrastructure Investment Bank
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
ESPO	European Seaport Organization
GRA	Gray Relational Analysis
MSR	Maritime Silk Road
OFDI	Outward Foreign Direct Investment
PRD	Pearl River Delta

CHAPTER 1 INTRODUCTION

1.1 Research background

As an essential concept for China, the "Belt and Road Initiative" (BRI) was put forward by the Chinese President Xi Jinping in 2013. The proposal of jointly building "Silk Road Economic Belt" and "21st Century Maritime Silk". Subsequently, in relevant important documents, it was clearly demanded that "the building of infrastructure connectivity with neighboring countries and regions be accelerated, the construction of the Silk Road Economic Belt and sea route of Silk Road be advanced, and a new pattern of all-round opening up be formed.".

The construction of the Maritime Silk Road in the 21st Century is an important initiative for China and the countries along the Maritime Silk Road (MSR) since it seeks cooperative development and promotes common prosperity. This initiative is of great significance for strengthening cooperation in the Asia-Pacific region and even the world, promoting cooperation and world economy, and achieving common prosperity.

Since China's open-up and accession to the WTO, the number of China's foreign Engineering contract is also increasing. The open-up has brought about many achieved more positive results, such as abundant capital, rich labor resources and other favorable conditions. Nowadays, China are aiming at a higher position in international projects. The construction of the Belt and Road is proposed to meet the needs of this reality and to promote the construction of surrounding areas. The Belt and Road Initiative and its implementation are exercised through the establishment of the Silk Fund, including the establishment of China-Republic of Korea, China-Australia and other free trade zones. All these measures show that China has made great efforts on the road of external development. At present, the construction of the Belt and Road has an issue of connectivity. On top of this priority, the investment field will strengthen the construction of infrastructure. Under the current background, China's engineering enterprises will vigorously open to the outside world, and actively contract the coastal areas of the project works. As well as

complying with the Belt and Road's development strategy, businesses in the surrounding region also need to strengthen themselves, expand overseas markets, and further meet the demand for energy, high speed rail, and infrastructure building along the route, to promote the economic development of all countries. The introduction of the Belt and Road, can be seen in China's policy more accurate, in order to promote the development of China's economy, Chinese government departments at all levels are making great efforts. In the future, China's development under the Belt and Road will have a positive impact on the surrounding countries. It is expected that in the long-term construction process, the BRI can not only promote the development of enterprises, but also to constantly improve China's own economic. At the same time, it is necessary for enterprises to strengthen innovation, which can promote the development of peripheral trade and the transformation of trading enterprises under the impetus of the Belt and Road. In the process of development, many enterprises should not blindly follow the previous development plan, but must conform to the current development plan and constantly improve themselves and other fields. In the process of perfection, these enterprises will realize the tremendous achievements that Belt and Road Initiative can bring. The Belt and Road Initiative not only inherits the spirit of the ancient Silk Road, with solidarity and mutual trust, equality and mutual benefit, inclusiveness and mutual learning, and win-win cooperation at its core, but also conforms to the trend of the times, which seeks peace, development, cooperation and win-win results. The BRI is an inclusive, open concept, with multiple national aspirations, multiple functions of opening up, and a broad geographical extension. The long-term goal of the BRI is to build a new model of regional cooperation, while the short-term goal is to connect roads and ports for open trade, and to strengthen cooperation in trade, transportation and investment. At present, under the guidance of the planning, and in accordance with the contents to build the framework of relevant agreements, China should work with all other countries along the BRI to overcome the obstacles of economy, politics and culture, and promote the construction and supporting of key railways, highways and airports by unimpeded trade channels. China and other countries should make further efforts

to expand the scope of industrial cooperation, establish various forms of organizations and institutions, and formulate a series of policy measures and coordination mechanisms.

Among them, shipping is the most important mode of transportation in international logistics. It refers to the use of ships through sea lanes in different countries and regions between the ports. It is also a widely used means of transport of goods in the world. In international shipping and logistics, ports are a very important resources. The port can provide safe access to ships and berthing conditions; it has the characteristics of land-water combined transport, It is also a distribution center for industrial and agricultural products and trade import and export materials. As a natural hub connecting the inland and the ocean, the special node of international logistics, the ports plays a very important role in social and economic development, and in radiating the trade of the city and even the wider region. With the rapid development of the economy and the improvement of the traffic environment, the function of the port has been extended, the service requirements of the customers have become more and more diverse, and the competition of each port has become more and more intense. The enhancement of port efficiency and response speed, the constant adjustment and improvement of port function have become the important factors of port comprehensive competitiveness.

1.2 Research Significance

As a living space for mankind, the lifeline of the ocean maintenance the global security problems in the fields of economy, trade, energy and national defense. Transportation is the blood and skeleton of economic development. To push forward the construction of Belt and Road, the foundation and key point is to connect the transportation. At present, Chinese economy is highly interconnected with the world economy, and the Belt and Road is the need of the people of all countries for skillful cooperation and global economic integration. We will actively promote the docking of the sustainable development goals of the countries along the Belt and Road, and the new form of the ancient Silk Road will once again be crowned with stars in

history.

The development of the research port is the real demand of the construction of Maritime Silk Road. An analysis of the important ports along the Maritime Silk Road and the changes in trade volume and self-construction since the implementation of the Belt and Road Initiative can deepen the understanding of the ports along the route. In order to achieve long-term stability and sustainable development, the port must know its own operating condition clearly and accurately, locate reasonably, avoid the weak link in the operating process, and exert its advantages. The Maritime Silk Road is of great practical importance for the construction of ports and the evaluation of port location is of great significance to the investment evaluation of overseas ports, the planning and construction of investment ports, the construction of port terminals, the hinterland traffic roads and industrial parks. The quantitative analysis of the regional advantages of the Maritime Silk Road can help to grasp the overall spatial distribution characteristics of the regional conditions of the ports of the countries along the route. Based on this, the differences of the regional conditions of the ports of each sub-region can be analyzed microscopically. The quantitative analysis can also be used as the basis of port competitiveness evaluation to study the location advantages and disadvantages of ports and their hinterland. As an important technical support of the Belt and Road Initiative, the evaluation of the regional advantages of the ports along the Maritime Silk Road for international trade and investment, ocean transportation and scenario simulation is also of paramount importance. It can not only provide the scientific basis for the port and its hinterland infrastructure construction and the port future investment forecast, but also work as the important reference or promoting the Belt and Road initiative.

1.3 Domestic and overseas research status

In the two UN trade conferences in 1992 and 1999, ports were divided into four generations according to their functions. Before the 1950s, the port mainly had the functions of transshipment, temporary storage, receiving and sending of sea cargo, and regarded the transportation hub as the location, which was the first generation

port. When the port appeared the simple sub-assembly distribution also has the cargo value-added commercial function, the loading and unloading and the service took the localization, afterward 30 years was defined as the second generation port; The highly organized logistics services, together with the related financial and information services, must be positioned in trade and logistics. In the 30 years since the beginning of the 21st century, the trade and logistics center has been regarded as the third generation port. Forming the port alliance and work as the logistics operator of upstream and downstream enterprises is the development trend of the fourth generation port.

1.3.1 Current research situation in China

At the present stage, the theory of the Belt and Road is put into practice by the state-owned enterprises and studied by many domestic scholars. Wang and Zhang (2015) have conducted in depth research and analysis on the international influence of the Belt and Road Initiative. In order to study the rationality of China's policy and the practical significance of China's Belt and Road, scholars have also analyzed it from various angles in their research reports. For example, Chen ((2016), pointed out the development situation of the Belt and Road in her paper. According to the significance of the relevant problems and key points arising at the present stage of the Belt and Road, she made a comparative analysis and put forward a proposal to promote the development of the Belt and Road, Li and Li (2016) have also studied the economic situation of the development of the Belt and Road.

The Belt and Road proposed that China's construction contracts can meet the demand for high-speed rail communications and power infrastructure along the route. Therefore, enterprises should also give full play to the mechanism of cooperation, integration into the development model of new initiatives. Active exploration of new areas, construction, contracting major infrastructure construction, the brand image shaping, improvement of their own regional industrial advantages, and the process to comply with the needs of national policies could contribute to the stable development of enterprises. In his research, Liang (2015) also clearly put forward several

problems that need to be solved in order to promote the opening-up of Chinese enterprises. First, enterprises need to build themselves, and to solve the financial aspects of the problem as well as the training and construction of personnel. Li, Jia and Wang (2016) analyzed the development of China's external contracting in the international and domestic environment and summarized the financing of China's external trade contracting related issues. For example, China should improve the relevant laws and regulations to strengthen the financing support for enterprises.

The long-term goal of the BRI is to establish a new model of regional cooperation. In the near future, cooperation will be mainly in the fields of trade, transportation and investment. No Customs Union will be established in the future; it is more of a pragmatic and flexible economic co-operation arrangement (Lung, 2013). China works as the link between global trade, maintaining peace and stability, bridging east and western cultures, and promoting people-to-people ties and so on (Zhou, 2014) . Its core goal is to open up a broader commodity market and energy, resources supply for China (Cai, 2014). Compared with the relevant proposals by the United States, Russian Federation, Iran, Kazakhstan, Japan and other countries, China is trying to change the passive situation of relying too much on the markets of the United States, Japan, the Republic of Korea and ASEAN. China will improve the new pattern of opening to the outside world that is compatible with opening the coast and the borders to the West. Its highlight is the "four pillars" of China's policy towards Central Asia, the "five pillars" of the "Silk Road Economic Belt" and the "five concrete measures" of SCO's pragmatic cooperation in principle (Lung, 2013) . The BRI is not easy system. It aims to build a new international political and cultural order (Zhao, 2014), forming "community of shared interests" and "community of common destiny for all mankind" with neighboring countries to improve the road, railway, port, customs clearance and other soft and hard conditions of the ancient Silk Road and other Eurasian continental passageways (Lung, 2013). Regional transport infrastructure is recognized as an important factor in the process of regional integration (Prabierde et al., 2009). The main task is to promote infrastructure connectivity and enhance economic and trade cooperation only in line with the future

development goals of the Central Asian countries, and for Russia, Mongolia, Afghanistan, Pakistan and so are the most "ideal development model" (Li, 2014) , with strong regional complementarity (Li Hong, 2014). It is of essence to level, expand industrial investment cooperation, deepen energy and resources cooperation, expand financial cooperation, strengthen people-to-people and cultural exchanges, and strengthen eco-environmental cooperation (Li, 2014). The construction of the Silk Road Economic Belt is essentially the development of the channel economy. It is an inclusive and open concept with multiple national demands and multiple opening-up functions. It shows broad geographical extension, and the BRI points to multiple open functions such as cooperation, mutual trust, communication and integration. It is a comprehensive consideration of national development, international cooperation, cultural revival and narrowing the regional gap (Dang, 2014). It is China's new multilateral win-win approach to Euro-Asian and global economic development (Zhang, 2014) that bridges the gap between developed, developing and least developed countries (Li, 2014). We should speed up the construction of highways, railways, aviation and inland ports in an all-round way, and build a modern three-dimensional transportation corridor heading west, south and east (Gao, 2014). Economic Cooperation is an important support point for development (Gao et al, 2005) and the implementation of the new Silk Road Initiative (Li, 2014). "New Silk Road" plan is to open the north and the middle route, the south routes expected to open to Iran in the future, even if the land can not open the south route, then by the sea "new Silk Road" plan as a supplement (Zhao et al, 2014). The focus is to create fully convenient channels, and the establishment of a customs and economic belt will closely revolve around economic cooperation, adhere to the principle of mutual consultation, joint contribution and shared benefits, make full use of existing cooperation mechanisms and platforms, and accommodate the interests and concerns of all parties, seeking the greatest common denominator of cooperation (Lee, 2014). With the industrial cooperation of Central Asian countries, the Base Union, the expansion of the organization's members, the space focus is the second Asia-Europe continental bridge along. The path is to gradually explore a

unified and coordinated foreign macroeconomic policy. Establishment of the Silk Road Economic Belt Corridor Coordination Committee, Innovative Infrastructure Financing Mechanism (Hu, 2013). To develop convenient, efficient and reliable mainland Hashimoto's idea is to take the government as the leading, take the agriculture and the energy industry as the foundation, the multi-level, multi-angle, omni-directional opening cooperation (Wang et al, 2013). Energy cooperation with Central Asian countries may be considered in the areas of energy and trade, energy and investment, energy and transport, and energy and environment cooperation (Chailey et al, 2014). The Bar for advancing co-operation in Central Asia's complex geopolitics should not be set too high (Hu, 2013). China should strengthen the transport with resource countries, consumer countries and transit countries in order to shorten the transport distance and reduce freight charges, (accelerated Freight 2005). The three silk roads, namely land, air and information, will be developed to promote the signing of traffic facilitation agreements by all countries and accelerate the establishment of an international transport corridor linking the Pacific Ocean and the Baltic Sea (Hui, 2014). China should increase efforts to build a modern logistics system (Wang, 2014). Take modern logistics industry as a leading and pillar industry (Wang, et al, 2013). Energy cooperation should focus on energy cooperation among countries with a sense of "community of common destiny for all mankind" and strengthen "common energy security" (Wang, 2013) .

With regard to the current situation of participating in the ports along the Maritime Silk Road in the 21st century, in the investment layout of overseas ports, not only the central enterprises are increasing their investment efforts, local port operators are also going overseas in various ways (Lu 2014); China's port and shipping enterprises have expanded their overseas strategic layout in order to obtain global quality port resources, at the same time, it summarizes the outstanding achievements of the overseas ports layout of enterprises such as COSCO Shipping Ports(Lei 2014). There are four motives for Chinese port and shipping enterprises to go abroad. Five modes of participating in overseas port projects and four principles of difference, alliance, security and profitability are put forward (Liu). In terms of participation mode, China

implements the global port expansion strategy, and domestic port and shipping enterprises attach great importance to port investment in undeveloped African market and surrounding Asian market, and put forward four modes: joint venture, merger and acquisition, BOT and franchise (Zhang 2015). There are four construction modes of maritime strategic fulcrum port: joint venture mode, M & a mode, long-term leasing mode and franchise mode. According to the characteristics of different modes, enterprises should avoid the possible policy risk and legal risk, and improve the relevant system of maritime strategic fulcrum construction (Liu 2014).

In the aspect of risk, China's participation in overseas port projects at present are political risk, operational risk and legal risk (Xie 2016). And overseas port construction projects are mainly divided into external risk and internal risk. External risk includes political risk, economic fluctuation risk, exchange rate risk, war risk and legal risk, internal risk includes management risk, project raw material risk and project delay risk (Wan 2015).

1.3.2 Foreign research status

For the Belt and Road as a whole, the theory of the Belt and Road influence has long been proposed abroad. Among them, American scholars at the forum of the Belt and Road have proposed that in order to build an international infrastructure network. Moreover the European Union, we can gain some experience and lessons through the construction of the Belt and Road, in the overall development process, a certain impact will be brought to the international community. At the 18th CPC National Congress, General Secretary Xi Jinping put forward the important theory of the Chinese dream, the core of which is to realize the great rejuvenation of the Chinese people. Amrita Jash (2016) also sees the promotion of Belt and Road as a basic way to realize the Chinese dream, strengthen foreign trade links through the construction of new trade network infrastructure, and make our country exert its own advantages in the construction process, For example, the Asia Infrastructure Investment Bank (AIIB), provides an alternative to the Western led Bretton Woods system that laid a solid financial foundation for the Belt and Road, it also provides an equal platform

for underdeveloped economic regions and plays a more active role in international political economy. Cheng (2016) also took a closer look at the main issues of the Belt and Road Initiative such as what are the real objectives behind the initiative or whether China should be identified as the initiative's main task in the process of investment and trade building, and market-based trading. Nalbantoglu (2017) believes that after 40 years of reform and opening-up, China is now facing economic structural imbalances, income inequality and environmental problems that require a paradigm shift; therefore, it is against this background that the Belt and Road Initiative is put forward to maintain the balance of development and promote the construction of sustainable development in China.

The CHR a think tank based in Bergen, Norway. "determinants of Chinese outbound investment" by researcher Ivarkolstad and Arne Wiig, researchers at the Michelsen Institutea, examines the determinants of Chinese outbound investment using a hypothesis test. Emphasis is placed on the host government, resource endowment and the interaction of these three indicators. According to the report, in recent years, China's overseas investment has grown rapidly, but there have been mixed reactions from outside. On the one hand, some scholars believe that China's overseas investment is a good thing for the host country and is conducive to the development of the host country, especially from the perspective of technology transfer. But on the other hand, some scholars believe that China's investment and the inflow of Chinese capital essentially support the bad government of the host country. In addition to evaluation, there is not much research on Chinese overseas investment. According to research, there are only three academic papers on the drivers and effects of Outward Foreign Direct Investment (OFDI) in China, and the conclusions of these three papers are different. According to Qian (2008) , the flow of OFDI in China has nothing to do with the "good" or "bad" of the host government, but has to do with the resource endowment, while Cheng and Ma (2008) do not consider the host government, nor take into account resource endowments. The Ivar Kolsta and Arne Wiig reports identified two problems with the three reports: Buckleyet Al.(2007) , Cheng and Ma (2008) have problems in data selection. Both papers use approval data

to reflect OFDI in China. However, due to the non-approval situation of Chinese overseas investment, the report uses real investment data to reflect China's OFDI. Previous literature has used "host country government" and "resource endowment" as two indicators, without considering the correlation between the two, the report re-selects and prioritizes the determinants of OFDI in China from both perspectives.

The competitiveness of the three major international hubs (Busan, Tokyo and Kaohsiung Ports) in Northeast Asia is evaluated by a mixed multi-criteria decision-making (AHP) and gray relational analysis (GRA) method from the perspective of logistics. In addition, the five dimensions (the political and economic environment, operating environment, cost, infrastructure conditions, incentives) proposed 20 evaluation criteria, and do a comprehensive ranking. Vinhv. Thai (2015) and others have made a comparative analysis of the ports of Vietnam and South Korea, mainly in the port efficiency and effectiveness of research, with special attention to port human capital. PaulTae-Woo Lee and others have evaluated Asia's major container ports, including those in Busan, Hong Kong, Shanghai and Singapore, as customer-centric community ports, or fifth-generation ports. The competitiveness of ports is evaluated by considering the cross-sectional, vertical and horizontal aspects of port evolution, and the validity of the method is verified by descriptive and quantitative methods.

For port studies in and around Europe, Sanja Bauk and other factors including economy, technology, logistics, environment and community participation (a combination of qualitative and quantitative factors) were taken into account, and the ports of the Adriatic Sea, the Aegean Sea and the Black Sea were investigated by the method of Preference Order Structure Assessment and analytic hierarchy process. The aim is to give a qualitative explanation of the port's marketing methods in order to attract more customers. Esparza (2014) studied 46 Spanish general ports and constructed the Spanish Port System (SPS). Balci et al,(2015) research on the impact of service quality differences at different levels of Turkish ports FOR port competitiveness. Customer Service and customer relationships can be an effective differentiator for container transport. Akgilo et al. analyzed the efficiency level and

competitive position of the main container ports in Turkey. Using the DEA model, the gap between four Australian ports and 12 international container ports is analyzed and compared in terms of efficiency.

Dareen Ronald Fraser studies the changing status of container ports in southern Africa in the global container transport network. The results show that most of the major container ports are located in South Africa, Namibia and Mozambique, while the ports of Mauritius and Madagascar have also been explored in the area of shipping services. George et al. use analytic hierarchy process (AHP) (Liu & Zeng,2018)to evaluate the main ports in West Africa, and rank the total weight of ports according to the different criteria used. The study looked at the connectivity of Canary Islands ports in North West Africa, arguing that it was important to analyse the connectivity of ports to control costs.

Foreign scholars have not studied China's overseas port investment, but they have paid long attention to the infrastructure connectivity along the Belt and Road. Grove, vice-president of Asian Development Bank (ADB), believes that financing is the biggest obstacle to China's realization of infrastructure connectivity with the countries and regions along the Belt and Road. Political resistance is also a factor that cannot be ignored. Grove also noted that social benefits and environmental protection in the host country are also major concerns for the government. Badre, the World Bank's vice president and chief financial officer, sees a $1.5 trillion to $2 trillion annual funding gap in the global infrastructure market.

1.4 Research Methodology

1.4.1 Integration of macro and micro research.

On the one hand, with the goal of building a strong maritime country and developing a marine economy, the overall study will be carried out in the context of the current Belt and Road Initiative; on the other hand, concrete analysis will be made through concrete implementation contents, to make it more objective and realistic.

1.4.2 Literature Review

First of all, reference is made to literature on port location theory and the evaluation of location advantage, from which the relevant research papers, journal articles, master's thesis are indexedto have an extensive and in-depth understanding of the research status of related issues, and re-systematize the theoretical basis of the research issues and the existing deficiencies. The evaluation of the port location advantage degree is made, an exploratory evaluation model combining land and sea location advantages is constructed at last.

1.4.3 Research methods

The selection of evaluation model indexes and the determination of relevant parameters in the model can be done by the following two ways. First of all, search the authoritative websites and read relevant literature in classic works and journals with high impact factors so as to determine the impact factor indexes. Secondly, use the method of expert intelligence scoring to quantify the qualitative data, mainly by the evaluation parameters of excellent journals and highly cited literatures for reference.

1.4.4 Indicator scoring

According to the analysis of port location influence factors, the influence scores of various indexes are calculated quantitatively, such as traffic network density calculation, linear model which accords with the law of distance attenuation, location potential model, etc., The LINEAR superposition model of port location advantage evaluation is established based on the results of each index. The regional advantage scores of the important ports along the Maritime Silk Road are evaluated by constructing the regional advantage degree model of the ports.

1.4.5 Multi-disciplinary, multi-horizon, multi-angle comprehensive research

The Belt and Road Initiative is a systematic project that covers cultural, economic, strategic, ecological and other fields in which ports play different roles. This requires the use of professional knowledge in these areas for interdisciplinary, integrated and systematic research.

1.5 Research objectives

Firstly, the impact of the Belt and Road policy on the development of key ports in China and around the world has been analyzed in terms of the volume and volume of cargo handled by ports around the world over the years. Further, the objectives are studied of the Maritime Silk Road to make judgments on the development of each port.

Secondly, according to the Belt and Road, the trend of policy development, we should study how to make policies for port construction and deepen reform in China.

Thirdly, analysis of changes is made in port container throughput because of the implementation of the Belt and Road policy and its relevance to various indicators.

At last, the current situation of China's investment in foreign ports and the feasibility of port linkage development, and how to speed up port efficiency and annual throughput capacity is analyzed .

CHAPTER 2 ANALYSIS OF PORTS ON THE MARITIME SILK ROAD

2.1 Domestic ports

Since 2000, China has played a decisive role in the growth of port throughput along the Maritime Silk Road. The rapid rise of Chinese ports can also be seen in the world container throughput ranking. In 2000, among the top 10 ports in the world container throughput ranking, only Hong Kong and Shanghai were listed, while the others were from developed countries and regions. After a decade of development, six Chinese ports were listed in the top 10 of global container throughput in 2010, and since the implementation of President Xi Jinping's Belt and Road policy, by 2019 the top 10 ports in the world for container throughput had changed, and the number of Chinese ports in the top 10 had risen to seven, with new Port of Tianjin in ninth place. In addition to these ports, container throughput at other Chinese ports has also increased significantly, rising in the global rankings. At present, China has the largest container cargo demand in the world, and China is also an important driving force for the rapid

development of the global shipping industry in recent years.

2010 rankings	Port	Container throughput (million ETU)	2019 rankings	Port	Container throughput (million ETU)
1	Shanghai	2907	1	Shanghai	4330
2	Singapore	2843	2	Singapore	3720
3	Hong Kong	2353	3	Zhoushan, Ningbo	2753
4	Shenzhen	2251	4	Shenzhen	2577
5	Busan	1416	5	Guangzhou	2300
6	Zhoushan, Ningbo	1314	6	Busan	2195.5
7	Guangzhou	1255	7	Qingdao	2100
8	Qingdao	1201	8	Hong Kong	1836
9	Dubai	1160	9	Tianjin	1730
10	Rotterdam	1115	10	Dubai	1492

Table 1-Container throughput of the world's top ten ports

2.2 Southeast Asian ports

Southeast Asia, which plays an important role in Maritime Silk Road's Trans Shipping Routes and is a key factor in Maritime Silk Road's return to prosperity, is second only to China in terms of container throughput, the strategic position of the north side of the Strait of Malacca is very important. It has been an international trading port since the 13th century and has now developed into an internationally renowned entrepot. In 2012, 85% of the world's goods were transshipped through the port of Singapore, container throughput is second only to Shanghai in the world. In addition, thanks to the rapid economic development in the region, a new generation

of ports, such as Port Klang, the maritime gateway of Malaysia, is well positioned to serve as an ideal port of call for trade routes from the Far East to Europe, container throughput reached 13.2 million TEU in 2019, ranking 12th in the world with an average annual growth rate of 7.2%. Malaysia's other major port, the Port of Tanjung Pelepas, is at the intersection of East West and North South international shipping routes, just 45 minutes from the world's main routes, and has been hailed as one of the choke points of world shipping. In 2019, container throughput was 9.16 million TEU, 18th in the world. Indonesia's largest cargo port, Tanjung port, Vietnam's Haiphong port and Saigon port, the Philippines'Manila port, Thailand's Linchaban port and Bangkok port have all rapidly emerged as important container ports in recent years, in the world's top 100 container throughput.

2.3 South Asian ports

Container throughput in South Asia is the smallest and slowest growing region along the Maritime Silk Road, although shipping maps show that the region has many ports, particularly along the southern coasts of India and Pakistan, port density is relatively high but the region lacks large-scale port, this may be due to the port fragmentation and lack of cooperation. Sri Lanka was in ancient times the central port of the Indian Ocean trade, it is located on the central shipping route of Asia and plays an important role in the maritime trade and the spread of religion in the Indian Ocean. Sri Lanka is also the first country to respond positively to President Xi Jinping's initiative for the construction of Maritime Silk Road, Colombo is the largest port in Sri Lanka, as it has a strategic position of an important node port in the Indian Ocean, , which plays an essential role as transit port for ships crossing the Indian Ocean. On November 29,2018, Sri Lanka's National Port Authority and the China Harbour Engineering signed the DJAJA container terminal expansion project agreement. In 2019, the container throughput exceeded 7 million TEU, ranking 22nd in the world. India's Navasheva port is the country's largest port, with 5.05 million TEU container throughput in 2019, ranking 31st in the world. Cochin port is located in the southwest coast of India, west of the Arabian Sea, south of the Indian Ocean, has

excellent seaport, water transport is very developed, known as the "Queen of the Arabian Sea", is connecting Asia and the Arabian Sea hub. Along the ancient Silk Road at sea, Cochin was an important trading post and transit point. In addition, Pakistan's Karachi and Gwadar Ports play an important role in the 21st Century Maritime Silk Road. Gwadar Port is the third largest port in Pakistan, a key link in the China-Pakistan economic corridor. Gwadar Port is a deep-water port, which was built and developed by China in 2001. It is located near the strategic pivot of the Persian Gulf, the completion of Gwadar Port is of great significance, which connects several important sea lanes from Africa and Europe to East Asia and the Pacific through the Red Sea, the Strait of Hormuz and the Persian Gulf.

2.4 Ports in West Asia and North Africa

As an emerging economy in the Middle East, the port container throughput also maintains a rapid growth with the rapid economic development. The Middle East is China's main source of oil imports. In October 2013, China officially overtook the United States as the world's largest net importer of oil, overtaking the United States at ten thousand barrels per day. With the Middle East accounting for 47.7 percent of China's total oil imports, such an important strategic position is bound to become an important node in Maritime Silk Road. As the main way of oil trade, port transport is becoming more and more important. Dubai, the largest port in the United Arab Emirates, is the largest free trade port in the Middle East. It is at the junction of Asia, Africa and Europe, and is the throat of east-west exchanges, it is also an important gateway to South Africa, India, Central Asia and Eastern Europe. In 2019, the container throughput was 14.11 million TEU, ranking 10th in the world. As the largest container port in Oman, Salalah is an important trans-shipment port in the Middle East, mainly serving trans-shipment between main line vessels and serving as a container hub in the Middle East and Persian Gulf region, 50th in the world. In addition, Saudi Arabia's Jeddah Seaport and Dammam Port, Iran's Bandar Abbas, Yemen's Aden are also in an important strategic position.

2.5 Mediterranean ports

The Mediterranean coast was one of the destination of the ancient Maritime Silk Road, and records show that the Maritime Silk Road reached as far as Italy in the Mediterranean, so the ports of the Mediterranean region are also important nodes of the 21st Century Maritime Silk Road. Port Said in Egypt, located at the Mediterranean outlet of the Suez Canal, is a trans-shipment port between Asian and Mediterranean ports and one of the world's largest coal and oil storage ports, with a container throughput of 30.5 million TEU in 2019, ranking 57th in the world. As early as the 50s of last century, the ports of European countries along the Mediterranean had formed the second generation ports with perfect transportation service and formed port-adjacent industry. Today, the European countries in the operation mode and management mode of each port are at the internationally leading level. Greece was the first port of entry into Europe through the Suez Canal in Maritime Silk Road, so the coordinated development with Greek ports is the key to opening up the eastern European ports. And the southern port of Piraeus is the largest port in Greece. It is also one of the world's 50 largest container ports and the largest container ports in the eastern Mediterranean region, with a container throughput of 4.91 million TEU in 2019, an increase of 18.4% over the previous year. In 2008, COSCO Shipping announced that its holding company, Cosco Shipping Ports, won an international public tender for a container terminal at the port of Greece, Franchising for 35 years at Pier 3 of Piraeus. The port of Gioia Tauro of Italy, is the largest trans-shipment port in the Mediterranean region. Its trans-shipment business has been impacted by the rise of the trans-shipment port in recent years, but the annual container throughput still reaches 2.33 million TEU, with an average annual increase of 2.5%. Spain's Algeciras and Valencia both had the highest container throughput in the world in 2019, with 4.77 million tons and 5.18 million tons, respectively. The Port of Marseilles in France is the largest commercial port in France and the largest commercial port in the Mediterranean. These ports are all significant ports along the Maritime Silk Road.

CHAPTER 3 CHINA'S PORTS ALONG THE BELT AND ROAD CONSTRUCTION

3.1 Progress in port cooperation between China and countries along the route

Most of the countries along the Maritime Silk Road are developing countries. The economies of Southeast Asia, South Asia, West Asia and North Africa are at a medium to low level. China has always carried forward the responsibility of a big country, continuously sending funds and skilled workers to countries in need, and investing in the infrastructure of those countries regardless of the cost. On the other hand, the continuous development of China's international trade and its heavy reliance on sea transportation, the development of the Belt and Road Initiative and Maritime Silk Road has also promoted China's continuous participation in overseas port projects, port cooperation is gradually becoming an important way for China to communicate with countries where ports are located. Given the trust placed in China by the countries along the Maritime Silk Road, cooperation in port facilities between China and many of the countries along the route has yielded notable results. As an infrastructure industry, port industry has the characteristics of scale economy and capital-intensive. Port projects often need huge capital investment, and are easily affected by many factors. In recent years, Chinese enterprises have taken part in a number of overseas port projects, which reflects the external layout of China's economic field in recent years and to some extent indicates the future trend of China's diplomacy. Since 2013, that is, after the Belt and Road initiative, Chinese enterprises have successfully signed or reached agreements as shown in Table2.

Country	Port project	Signing	Value
Indonesia	TANJUNG PRIOK Expansion Project	2017	$590 million
Malaysia	Port Royal	2016	$1.81 billion

	Kuantan Port	2014	$177 million
Singapore	Construction of berths in Pasir Panjang	2016	unknown
Philippines	Davao Port Reclamation Project	2016	$39 billion
Cambodia	Sihanoukville Special Economic Zone	2007	unknown
Myanmar	Deepwater Port and Industrial Park in Kyaukpyu Special Economic Zone	2017	$7.3 billion
Brunei	Port Mora	2017	unknown
Pakistan	Guadal port	2013	$1.62 billion
	Qasim Port Civil Engineering Project	2014	$130 million
Sri Lanka	Colombo Southport Pier	2011	$550 million
	Hambantota port	2017	6.57 billion yuan
Bangladesh	Expansion and upgrading of the port	2016	3.53 million yuan
	Oriental Refinery WHARF	2016	550.4 million
United Arab Emirates	Caliphate	2017	$300 million
	Caliphate II container terminal	2016	$783 million

Qatar	Foundation and breakwater	2011	$880 million
Turkey	Compton pier	2015	$900 million
Iran	Qeshm oil terminal	2016	$550 million
Saudi Arabia	Haier Port Expansion Phase	2014	$200 million
Djibouti	Port of Djidouti	2013	$185 million
	Dohare Multifunctional Port	2016	421.7 million
Madagascar	Tamatave Deepwater Port	2015	$1.02 billion
	Narenda Deepwater Port	2017	unknown
Kenya	Ram Harbor Berth Construction	2014	$479 million
Greece	Piraeus harbor	2008	370 million
Italy	Design contract for Venice	2017	$3.19 million
	Puerto Vallarta	2016	$7.05 million
Australia	Port Darwin	2015	$370 million
	Port Melbourne	2016	$7.3 billion

	New Newcastle	2015	$1.75 million
Papua New Guinea	Port of Morbius	2015	$1.2 billion
Yemen	Aden container terminal	2014	unknown
Tanzania	Expansion of the port of	2017	$154 million
	New Port of Zanzibar	2014	$200 million
	Port of Bagamoyo	2014	unknown

Table 2-The situation of China's investment along the Belt and Road

3.2 Gwadar Port

The construction of Gwadar Port is a typical example of Chinese investment in overseas port projects. Gwadar Port is a deep-water port, which was built and developed by China in 2001. It is located near the strategic pivot of the Persian Gulf, from Africa and Europe to East Asia and the Pacific through the Red Sea, the Strait of Hormuz, Persian Gulf. It connects several important sea routes, from the global oil supply of the main channel, the Strait of Hormuz about 400 km. The building of Gwadar Port is of great significance. First of all, a pipeline from Gwadar to Xinjiang could bypass the blockade of the South China Sea in an emergency and help resolve the Malacca's plight as a major shipping route. The construction of Gwadar Port was a major artery for China, and its Maritime Silk Road reached South Asia, the Middle East and Africa, playing an important role in the navigation of the entire sea route. Pakistan decided to build Gwadar as a port in 1964, but it was limited to money and technology, and it wasn't until 2001 that China agreed to invest in the project that it entered the implementation phase. However, when the first phase of the port project

was completed and the second phase of the project bid was rejected by China, Singapore was deliberately left idle in an attempt to delay China's development and maintain Singapore's shipping status. A decade after the Port Authority obtained the right to operate, Gwadar Port began to play its rightful role in the Chinese business after it saw through Singapore's intentions to forcibly withdraw the right to operate and hand it over to China. During President Xi Jinping's visit to Pakistan in 2015, the two sides agreed to form a "1 + 4" Economic Cooperation Pattern by taking the China-Pakistan economic corridor as the lead and focusing on cooperation in Gwadar Port, energy, transportation infrastructure and industry (Zhou, Xi &Li 2019). In November 2016, Gwadar Port officially set sail and both countries witnessed the first Chinese merchant ships set sail from Gwadar Port. In May 2017, President Xi Jinping made another reference to Gwadar Port in his speech at the opening ceremony of the "Belt and Road" Forum for International Cooperation, stressing the need to "plan and implement a large number of connectivity projects. ". Today, Gwadar Port has been transformed. After the operation of the China Port Control Company in Gwadar Port, the port has added five new container cranes, built a new 100,000-square-metre yard, and added state-of-the-art container scanning equipment, the original 100,000 gallon desalination was expanded to 220,000 gallons, two new sewage treatment systems were added, 80,000 square meters of green space were added, and a new liquefied petroleum gas receiving station was built. At present, Gwadar port can handle bulk cargo, containers, ro-ro cargo, liquefied petroleum gas and other businesses which has full operational capacity. It will be the most important part of the China-Pakistan economic corridor and will become a regional trans-shipment hub and regional economic center.

3.3 Port cooperation between China and Sri Lanka

Sri Lanka is known as the Pearl of the Indian Ocean, the crossroads of the sea route from the Pacific to the Indian Ocean, and the place through which the ancient Maritime Silk Road passed. In 2013, when President Xi Jinping first proposed the creation of the Maritime Silk Road, Sri Lanka was the first country to endorse it,

essentially because the Maritime Silk Road has served Sri Lanka since ancient times(Wen 2018). Two of the country's most important ports were built by Chinese companies. In October 2007, with Chinese assistance, the Sri Lankan government began construction of a large port in Hambantota, and in June 2012, the Chinese invested $1.5 billion in the construction of the deep-water port of Hambantota which has become the most important logistics and supply centre for all ships in the Indian Ocean to the Pacific, berthed more than 1,016 ro-ro ships and imported and transited more than 656,000 vehicles between June 2012 and January 2017 making Hankang the second economic development center outside of Colombo. Also one of the most important ports in Sri Lanka, Colombo, Southport was bid in 2009 by China Merchants International Ltd., a blue chip company listed on the Hong Kong Stock Exchange. Construction began in 2011 and was completed in April 2014, Colombo Southport is by far the largest deep-water port in South Asia, and the construction of the Southport container terminal has given Sri Lankan maritime shipping a huge competitive advantage, so far, it is the only port in South Asia that can handle the super-large container ships with 18,000 standard containers. The program contributes more than $1.8 billion in taxes directly to the Sri Lankan government over the 35 year contract period. The completion of the port has helped Sri Lanka to realize its aspirations as a regional shipping centre.

3.4 Port cooperation between China and Cambodia

Sihanoukville is Cambodia's largest seaport and port of entry and exit for Foreign Trade. The scenic and low-cost port attracts a large number of tourists every year, with Chinese tourists accounting for about 60% of the total, Sihanoukville Special Economic Zone is the only special economic zone in Cambodia (Jiang Shan 2018). It was one of the first overseas economic and trade cooperation zones awarded the bid by the Ministry of Commerce of the People's Republic of China, and it was also one of the first six overseas cooperation zones approved by the Ministry of Commerce and the Ministry of Finance, the position is similar to that of China's Shenzhen, President Xi Jinping said, when he met with Cambodian Prime Minister Hun Sen at

the Asian–African Conference on April 23,2015, "We need to strengthen infrastructure connectivity and cooperation within the framework of the Belt and Road to properly operate the Sihanoukville special economic zone".

President Xi Jinping in his visit to Cambodia in 2016 spoke highly of the vibrant development of the WESTPORT special administrative region as a model for practical cooperation between China and Cambodia under the Belt and Road initiative". In the same year, the Chinese and Cambodian governments continue to implement cooperation projects such as the WESTPORT Special Administrative Region in the Sino-Cambodian Joint Statement. The WESTPORT Special Administrative Region will take this opportunity to accelerate its development and strive to make the Westport Special Administrative Region a successful example of China's overseas economic and trade cooperation zone and a shining pearl in the Belt and Road.

3.5 Cooperation between Chinese and Greek ports

In 2008, in the presence of the heads of state of China and Greece, Chinese enterprises signed an agreement with the Piraeus of Greece, for operation of Piraeus container terminals 2 and 3. This cooperation is a typical case of Chinese capital "going out" and a model of cooperation between China and developed countries. In June 2014, Chinese Premier Li Keqiang paid a visit to the Piraeus dock, to understand the current situation and the long-term plan of the port development in detail, and Premier Li pointed out that the Piraeus should be made a pearl of cooperation between China and Greece. The successful cooperation also shows to the world that China does not export the excessive capacity, but seeks a win-win cooperation that benefits both sides. China's assistance in the construction of foreign ports has not only improved the facilities of the relevant ports, moreover, it has stimulated the local economic development and solved the employment of local residents,

3.6 Port cooperation between China and Djibouti

In August 2014, the Chinese Construction Company won a contract for one hundred million US dollars to build the first phase of the Doha Ferry Terminal at Djibouti port. Situated to the south-west of the Gulf of Yalau, Port of Djibouti is Djibouti's largest seaport and one of the East Africa's largest modern ports with an important strategic location. At the beginning of the 21st Century, Port of Djibouti became an international port for ships of all nations to meet the needs of ocean navigation and the fight against piracy off the coast of Somalia. More than half of the Chinese convoy's supplies came from Port of Djibouti. China's assistance to Port of Djibouti can be said a "public goods" for the convenience of all countries.

CHAPTER 4 STUDY ON THE CHANGES OF PORT THROUGHPUT SINCE BELT AND ROAD

4.1 Throughput impact factors

The change of throughput structure can reflect the acceleration of the adjustment of hinterland industry layout, which is influenced by the following four factors.

4.1.1 Macroeconomic development environment

Changes in the macroeconomic development environment are influenced by factors such as severe international economic situation, insufficient market demand and shortage of funds; the growth rate of industrial production has been decreasing.

4.1.2 Macro policy implications

The problem of overcapacity in industries such as steel, coal and cement support the rapid growth of the industrial economy but are high in energy consumption. Under the implementation of supply-side structural reform, backward production capacity has been eliminated at an accelerated pace, and leading enterprises have been merged and reorganized, overall capacity continues to decline, and demand for bulk cargo in these industries is a key driver of port throughput (Tang, Lan & Zhu. 2018).

4.1.3 Industrial restructuring and upgrading

The mode of industry development is changing from large-scale input of factors in the past to relying on scientific and technological innovation, and the traditional coal and ore, as the low end of the industrial chain, must be a major incentive for the demand decline.

4.1.4 Trends of the times

On the one hand, emerging goods such as commercial vehicles are the product of a certain stage of socio-economic development, and the people's pursuit of quality of life is on the rise in the future, resulting in a strong trend in the development of such demand; on the other hand, the status of environmental resources has become increasingly prominent. LNG, as a clean energy, its application and demand will be expanded.

4.2 Research on the correlation of container throughput in ports

The analysis focuses on the determinants and consequences of port capacity, including container and cargo volumes. In order to find out the factors that affect the handling capacity of the offshore ports, we build a hypothetical model based on the general hypotheses mentioned earlier. The variables are divided into different parts, including port infrastructure, port location, potential economic factors and so on. Variables that might affect language ability are picked and can be measured from a data set. Five variables are found including distance (DN) from the top five ports in the world, GDP, population of the city where the port is located, the number of cranes, length and the number of berths.

So, the final equation is:

$$Capcity = f\ (\ d1,\ d2,\ d3,\ d4,\ d5,\ GDP,\ Pop,\ crane\ length,\ crane\ number,\ )$$

We can do linear regression over different time periods (2008-2013 and 2013-2018) to find the different effects of these factors and to determine whether policies have a positive impact on them. We can also use the model to evaluate port efficiency and determine whether there is an improvement in efficiency overall. Different regression

functions can be used in model evaluation, including ordinary linear regression, time difference and time series.

4.3 Data Description

The data is collected from National Bureau of Statistics of China. Firstly, according to previous literature, we know that the container throughput is correlated with port internal and external factors. Port infrastructure is the key internal factor affecting port throughput. But since infrastructural elements are very complicated and diverse, I choose two main reference statistics: the berth number and the length of the berth. Besides, the level of economic development of the port city is also an important external factor; so I include the GDP per capita of the port city in the model. Then because the Belt and Road was proposed in 2013, in order to evaluate the changes that brings to the port, the analysis data is chosen both before and after 2013. Since 2010 can be treated as the post period of 2008 world financial crisis, from that time the world economy had gradually returned to normal, so the analysis is based on the data from year 2010 to 2017 for five main ports on the shipping route. In conclusion, the model includes four variables: the container throughput, berth number, berth length and GDP per capita for the located city of five main port cities from 2010 to 2017.

The figures demonstrate diverse descriptive statistics and analysis methods to show the impact of Belt and Road Initiative on the port. Graphs and tables are provided below. Firstly, we analyze the dynamic changes of major variables over the past seven years. We choose the container throughput of each port in 2010, 2013 and 2017 respectively in order to make a horizontal comparison. Figure 1 shows that the container throughput of Shanghai has been far ahead of other ports in throughput in recent years. The container throughput of Shanghai is noteworthy, almost four to five times as much as other ports. Meanwhile, the throughput growth of Guangzhou Port is quite obvious and the gap between it with Shenzhen is continually narrowing.

Then the sequential growth rate of container throughput of each port from 2011 to 2017 is calculated. It can be seen that the growth rate of container throughput of

Shanghai Port fluctuates greatly. The sequential growth rate of Qingdao port is dropping year by year. Shenzhen Port's sequential growth rate fluctuates around 1, approximately 0.1 less than Guangzhou Port.

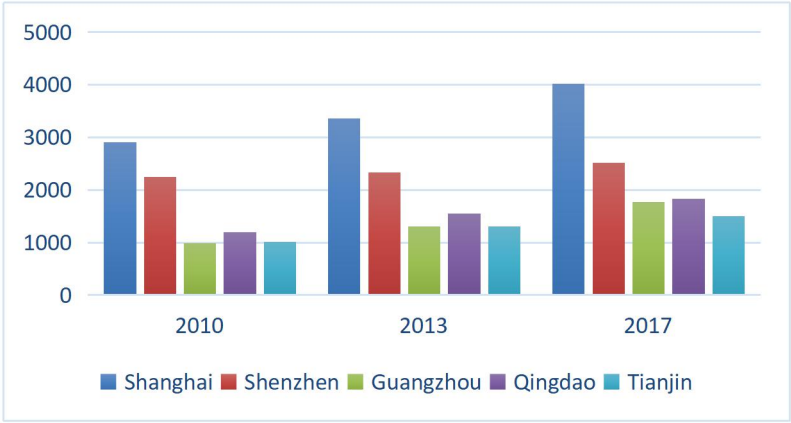

Figure 1 Container throughput of each port in 2010,2013,2017

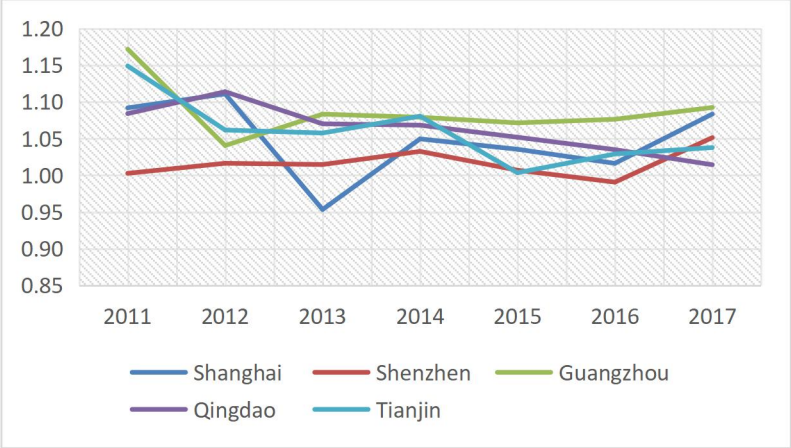

Figure 2 Container sequential growth rate of each port

Figures 3 and 4 show the berth number of each port in 2010, 2013, 2017. Shanghai still has a clear advantage in terms of the number and length of berths, but the change of the berth number and length is far more slightly than the volume of container throughput. However, Shanghai still has a clear advantage in terms of the number and length of berths. With the Belt and Road Initiative, Shanghai has been constantly improving its dock efficiency

Then I calculate the correlations, which shows the impact of potential factors on

container throughput according to different ports. In other words, in general, berth number, berth length and GDP per capita have different correlations with container throughput in 5 main ports. For example, Guangzhou has the highest correlation of two infrastructure variable with container throughput (0.8765 and 0.9722). Tianjin has the highest correlation of GDP per capita with container throughput (0.9938).

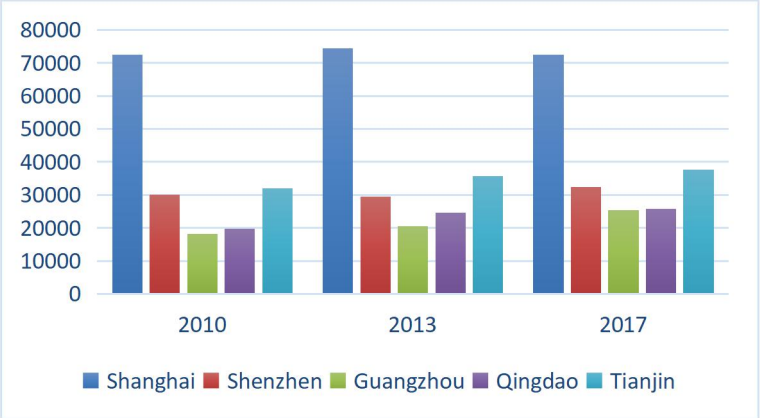

Figure 3 The berth number of each port in 2010,2013,2017

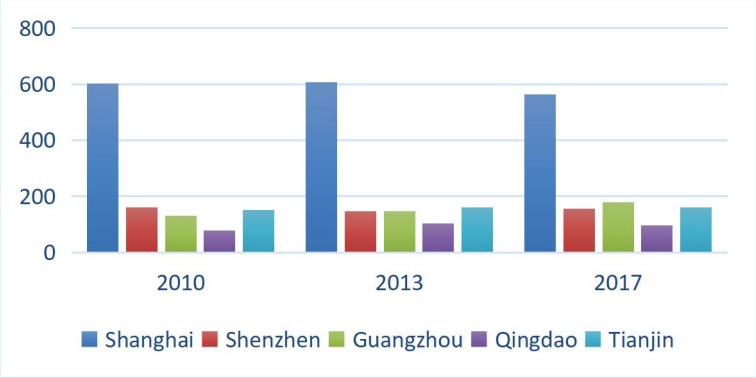

Figure 4 The berth length of each port in 2010,2013,2017

Port	*Independent* *Dependent*	*Berth Number*	*Berth Length*	*GDP per capita*
Shanghai	*Container Throughput*	-0.59661	0.2455	0.9256

Shenzhen	*Container Throughput*	*-0.2661*	0.6391	0.9716
Guangzhou	*Container Throughput*	*0.8765*	0.9722	0.9581
Qingdao	*Container Throughput*	*0.8765*	0.9438	0.9819
Tianjin	*Container Throughput*	*0.7377*	0.9159	0.9938

Table 3 Correlation coefficients

Given that correlations are revealed, linear regression models are constructed and analyzed in ports under study, which applies the OLS regression. The dependent variable is container throughput, while the independent variables are berth number, berth length and GDP capita. As a result of regression analysis, significance and availability of regression models were tested, and thus, based on them, influences of internal and external factors on container throughput according to ports can be analyzed.

Constructing the regression models, significance probability, contribution degree, and standard error of estimate are calculated, and they are meaningful values. For example, for Guangzhou, the coefficients of berth number, berth length and GDP per capita are -2.901, 0.091, 0.0054 respectively. The p-value of t statistics are 0.402, 0.026, 0.023 respectively. Thus, the coefficient of berth length and GDP per capita is significant while the coefficient of berth number is not. The contribution degree (R2) is 0.9908, the p value of F statistics is 0.0002 and also less than 0.05, which shows that regression equation is significant and the variables are jointly significant. The regression shows that the port container throughput has close influence on regional economy, but less significantly correlated with berth number and length. The reason for this phenomenon might because the above two data cannot represent the port efficiency.

Dependent Variable	***Container Throughput***				
Coefficient	*Shanghai*	*Shenzhen*	Guangzhou	Qingdao	Tianjin
Berth number	-13.07283	4.85608	-2.901623	2.701316	1.357983

Berth length	*12.20811*	*3.19777*	*3.097831*	*3.024664*	*3.702374*
	0.1673518	-0.0370432	.0910151***	0.0079554	-0.0101349
	0.105954	*0.0213399*	*0.0262226*	*0.0210775*	*0.0207998*
GDP per capita	0.0091062	.0048526***	.0054178***	.0099493***	.0119392***
	0.0097029	*0.0009577*	*0.0015016*	*0.0015421*	*0.0022241*

Table 4 OLS regression of container throughput

CHAPTER 5 POLICY RECOMMENDATIONS

Domestic port resources should be integrated to enhance the overall competitiveness. The 13th five-year plan for the national economic and social development of China has made a detailed plan for the development of China's marine economy. The plan emphasizes the need to deepen the integration of port shoreline resources and optimize the layout of port and day, and to formulate and implement the plan for the marine theme functional zones for optimizing the spatial distribution of marine economy. Coastal provinces such as Shandong, Zhejiang and Fujian have put forward marine economic development plans and promoted them into national strategies.

5.1 Clear Functional Positioning of ports to reduce malicious competition

Focus on building Xiakou-Guangzhou "Double Hub" Port as the departure port of China's coastal area in the 21st Century Maritime Silk Road. It should rely on the Fujian Free Trade Zone, coordinate with Port of Keelung and Port of Kaohsiung, and exert the function of Shipping Service, Guangzhou Port facilities are more superior, and they have established a stable route along the majority of ports. Based on the basic functions of shipping, double hub port dislocation development should complement each other. This will increase investment in the construction of sea lanes

in the Port of Shenzhen and Port of Ningbo, promote the integration of surrounding ports with capital as a bond, and increase the trans-shipment capacity of Port of Shenzhen and Port of Ningbo-Zhoushan. In addition, the coastal ports should pay attention to the on-the-spot inspection, give full play to the port's own comparative advantages and core capabilities, and join in the construction of Maritime Silk Road with correct positioning.

5.2 Give play to market leading

To break the outdated concept of "only fast cannot break" of GDP growth, and to put an end to the blind development of port resources in individual regions in pursuit of GDP growth. The development of the port should respond to the demand of the market. The unrestrained opening will lead to the waste of resources and the excess capacity. Regional governments should reduce their intervention in port operation, and their role should be to create the environment, build the platform, and transfer the dominant power of resource allocation to the market. The governments should actively safeguard the fairness of the market, actively transform the mode of port production and operation and expand the scope of port business. Although China's coastal ports are in the top ranks in terms of cargo and container throughput, they still lag behind in terms of modernization and business scope. The new round of industrial revolution has put forward the demand for individualized and differentiated goods and services, and the function of ports requires more individualization and intelligentization. Ports are no longer just carriers providing transportation and industrial functions, they should also provide information, commercialization and modern logistics integrated services and other functions. China's coastal ports should keep pace with the times, be bold in innovation, actively change the mode of production and operation, uniformly allocate resources, implement more refined operations and more targeted services, and meet the individualized and differentiated needs of the market and customers. They should also break through the limitation of the traditional port, connect the land to the hinterland and the sea to the hinterland

through the information network and expand the service scope of the port.

5.3 Continue to strengthen investment in overseas ports to gain international market share

Most of China's ports are deep in the inland sea and far from major global shipping routes. This is not conducive to domestic ports participating in international shipping. China should take capital as a bond and increase investment in ports and terminals of the countries along the routes. Through mergers and acquisitions, equity investment, cooperative operations, and other ways, multinational operating companies are established in order to seek international market share and achieve the extension of capital expansion. In particular, a solid and stable framework is the necessary condition for the joint development of regional ports for strengthening investment in regional hub ports along the route and strengthening the advantages of the hub. State investment in ports in the Indian Ocean region and the Piraeus in Greece in recent years has demonstrated that overseas port investment can not only enhance China's maritime voice in the world, but also lead to China's "going out" policy is more inclined to go out with capital, not just excess capacity output.

5.4 Measures to optimize the efficiency of China's major ports

At present, the Port Space System along the Maritime Silk Road is dominated by China's container ports. According to the current development trend, we can reasonably predict that China will have closer economic and trade ties with the countries and regions along the Maritime Silk Road. Ports are an important bridge for realizing the connectivity between China and the countries along the Maritime Silk Road. This is a good opportunity for China's major ports, but also put forward higher requirements to the efficiency of China's major ports. Through the above analysis, we can find that the overall efficiency of China's major ports from the perspective of the Maritime Silk Road is still relatively low. Therefore, it is necessary to put forward targeted measures to optimize port efficiency, thus better communicate with other

countries and regions along the Maritime Silk Road.

5.4.1 Bohai Sea Bay

The ports of Tianjin, Dalian, Qingdao and Yantai are all located at the centre of the Northeast Asian Economic Zone in the Bohai Economic Rim. Currently, some ports are inefficient, which do not fit well with their rankings for container and cargo throughput. The four major ports have some overlap in their positioning, and each port belongs to different provinces or municipalities. This is caused by non-unified planning and management. The business scope and management policy are also quite confused in these regions. After China put forward the Belt and Road Initiative, the ports responded positively to the national call. Three of them has began to actively move towards internationalization. Although the outlook and actions will lead to the ports' own vitality, they will inevitably intensify the competition among the three ports, resulting in a serious waste of resources.

Port of Tianjin is located in the economic circle of Beijing, Tianjin and Hebei. The superior geographical environment should be focused and a convenient logistics network system should be constructed by increasing the role of radiation to enhance. Tianjin Port's position in the country, to the north of the International Shipping Center, to expand the influence of its economic hinterland, to strengthen cooperation with enterprises in the hinterland, to extend the port industry chain.

Port of Dalian should give full play to the policy advantages of the old industrial base in the northeast and promote cooperation with the other two provinces in the northeast. It should also improve the level of port management technology, form an effective allocation of port resources, and expand the size of the port appropriately so as to strengthen Port of Dalian's position in the shipping industry in the northeast.

As China's largest coastal port with the largest oil and coal storage capacity, Qingdao Port's core competitiveness lies in its leading national management technology. Therefore, Shandong Province should take Qingdao Port as the center and Yantai Port as a supplement, to enlarge the scale of the transport industry with its own characteristics.

Cooperation is the only way for the port cluster around Bohai Sea to work together to break the regulatory mess through business exchanges and cooperation among the port clusters. The four major ports have formed a regional shipping network with the ports of Tianjin and Qingdao as the double-hub ports.This will put an end to repetitive construction, help to create a scientific layout and a reasonable policy system, and build a high-quality, high-standard Port Group around Bohai Sea, strengthen the cooperation with Japan and South Korea ports and serve the northern coastal and inland areas of China.

5.4.2 Yangtze River Delta Port Cluster

The Yangtze River Delta Port Group is the most densely distributed and largest throughput port group among the five major port groups in China, and also the most shipping-intensive port group in the world. Port of Shanghai and Port of Ningbo-Zhoushan are among the world's largest ports with the highest throughput, but the combined efficiency of these two ports is at the middle and lower reaches of the river; therefor it doesn't match its throughput ranking.

Due to the inaccurate functional positioning and the cross-cutting status of the economic hinterland of each major port, the services of each port can effectively cover the Yangtze River Delta region. In order to pursue their own interests, the ports in the Yangtze River Delta Port Group vigorously compete for the cargo sources in the hinterland and the competition between the ports is fierce. Therefore, the integration of port resources is not in place, and the port planning is still limited to different provinces or autonomous regions.

As the representative of the Yangtze River Delta Port Group, Port of Shanghai and Port of Ningbo-Zhoushan are the core and support of the economic development of the Yangtze River Delta. Port of Ningbo-Zhoushan is a sub-hub port, mainly in the low-end, complementary functions of the two ports, dislocation development, give play to the advantages of the combined port. Relying on the regional and policy advantages of the Shanghai pilot free trade zone, enhancing the competitiveness of ports through cooperation, forming the advantages of port groups, and actively

establishing the 21st Century Maritime Silk Road Port and Shipping Alliance, we will strengthen long-term and stable relations with the countries and regions along the Maritime Silk Road.

5.4.3 Southeast coastal port cluster

The southeast coastal ports facing the Taiwan Strait, the Yangtze River Delta to the north and the Pearl River Delta to the south, are located at the intersection of the western and southern lines of the 21st Century Maritime Silk Road. However, through empirical calculation, we can see that the overall efficiency of Fuzhou Port, Xiamen Port and Quanzhou Port is relatively low since the ports only consider short-term interests and compete with each other blindly. In fact, it is not conducive to long-term cooperation and the formation of a sense of alliance. The cooperation among the three major ports is loose, and it is difficult to compete with other large ports at home and abroad. Even though they have signed cooperation agreements with some ports at home and abroad, they still have not formed a complete system, and their strength is weak compared with other port groups.

Fujian Province has many excellent deep-water harbors, but for a long time these three harbors have not been strong enough to build deep-water port. Therefore, Port of Xiamen should build an international shipping center in southeast China, carry out scientific planning and overall development at the same time, form a strategic alliance among the three major ports, strengthen the construction of deep-water navigation channels and deep-water berths, make clear the service position of the terminal, make full use of the excellent port, improve the technical level of port management, improve the utilization of port resources, so as to improve the efficiency of port operation. With the policy advantages of the Hercynian strategy and the Fujian Pilot Free Trade Zone, we will build multi-level port cooperation with the rest of the world. In particular, we should actively communicate with the ports of the Yangtze River Delta and the Pearl River Delta to form a regional linkage for development. Second, we should take advantage of the "five borders" in the Fujian-Taiwan provinces to increase cross-strait connectivity and build a cross-strait

port cooperation alliance, promoting cross-strait co-construction of the Maritime Silk Road. Third, aiming at Southeast Asia along the Silk Road in the 21st Century, forming an alliance with the relevant ports of Southeast Asian countries, and striving to expand the international port alliance.

5.4.4 Pearl River Delta ports

The Pearl River Delta (PRD) port cluster is located in the Pearl River Delta Economic Zone and has the advantages of being an economic, trade, financial and international shipping center in the region; the competition within the port group is also quite severe. The ports in the Pearl River Delta cluster are located in a cluster of ports, and the locations of ports where ships can dock are very close; therefore the competition among ports is extremely fierce. At the same time, there are some sharp problems such as repeated construction and vicious competition among ports for their own interests. This is mainly caused by the facts that various ports do not have an accurate understanding of their business positioning, port division of labor is not clear. In addition, the economic hinterland of the Pearl River Delta has shrunk, coupled with the impact of other port clusters, resulting in a reduction in supply.

Therefore, the ports in the Pearl River Delta should rely on the Pearl River Delta and the Pan Pearl River Delta region, follow the path of cluster development, and at the same time take advantage of the policy facilitation of the Guangdong Pilot Free Trade Zone and the advantages of Hong Kong as an international maritime centre. Taking Port of Shenzhen and Port of Guangzhou as the center, Shantou Port and Zhanjiang Port as the two wings, the the ports in the Pearl River Delta should effectively integrate the internal resources of the port group, scientifically orientate and rationally plan, so as to realize the win-win development of the port, and build an international hub port. The Pearl River Delta Port Group has obvious advantages in location, so it has rich experience in the improvement of hardware facilities and the management of various port production activities. With the advance of the Maritime Silk Road, there is a great demand for port facilities construction in neighboring countries; therefore, the ports in the Pearl River Delta can take advantage of the

Maritime Silk Road to actively engage in the construction of port infrastructure in neighboring countries, In addition, the ports can, by creating high-quality marine tourism routes oriented to the countries and regions along the Maritime Silk Road , design distinctive peripheral products to develop cruise tourism industry.

5.4.5 Southwest coastal port cluster

The development of container transport in the southwest coastal port group is relatively late, but since it is backed by provinces and cities such as Yunnan, Sichuan and Guangxi, which have vast hinterland, rich resources and huge development potential, it is faced with a warming Association of Southeast Asian Nations (ASEAN) economic circle. Now it has become a "golden channel" for economic and trade exchanges between China and ASEAN.

The comprehensive efficiency of Haikou Port, as the South Gate of Maritime Silk Road, is relatively low. This is mainly because compared with other ports, the containerization of Haikou Port started relatively late, lacks the related hardware facilities construction. In addition, the economic hinterland of the seaport has a relatively narrow area and a relatively low level of economic development, with only Hainan Island and its surrounding areas radiating.Moreover, it is also hard to expand into the wider economic hinterland, where other powerful port rivals compete for goods from the hinterland.

Therefore, in the light of the current situation of the efficiency of the seaport, it is necessary to appropriately expand the scale of the seaport, carry out the specialized construction of the port terminal, learn from the management experience of other large ports, optimize the handling capacity of the port, and give full play to the potential of the port according to its own merits. We should accelerate the integration of port resources in the region to create an overall advantage, and build a shipping hub backed by southern China. By taking advantage of the "Bangladesh-China-India-Myanmar Economic Corridor Construction", Foreign Trade Transit Port, as well as of the proximity to Southeast Asia, and Southeast Asian countries, a friendly port should be established in order to strengthen economic and

trade exchanges with Southeast Asian countries.

5.5 Establishment of a port linkage mechanism

5.5.1 Port Information Linkage

Establish an information linkage mechanism for the ports in the region along the routes and coordinate the resources information of the ports along the routes. The information level has gradually become an important index to measure the competitiveness of a single port or a group of ports. The establishment of information linkage mechanism for regional ports along the route and the sharing of international logistics information are conducive to enhancing the overall competitiveness of regional ports. First of all, each port should, according to the standardized standard format, improve its own information conditions. Secondly, relevant ports should establish information coordination mechanism to realize the opening and docking of port information ports, even if information data exchange is carried out, realize the inter-regional and inter-departmental connectivity and data exchange and sharing of ports in the region. Finally, the ports, based on feedback information, efficiently deploy ships and equipment to further facilitate customs clearance between the countries along the route, so as to keep the routes in good order throughout the region.

5.5.2 Port Capital Linkage

Establish a capital linkage mechanism for the ports in the region along the routes to promote RMB offshore settlement. Where there is trade, there will be settlement, and countries will have a lot of trouble with currency exchange when they conduct port trade in the region. Therefore promoting the settlement function of the RMB in the regions along the Maritime Silk Road will greatly improve the efficiency of cargo handling at the ports. The Asian Infrastructure Investment Bank has already begun to play a role, and it should carry out the unified clearing business in the region as soon as possible, assuming the role of settlement between the ports in the region along the Maritime Silk Road.

5.5.3 Port Policy Linkage

Establishment of a policy linkage mechanism for the ports in the region along the sea route of Silk Road to jointly plan for the future. With the emphasis on the market-oriented cooperation mechanism, the government is the most effective coordinating body for the joint development of ports in the region, and there exists an organization called the European Seaport Organization (ESPO) in the mature European Port Union, responsible for participating in the formulation of EU maritime policy, protecting the port status of EU member states in the development of national economic plans. Countries along the Maritime Silk Road should set up a dedicated Maritime Silk Road to conduct regular seminars on regional ports along the Maritime Silk Road, for the Maritime Silk Road propose constructive proposals to the sustainable development of the Maritime Silk, so that the glory of Maritime Silk Road could maintain.

5.5.4 Port Security Linkage

Establishment of a security linkage mechanism for ports in the regions along the routes to ensure the safety of the navigation channels in the regions along the routes. The safety of the sea route is the key to the sustainable and stable development of the 21st Century Maritime Silk Road. The Maritime Silk Road has been threatened by various potential safety hazards since ancient times. Piracy, treason and severe weather are the main factors threatening the safety and security along the MSR. With the development of legislation and law enforcement in modern society, the threat of piracy to shipping lanes has been greatly reduced, mainly due to the damage caused by bad weather to passing ships, sub-regional responsibility system set up maritime safety patrol, responsible for the rapid handling of accidents, deep-water search and rescue missions, effectively ensuring the safety of navigation along the Maritime Silk Road .

CHAPTER 6 CONCLUSION

In the future, the Port Space System along with the Maritime Silk Road will provide a good opportunity for the development of China's ports. Port infrastructure is optimized in terms of scale construction and management techniques so as to improve port efficiency. The specific measures are as follows: In the Port Group around Bohai Sea, Tianjin Port and Qingdao Port should work as double-hub ports, while Dalian Port and Yantai Port work as auxiliary ports. In adddition, a scientific and rational structural layout and a well-structured port system should be formed to strengthen cooperation with various ports in Japan and South Korea. Moreover among the Yangtze River Delta Port Group, Shanghai Port is the main hub port and Ningbo-Zhoushan Ports work as is the secondary hub port. More attention should also be paid to the integrated development of ports, so as to give full play to the advantages of combined ports, to improve the efficiency of the entire port group, actively establish the 21st Century Maritime Silk Road port and shipping alliance, and strengthen long-term and stable relations with the countries and regions along the Maritime Silk Road. Xiamen Port should be built as an international shipping center in southeast China so as to carry out scientific planning and overall development, form a strategic alliance among the three major ports, strengthen the construction of deep-water channels and berths, define the service position of the terminal, and make full use of the excellent ports, and improve the technical level of port management, improve the utilization rate of port resources, thereby improving the operational efficiency of the port, and build three levels of port alliances to the outside world, that is, the initiative to link up the ports of the Yangtze River Delta with those of the Pearl River Delta, to establish a port cooperation alliance between the two sides of the Strait, and to form an alliance with the relevant ports of the ASEAN countries. In the Pearl River Delta Port Cluster, we should take Shenzhen Port and Guangzhou Port as the center, Shantou Port and Zhanjiang Port as the two wings, effectively integrate the internal resources of the port group, carry out scientific positioning and rational planning, realize the win-win development of the port, and build an international hub port, actively undertaking the construction of port infrastructure in Southeast Asian and South Asian countries, and building cruise tourism routes for

ASEAN and other countries along the routes. Among the southwest coastal Port Groups, the scale of seaports needs to be appropriately expanded, to professionalize port and terminal construction, optimize port throughput capacity, reduce administrative and market barriers to port clusters in the Gulf of Tonkin, and implement the integrated mode of port logistics supply chain in the Gulf of Tonkin, This will help to built a shipping hub facing the South China Sea, as well as a transit port for foreign trade. To take advantage of its proximity to Southeast Asia, we have established a friendly port connectivity with the important ports of Southeast Asian countries.

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