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Horizontal integration in the port industry in China challenges and outlook

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DECLARATION

I certify that all the material in this research paper 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.

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Horizontal integration in the port industry in China challenges and outlook

Msc

The topic of this article is on the new trend taking place in China port industry, which is the horizontal port integration of Chinese port industry.

And I use both qualitative and quantitative methods to analyze port integration in China which takes Ningbo Zhou Shan port as a practical case. Qualitative method involves the conceptual framework before and after analysis of Ningbo Zhou Shan port, and find out the gap between theory and practice. When it comes to quantitative method, regression analysis is mainly used for finding out the relation between financial indicators and both macro and micro outside indicators, in order to find out whether port performance is improved or not after the horizontal port integration.

And I have got the conclusion that horizontal port integration in China port industry doesn't necessarily lead to improvements on port performance. At least from a short period of time, like two or three years. Therefore it still takes more time to see whether the integration does benefit Chinese port industry. In accordance with what I have analyzed, some suggestions and applications have been proposed to both Ningbo Zhou Shan port and other ports in China.

KEY WORDS: Chinese port, horizontal port integration, port industry.

Catalogue

1. Introduction

1.1 Backgrounds of this dissertation

Previously, destocking in Chinese iron ore and coal industries have drawn great attention. And recently, port integration in China has been laid sufficient emphasis.

Originally, port integration was developed in the United States and other developed countries (WANG Chengjin, César DUCRUET, WANG Wei, 2015). However, in past few decades, port integration has experienced significant changes in the whole world. Thus it soon becomes a global topic. Especially in 1980s, as global economy shifts to Asia, and in accordance with the adoption of reform and opening policy, China has witnessed rapid growth on economy, therefore Chinese ports are provided with unprecedented opportunities. (WANG Chengjin et al., 2015)

Both in north and south China, latest domestic port integration has been started. And after completions of several typical port integrations, it will definitely be followed by more similar cases. Besides, it is not difficult to understand that horizontal port integration is supposed to reduce competition, increase freight rate, and make overall plan of resource allocation. Meanwhile operation efficiency is going to be improved through reasonable fleet dispatches.

However, one of the most significant features of the latest domestic port integration is that government plays dominant roles in it. No matter port integration is taken place in north or south China, they are not totally driven by willingness from port enterprises themselves. After 19th CPC National Congress, in order to better allocate domestic resources and balance regional economic developments, the situation of only one integrated port in one province, will be the current layout.

Though on one hand, ministry of communications in China has been pushing forward the construction of port group company, on the other hand, National Development and Reform Commission is now making antitrust investigations on large ports. That means large scale of construction on port group companies has created objective conditions for monopoly. In contrast, administrative measures have

been taken to repress prices, which obviously violates rules of market economy. Therefore dilemma has been left to ports which are involved in it.

What I am going to do is to view the integration both objectively and statistically to make further analysis of Chinese horizontal integration should to check it out whether horizontal integration does help to improve port performance, or whether the integration only lingers on the simple calculation of total container throughputs.

1.2 Literature review

1.2.1Integration in Chinese port industry

Researchers have done many analyses on development of port integration in China.

In Weiwei Huo et al.'s article (2018), We can see that since the adoption of reform and opening policy, Chinese ports have experienced long-term high-volume growth, but soon after financial crisis in 2008, it suffered a period of low growth on volume. Thus government has worked out several plans on provincial level to encourage port integration, especially after the Initiative of policy on B&R. It concludes that port integration in China has been transformed from national level to provincial level.

That can also be found in the article of WANG Chengjin et al (2015), they propose that the port integration trajectory will continue to increase in China. Of all factors which drive the development of Chinese port integration, market-driven factors are more likely to be dominant ones. Among all port integration cases in China, integration of Ningbo-Zhou Shan port is of great fame. Bing Song (2018) talks about the development of Ningbo - Zhou Shan port from 2006 to 2009 which made its historical record of cargo throughputs reaching 1 billion. He also points out that along with its rapid growth, port integration in China will be increasingly pushed forward. So does Ren-Xiang Wang (2008), he takes Ningbo- Zhou Shan port as an example to show that land lord port model is a relatively suitable one in China in order to better allocate resources of Chinese port industry. Besides researches on port of south China,

there are also research papers on north China. Grace W.Y. Wang et al 's (2016) article analyses different ports in Bohai bay including Dalian Qingdao and Tianjin port, proposing that in order to balance and efficiently allocate limited resources , each port is supposed to make full use of their comparative advantages to through vertical and horizontal integration.

Many experts have figured out problems existing in Chinese port integration.

Shanhua Wu, Zhongzhen Yang(2018) point out that though China has produced the pattern of one port – one city which raises the enthusiasm in developing local ports, it also leads to the problem of duplication of similar port functions. They propose that port integration is a zero sum game, ports who benefit from the integration should transfer part of their increased benefits to ports which suffer loss in order to realize the systematic optimization. In the article of Jia-bin LI, Yong-sik OH (2010), they point out that ports are faced with competition not only from domestic ports but neighboring ports as well. Neighboring ports like Shanghai port and Ningbo-Zhou Shan port, these two biggest ports in Yangtze River Delta where container transport is highly concentrated are faced with fierce competition relation they should've cooperated with each other instead of being involved into fierce competition. Even in the start of 21st century, Dong-Wook Song (2002) suggests that as the further development of Chinese economy, the main concern of Chinese port integration should not linger onto hard integration but soft integration like information integration should be laid sufficient emphasis.

1.2.2 Current situation of port integration abroad

Satoshi Inoue (2018), through the analysis of Japanese port alliance between ports of Kobe and Osaka, points out that it is only recently that the port cooperation has extended its scope from physical integration to improvements of terminal efficiency and user friendliness. Otherwise, the alliance was pushed forward with strong willingness of central governments instead of market force itself which is similar to what happened in China. Nuria Nebot et al (2017), suggest that the integration between ports natural environmental is of great significance in Spain.

There are also some research papers on the reason why two ports failed to be merged. Geraldine Knatz (2018) proposes that without sufficient motivations or with the absence of supports from port administrators, port integration will not be successful to be carried out. Similarly in USA, Cassia Bomer Galvao et al (2018) analyze the merge case between ports of Houston and Galveston, showing that direct competition between potential operating ports, similar size of each and economic rationality play much more profound roles rather than political or social motivations. But they also figure out that failure of port integration may not be a bad result for each port. Because the failure may force each port to behave more strategically.

1.2.3 Horizontal integration in different industries

Horizontal integration in shipping industry

Soon after financial crisis in 2008, Eddy VAN DE VOORDE and Thierry VANELSLANDER (2008) shed lights on the benefit of horizontal integration. They point out that during the period of economic downturn, shipping companies are attempting to deploy additional capacity at a lower level of unit cost. Therefore horizontal integration is getting prevailed in maritime sector. Also in the article of Oscar Alvarez-San Jaime et al. (2013) they prove that horizontal integration between shipping lines does benefit user surplus and make contributions to social welfare. Especially when transport services are weakly differentiated and economies of scale are sufficiently small. Issues talked above have been well articulated, besides, how to measure the integration performance is also concerned. Photis M. Panayides and Dong-Wook Song (2007) propose four parameters to measure terminal supply chain integration through data observed via a large scale survey of container terminal operators. And in next year, a better version with modifications was released. In the article of Dong-Wook Song & Photis M. Panayides (2008) they put forward six parameters conceptualized to account for most of the variation in the degree of port integration and supply chain management. What's more, they identify a positive relationship between certain parameters in supply chain integration and port competitiveness like cost, quality, agility etc.

There are some other industries which benefit from horizontal integration.

In aviation industry, Steven Ankersmit et al (2014), reveal the potential of air cargo transport collaboration on a horizontal level finding that horizontal integration is able to improve transport performance through maintaining higher frequency of transport movements, meanwhile, reducing transport costs by up to 40%.

In truck industry, the paper of Per J. Agrell et al (2017), shows that horizontal integration can contribute to improved service provision, reduced service price, improved consumer surplus, and improved profit for carriers in practice.

1.2.4Existing problems

(1)Differences on similar concepts used are difficult to tell them apart

Concepts like port integration, port cooperation, and port mergers are not clearly distinguished among them. In most cases, they are used together in a hybrid manner. However, they should've been explained in different scenarios, instead of being used together. It is better to tell them apart in different meanings in order to well demonstrate different types of cases to have a clear scope of what we are really talking about.

(2)There is a lack of financial analysis

There is a lack of financial analysis. Researchers make their analysis mostly from maritime perspective. However, financial indictors play critical role in performance evaluation as well. Some of them talk about parameters on performance evaluation, these can be found in the article of Dong-Wook Song & Photis M. Panayides (2008). They push forward six parameters like information and communication technologies and relations with other stakeholders etc. But those are relatively difficult to be measured compared with financial ones. And financial indexes are supposed to give a straight overview on how the port integration goes in practice.

(3)Quantitative analyses on integration performance of Ningbo- Zhou Shan

port are not enough

There are many qualitative analyses on the integration of Ningbo-Zhou Shan port. But, quantitative analyses on integration performance of the case are not that many. Most articles published show more on advantages of the integration of Ningbo-Zhou Shan port from a macro point of view. But it still remain a question whether the integration is worthy being imitated. Or it is just the simple calculation of total container throughput. Thus more quantitative methods should be applied so that the overall picture will be presented.

1.2.5 Contributions of the thesis

In accordance with existing problems we have talked above. I would like to make following amendments

(1)Similar concepts will be distinguished

In order to better illustrate the horizontal integration of Chinese port. Clear meanings will be explained in one chapter in the dissertation.

(2)Financial analysis will be applied.

When it comes to financial analysis, there is one method which is supposed to reflect the comprehensive result of certain financial even, that is DuPont analysis. With the presence of its core indicator ROE, (Rate of Return on Common Stockholders' Equity) which is also can be understood as how much money can be earned by per net asset. Thus it's a useful tool to give out the overall picture of how the integration goes on from not only maritime perspective but financial one.

(3) Quantitative methods will be applied.

In addition to DuPont analysis, quantitative methods including linear regression, and dummy variable analysis will also be used to check the relevance between certain indicators.

In conclusion, when we talk about horizontal integration in the port industry in China, there are still some areas for us to explore deeply inside. Researches on the integration of ports in China still has its way ahead.

1.3 The framework and content of the dissertation

In this essay, I will first start from literature review, then find out problems exist in previous essays. After that with the help of both quantitative and qualitative methods to make analysis on a specific case, which is Ningbo Zhou Shan port. Based on the practical case, and previous analysis, results and implications will be given to the horizontal integration in China. Finally, I will sum up what I have talked about in this article. The whole framework is presented in figure 1.

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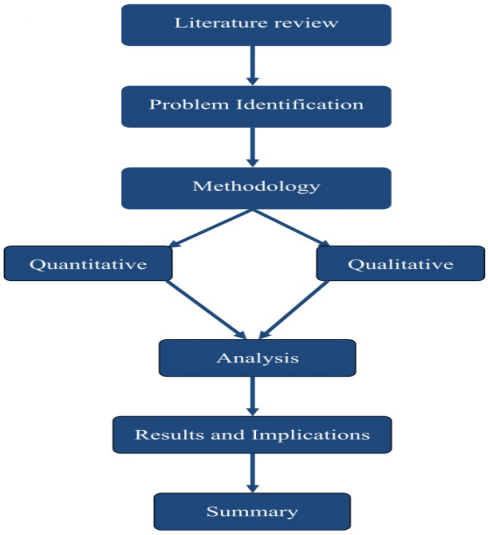

Figure1 framework of the article

2. Horizontal port integration

2.1 Concepts and types of port integration

Integration means privilege companies in a certain industry achieve their competitors' capacities, market shares, and operational resources by merging, acquisition and strategic alliance. Thus, port integration strategy refers to that port authorities assemble potential approaches for utilization in order to increase

operational production capacity and resources of ports in relation to handling and shipping services and optimize allocation of coastlines, berths, infrastructures, water and other resources (WANG Chengjin, César DUCRUET, WANG Wei, 2015). And it has two basic types, vertical integration, and horizontal integration. Here horizontal port integration means port integration between port industries. Besides, there is one another concept called port cooperation. It can also be divided into two types, they are horizontal cooperation and vertical cooperation which are two same types as port integration. However, port cooperation varies from joint venture, merger & acquisition to strategic alliance, also from port integration (Weiwei Huo, Wei Zhang, Peggy Shu-Ling Chen 2018). In other words, port integration has the closest meaning with port cooperation. While its difference is the existence of a joint venture. When there is a joint venture in it, it is a port integration, vice versa, it belongs to port cooperation. Therefore, in this dissertation, what I mainly discuss is horizontal port integration.

2.2 Dynamics of horizontal port integration

2.2.1 Deregulation from central government

In 2003, port of law has abolished the dual leadership of ports which means the central government has transferred all port management powers to local governments. Therefore, many ports which used to be national, now have become provincial ones. Therefore, ports are able to be great fiscal resources from local governments' points. It greatly encourages passions of governments to develop port infrastructures and optimize port resources.

Also, with the emergence of joint venture during processes of port integration, authorities have been centralized to give much clearer instructions to better improve the performance of ports involved in the integration.

2.2.2 Shore-line resources complementarity.

Vessels are getting increasingly larger, thus the importance of the value on

scarce shoreline resources for deep-water berthing continues to grow (WANG Chengjin et al., 2015). Especially for coastal provinces within same jurisdictional area. Therefore, coastal provinces sharing same spatial coverage often take unified planning, construction and management.

Sometimes, ports within same jurisdictional area can be complementary to each other. Example like Ningbo and Zhou Shan port. Ningbo port used to lack adequate deep water coastal lines, and after the integration between these two ports, Jintang Island in Zhou Shan port is effectively operated as a deep water subsidiary of Ningbo port. Therefore, it compensates for the lack of operational deep water region of Ningbo port.

2.2.3 Functional divisions between different ports.

With different characteristics of various ports, port integration is able to realize complementary harmonization in order to promote advanced customer services. Within Liaoning province, ports involved including Dalian, Ying Kou etc. They share similar cargos, comprising oil, grains etc. Thus functional divisions in this region is of great needs.

What happened in Copenhagen and Malmo is another example. Copenhagen port and Malmo port are located in opposite side of the Strait of the era. Both two ports had long been involved into fierce competitions. However in the early 21st century, port of Copenhagen and port of Malmo have been integrated as CMP which means Copenhagen Malmo port. And it has been proved that the integration has achieved great success. After the integration, both two ports have developed in an integrated way to pursue mutual benefits. Specifically, Copenhagen mainly focuses on cruise and container businesses. And Malmo concentrates on crude oil, chemical productions, ro-ro and bulk businesses which has greatly improved the performance of both ports.

2.2.4 Recession of macro environment

Current amount of export and import suffers from the fluctuation of maritime,

we can see from figure2. After financial crisis in 2008, both global GDP growth and global trading growth are in decrease comparing with years before 2008. And in 2008 GDP growth rate was almost 0. Though both figures had seen some increases in 2010, they continue to drop down in next few years and then kept in a relatively low level. Maritime industry is the derivative of global trading, under the recession of macro environment, the whole industry also suffers a lot. Ports are also faced with the situation of cargo shortages.

Therefore, in order to cope with the macro recession, horizontal port integration has been considered as a workable solution to get through the cold winter of the whole industry. Besides, after several years of construction on ports, port capacities have been released gradually, which means situation of oversupply comes up. And competitions between ports will be increased as well. Thus by reducing unhealthy competitions through port integration is also a new trend in port industry.

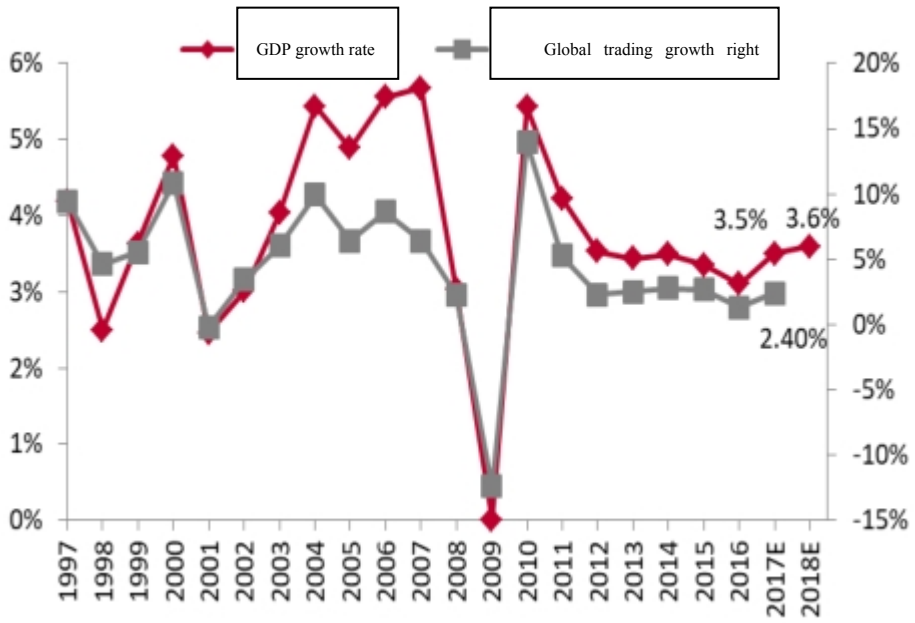

Figure 2 fluctuation between global GDP and global trading growth

Source: http://www.chyxx.com/industry/201711/581219.html.

2.3 Possible impacts of horizontal port integration

2.3.1 Elimination of cut-throat competition

In the same cluster, when cooperation profits are larger than cooperation costs, efficient labor divisions will take place, to well enhance core competency of the port cluster.

In Tokyo bay. At first, there were 6 world class ports in the same area, resources with same natures cannot be arranged in a proper way, which has caused severe cut-throat competition. Therefore central government and local authority have strengthened planning and construction of port clusters, and made constant optimization of utilization on port resources. In accordance with different functional levels, ports in Tokyo bay have been assigned by different jobs. Tokyo port has been regarded as a hub port for container ports and inland transportation. While Yokohama port has been classified as a port which is mainly responsible for regional import of materials. So do other ports.

Thus, every port in the same area has their own clear definitions of functions which are complementary among them. That is to say, the industrial chain has been formed to optimize profits all together. Every port within the same area has been integrated to make full use of port resources.

2.3.2 Setup of industry ecology

Industry is not just the simple gathering of companies, instead it is based on specific divisions and social coordination. Companies of different levels exist in the same cluster, making complementary functions among them. Just like biological ecosystem. What they are supposed to do is to cooperate with each other, they are more like companions instead of competitors.

Besides, inside the cluster, companies are supposed to share information, contribute mutual benefits, and make progressions. Like New Jersey and New York port cluster. Currently, it is the largest container port cluster in USA. Actually, New York port and New Jersey port are in different administrative regions. But they have overlapped economic hinterland and port functions. Therefore, local governments have decided to set up a joint administrative organization which has their own financial budgets, accounting system and some other authorities. On port operations,

it takes landlord model which enables ports to follow pathways of how market works.

That is to say, port integration is able to build a health ecology in the industry.

2.3.3 Regionalization of the port cluster

Regionalization means port integration should fully consider local economy to realize integration of regional economy. Integration of regional economy has been the new trend. It not only maintains the overall development of a country, but also benefits the whole port cluster.

On one hand, rapid development of regional economy provides adequate cargos. On the other hand, it strengths the status and images of ports themselves. Through the regionalization of port cluster, ports will benefit from local entities to get more cargos, and also local companies are able to benefit from the economic development brought by port itself. Therefore, cut-throat competition will be reduced, instead, mutual developments will be gained through the regionalization of port cluster. And also, the integration is able to widen financing methods of the port itself. Economic status of the port is going to be strengthened, more methods like self-financing, outside financing, and even IPO, will be greatly helpful to solve capital issues of port constructions. At the same time, cash flow of the port, will also be improved to some extent.

What's more, after the integration, like one port in one province, Polices will not be biased to one single port. Instead, it is the whole cluster that benefits from it.

2.3.4 Globalization of operations

Globalization of operations is the definite consequence of the development of port clusters. It is also regarded as an important pathway to continue to develop industry cluster. With the economy of scale, it is able to attract various external factors to come inside the port cluster.

With the integration goes by, the international status of a port cluster will be obviously improved, to raise its competency in the world, which is going to attract more cargos into the operation. And in other word, the development of the port cluster

will also be improved through international cooperation which will reversely promote the active development of the port itself in many aspects.

2.3.5 Negative influences

Except for those positive influences mentioned above. What cannot be avoided is that operational monopoly. Along with the process of integration goes by, pricing rights will be gradually favorable to port side. And related fees and taxes are also going to be affected by integration. In addition, after being integrated, when it comes to the organization issues, cooperation problems will be put forward to provincial level, that is to say, provincial level will be laid on more pressure in order to solve the problem. Therefore, total administrative costs will be increased instead.

2.4 Conceptual framework of horizontal port integration

After reading previous literatures on horizontal port integration, a conceptual framework has been summed up in order to better explain the structure.

As we can see in Figure 3, in the middle of the conceptual framework is financial indicator involved in horizontal port integration. And in this article, indicators like ROE (rate of return on common stockholders' equity), net profit, etc. will be applied to check whether they have some inner relationships with different factors including quantitative factors like throughput, regional GDP, and macro economy; qualitative factors like cooperation, competition and so on.

Symbol 'plus' in figure3, means the specific factor may have positive relationship with financial indicators involved in horizontal integration. While symbol 'minus' means it may have positive relationship with those indicators.

That is a general meaning of the conceptual framework, however, there are always some differences between theory and practice, that is to say there will be some possible extensions or modifications towards the framework. And finally I am going to make a more practical framework in order to better explain the situation.

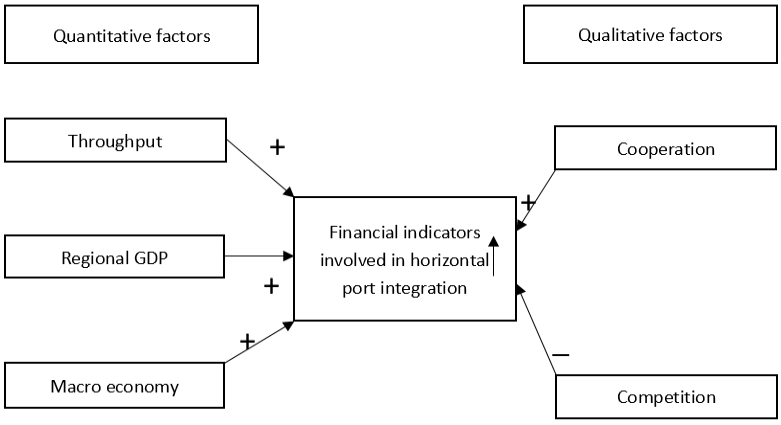

Figure 3 conceptual framework of horizontal port integration

3. Analysis of horizontal port integration in China

3.1 Development of Chinese horizontal port integration

3.1.1 Development of horizontal port integration in Jiangsu province

In March 2017, Jiangsu province proposes that in order to increase the intensity of port integration along its coastal line, Jiangsu port Group Company will be established through the integration of ports alongside rivers and seas. As two key ports in Jiangsu province. Nanjing port and Lianyungang port will definitely be two critical ports in it. As we can see from Figure 3. Nanjing port and Lianyungang port will be two major shareholders of the newly set up Jiangsu port Group Company. And structure of previous shareholders of Nanjing port and Lianyungang port Group Company will not be changed, however the actual controller of these two companies will be changed into SASAC of Jiangsu province.

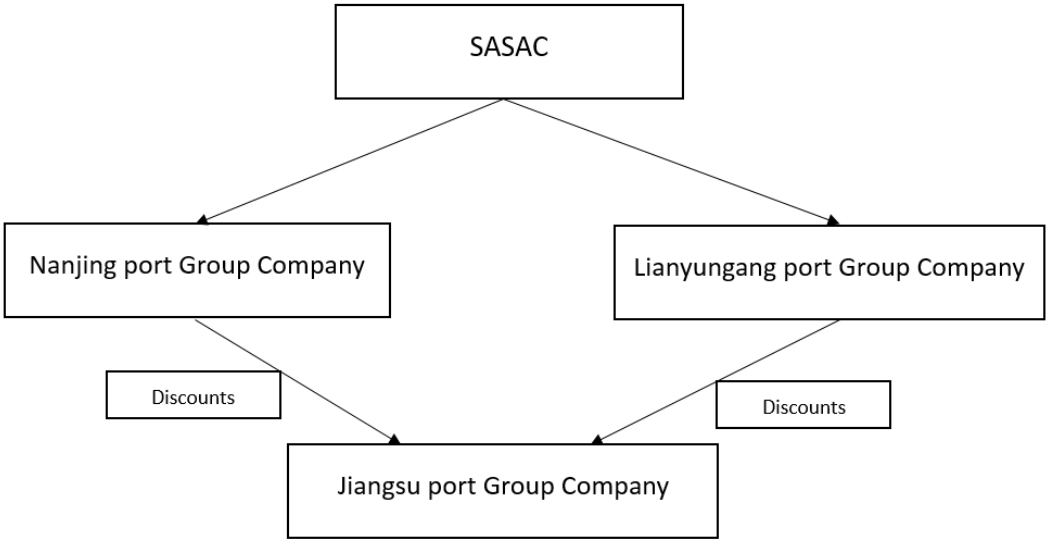

Figure 3 structure of Jiangsu port Group Company

Besides, from 2015 to 2030, Jiangsu province will take up the strategy of port divisions to category ports into different levels. Among which, Lianyungang port, Nanjing port, Zhenjiang port, Suzhou port, Nantong port will be major ports. While as regional ports, Yangzhou port Wuxi port, Taizhou port, Changzhou port, and Yan Cheng port, all these ports will cooperate to work together.

Among these ports above, Lianyungang port is defined as a logistics transshipment center between China and Kazakhstan and some other functional centers. On the perspective of liner shipping. It will be developed as main line of container transportation along the Long Hai line. And on the exportation of iron ores, a professional iron ore port of 200 thousand tons amount will be constructed in Lianyungang port.

In addition, Nanjing port will be defined as a regional maritime logistics center. On container transportation, Nanjing port will mainly develop its short sea and inland container transportation. On the exportation of iron ores, 70 thousand port will be constructed. On coal transportation, another 70 thousand port will be taken place. Finally, on commodity cars logistics, Nanjing port will make plans on commodity cars and work as a regional distribution center.

3.1.2 Development of horizontal port integration in Zhejiang province

Zhejiang is a traditional port province in China with deep water coastal lines of 754 kilometers, which is ranked among top of China both in quantity and quality. And there are four coastal ports including Ningbo Zhou Shan port and 7 inland ports. As time passes by, Zhejiang province has pushed forward port integration in different levels.

In 2005, the establishment of Ningbo- Zhou Shan port administration committee witnessed the opening of port integration in Zhejiang province.

On 7th August 2015, in accordance of instructions from central government and the reality of Zhejiang province itself, Zhejiang province has carried out strategic plans to integrate costal ports, related resources and relevant platforms in order to push forward the integration of sea economy and port economy. Zhejiang province would like to establish world class hub port, maritime service base, and port Group Company through new mode of capital mergers, port operations, and development between economy of sea and ports. With efficient operations and planning to integrate port group companies in the province.

On 29th September 2015, Ningbo and Zhou Shan port group companies have completed their substantial integration on assets, and it has become Ningbo Zhou Shan port Group Company which also has become core competency among Zhejiang sea ports.

In 2016, on the direct of Ningbo Zhou Shan port Group Company, and other five sea ports, the integration of ports in Zhejiang province has been almost completed. Ningbo Zhou Shan port will be regarded as the hub port, followed by Jia Xing, Wenzhou, Taizhou, Yi Wu port and other inland ports.

At the end of 2016, Ningbo Zhou Shan port has become the first 900 million port all over the world.

From financial perspective, total assets of Zhejiang Sea port investment and operation Group Company has reached 100.3 billion yuan, net asset is around 70 billion yuan. It is estimated that at the end of 2020, total asset will be 200 billion yuan, net asset 80 billion yuan including financing, port operations, port

developments, and maritime services.

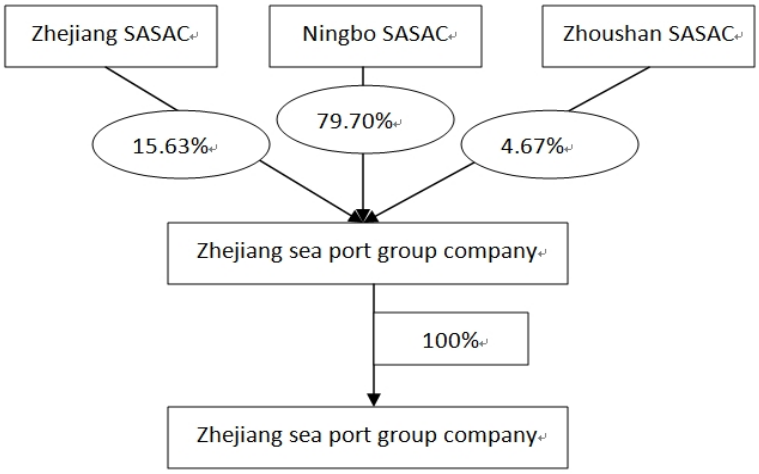

Figure 4 structure of Zhejiang sea port Group Company

3.1.3 Development of horizontal port integration in Guangdong province

In 2010, throughput of Pearl River delta has reached nearly 1billion ton. Among which, throughput of containers is larger than 42 million tons. And total amount of cargo throughput of Guangzhou Shenzhen Zhuhai is 700 million. Therefore, status of coastal ports is so outstanding and also classification has been formed.

In September 2012, ministry of transportation in Guangdong province, also proposed that in order to exploit port alliance thus regional integration should be pushed forward, so does government driving and market resources allocations.

There are also many cooperation between two main ports Guangdong and Dongguan, pushing forward port integration, optimizing customs efficiency, and infrastructures. Besides, new port areas will be developed under cooperation between two ports.

In January 2016, Guangzhou port Group Company, together with Zhuhai port Group Company, they are going to develop comprehensive cooperation on construction planning, business exchange, capital cooperation, and some other aspects. Zhuhai port will also take active part in the construction of Guangzhou international maritime center. At the same time, Guangzhou port will also be involved in the program held by Zhuhai port.

Besides, many joint works are held between Guangzhou port and Dongguan port. Among which, Guangzhou port will be oriented to speed up integrations of national ports, optimize customs efficiency and other infrastructures. What's more, environmental situations of Zhu Jiang channels will also be paid more attentions.

Except for the integration of Guangdong and Dongguan port. In July 2017, there are contracts between Foshan and Zhongshan which are cities nearby in Guangdong province aiming to build fourth port area in Nansha which is regarded that comprehensive logistics costs can be reduced, and strengthen attractiveness of cargos from the hinterland to better build up an international maritime logistics center.

Differentiation on development of different ports has also come up.

Ports have played significant roles in transportations of productions and daily stuffs. In Pearl River delta, liner shipping services are mainly concentrated in Guangzhou and Shenzhen, among which, Shenzhen is the largest liner shipping port, and Guangzhou is the largest internal trade transportation port. Coal transportation has long been taken by Guangzhou port, port service in Humen port and Zhuhai port has also been increased due to the increase of coal transportation demand in Guangdong province and other neighboring regions. Generally, Guangdong province has followed the blue print issued by Guangzhou province.

Pearl River delta is one of the key port clusters in China. In accordance with policy issued by government, in pearl river delta, it is based on Guangzhou Shenzhen and Zhuhai, including Huizhou, Zhongshan, Humen, Jiangmen as regional ports. Therefore ports functions are arranged in different classifications.

3.1.4 Development of horizontal port integration in Beibu Gulf

Though, faced with the looming situation of maritime, Beibu Gulf still performs well under the fluctuation, and it mainly benefits from, port integration program carried out in Beibu Gulf. A series of efficient measures have been taken place. Thus the performance of port integration has been obviously shown.

(1) Approaching to integration.

Beibu gulf is consisted of Fang Cheng port, Beihai port, and Qinzhou port. With

its coverage and deep-water, it is able to meet requirements of 300 thousand tons bulk and 200 thousand tons container ships. However, due to some historical reasons, it limits the exploitation of coastal resources, with its high debt rate and inadequate capitals, future developments of ports in this area have been greatly restricted.

In order to solve the problem above, unhealthy competitions between ports should be avoided. It not only includes planning, construction, but it also needs centralized administrations. Therefore, in 2006, three ports in Beibu gulf have been integrated as "Guangxi Beibu gulf port", detailed policies have been carried out to promote the pilot zone.

(2) improvement of overall performance

After the restructure of ports' functions, it solves the problem on who takes charge of which kind of cargos, and who takes a larger share on a certain cargo. Therefore, it naturally promotes the coordinative development of performance.

It is reported that under the constant depressing of macro-economy, Beibu Gulf pushes forward the port performance by matching cargos with containers, regulating operational fees, and reducing detention fees etc. Therefore, through operational regulations, 15 million yuan is reduced annually for enterprises involved.

(3) Reduction of meaningless competitions

In 2015, Fang Cheng port government has signed strategic agreements with Beibu gulf international port Group Company, pushing forward bulk port with total throughput of 400 thousand, and continue to improve the system of general bulk transportation. Fang Cheng port now has majored in general bulk with its reputation has been already known by others.

Besides, Guangxi Beibu gulf has developed its precious port resources by overall planning, and developing in different levels. Such as, some specific working areas, have been exploited together. On the basis of those developing areas, liner shipping companies, and some other privilege companies have been attracted to work as partners.

3.2 Comparisons of horizontal port integration in different provinces in China

In previous chapters, we have talked about development of port integration in different provinces of China. Therefore, I would like to make a horizontal comparison among different provinces to see what is the difference of horizontal port integration in China.

Table 5 Comparisons of port integration in China

Port/Port integration	Features	Pathway
Jiangsu province	With both sea and river costal lines	Ports and port group companies alongside both sea and river are going to be integrated as Jiangsu port group company. But its actual controller is Jiangsu SASAC.
Zhejiang province	Relatively soft integration	Zhejiang sea port group company takes 100% share of Ningbo Zhou Shan port. And SASAC of Zhejiang, Ningbo, and Zhou Shan take 15.63%, 79.70%, 4.67% of Ningbo Zhou Shan port respectively.
Guangdong province	Regional port cluster with more than one province	With the globalization of Guangzhou port and Shenzhen port, driving neighboring ports Dongguan and Zhuhai ports' development, to build an international port cluster which connects Hong Kong, Macau
Beibu gulf	Intensive integration	Establish Guangxi Beibu Gulf international port group company.

Judging from table 5, we can easily find the common place of the above mentioned port integration in different regions of China. That is they are guided or dominated under local governments, State Assets Administration Committee Capital Administration, which is known as SASAC.

Among which, the integration of Beibu gulf is the most intensive one that covers port groups, administration systems, shipping dispatch, and some other aspects. While Zhejiang province is relatively soft. Ningbo Zhou Shan port is taken by Zhejiang sea port Group Company, what's next is to gradually take Jiaxing, Wenzhou, into the overall integration. Anyhow, Ningbo SASAC will always take major shares of Zhejiang seaport Group Company. Due to some regional factors, except for cooperation inside the province, Guangdong province will also contribute to build closer relationships with regions nearby including Hong Kong, Macao, in order to serve the whole Pearl River delta region.

What is not shown in table1 is port group of Beijing, Tianjin, and Hebei province. Comparing with provinces mentioned in table1, the nature of integration happened in Beijing, Tianjin, and Hebei province is more on the cooperation between Tianjin port Group Company and Hebei port Group Company. The joint company held by two port group companies has been established in order to better realize mutual benefits.

3.3 Existing problems of horizontal port integration in China

3.3.1 Form is larger than context

Port integration aims at optimizing allocation of resources, reaching best outputs with least inputs. However, currently, some port integrations in China are only integrations on its covers, forms, and quantities. Not integration on its nature, contents, and functions. Therefore it is meaningless to make simple calculations on ports throughputs and construction scales. Each port is relatively independent, doing their own business, and lack professions, systematic resources allocations from perspective of modern logistics and comprehensive transportation.

3.3.2 Competition is stronger than cooperation

Due to the nature of port integration is still lingering at forms. Thus, administrators and operators of some ports still regard some other ports as competitors

to some extent. They compare with each other on core competency, hinterland, and investments. In contrast, they make less efforts on function coordination and resource matching.

Besides, during the process of integration, local authority of the port which has been integrated will be not willing to develop their own port. That is to say the integration which follows the pathway of port administration does help to benefit the integration on forms. However, it is going to depress the initiative of local government to continue to develop the port infrastructure. What's more, it will also weaken the relation between administrative department and port related organizations. Thus it may be difficult to get supports from local authorities. And it has become a systematic obstacle which blocks development of both port constructions and city economy.

3.3.3 Lack of division of works

There are some ports with same hinterlands, especially some giant ports. Judging from inner relations between regional economy and the amount of growth, and relations between ports and hinterland, they are supposed to have systematic functions. However, regarding from the current port planning, among some significant economic areas or even those have been included into overall plan of country, due to limitations of administration, there are some ports with relatively same capabilities, or same natures, obviously, functional differentiations have not been shown yet. Instead what they are doing is to compete fiercely. Therefore, ports involved are performing weakly on total throughputs. Besides, lack of administrative controls is also another factor which result in the current situation.

3.3.4 Government driven model still takes larger percent

As we can see in previous chapters. Port integration in Jiangsu, Zhejiang, Guangdong, Beibu gulf, all of them are dominated by the local or central government. Here comes the problem, port integration is supposed to happen more about the action taken by companies involved instead of some external factors like government driven

model. However, nowadays in China, it seems that only in port group of Hebei, Beijing, and Tianjin, that the integration is initiated by port group companies themselves. Therefore, it still remains a problem why port group companies are pushed to do integration things, instead, local authorities are more willing to take actions to promote the port integration.

3.4 Horizontal port integration in Europe and its implications

There are around 1200 ports in Europe, with its long coast line, and different geographic regions, horizontal port integration is faced with great difficulties. Therefore, optimization of port resources among European ports is in great need.

In accordance with the tough situation, European sea ports organization (ESPO) has been established in September 1993, held by European Union including Amsterdam, Rotterdam, Antwerp, and Hamburg etc. And ESPO represents overall benefits of European ports. With the help of ESPO, it regulates and coordinates functional divisions of different ports.

Firstly, on the idea of port integration, ESPO promotes free competition among ports instead of directly interfering ports operations. Secondly, on pattern of port integration, ESPO promotes benefits of the whole cluster through legal methods, at the same time, making sure that independence of each port can be secured. Thirdly, on policies of port integration, macro policies on environmental protection, sea and multimodal transportation, have been carried out to support healthy and rapid development of ports in different countries. Fourthly, on capital and technologies, ESPO takes statistics data as evidences for supporting ports on capitals, cash flows etc. to encourage sustainable developments among port clusters.

Therefore, European port integration is able to shed some lights on problems mentioned above existing in horizontal port integration of China.

(1) Specific laws should be made to promote integration on port resources.

European countries are highly regulated, restrict supervisions will be put first priority before anything got started. And at the same time, relevant laws should also

regulate rights and compulsory on management system, accounting independence, self operations, and taxes etc. so that ports development can be promoted in a more sustainable and legal pathway.

(2) Comprehensive management mechanism

Completion of management mechanism is both the structure and basement of port management and port integration. In order to better coordinate and integrate European ports, like what has been mentioned before, ESPO is an example. With the help of ESPO, European ports are going to develop in a sustainable pathway on different aspects.

(3) Market plays a critical role in port integration

Except for well-organized laws in European countries, developed market economy is also a symbol. Mainly in accordance with supply and demand in the market, and also with the help of government policies. But government seldom interferes their operational behaviors in the market. In one word, market should play a critical role in it.

4. A case based on Ningbo Zhou Shan port

Like what has been illustrated in previous chapters. Integration of Ningbo Zhou Shan port is also driven by dynamics mentioned before. As the deregulation from central government, and for the better utilization of shore line resources, it initiates the new trend happened in China. Unlike intensive integrations taken place in other provinces, it started in year 2005, and finally finished its substantial integration in 2015.

There are some positive impacts which have been shown after the integration, including elimination of competition, expanding its service into a global wide. But also some problems can’t be avoided.

4.1 Introduction of horizontal integration on Ningbo Zhou Shan port.

Originally, Ningbo Zhou Shan port used to be two ports. Ningbo port and natural

deep water port Zhou Shan port. They are located on Yangtze River delta which has city clusters of Shanghai, Hangzhou, and Ningbo etc. And it is also one of the most developed and active regions in China. Though, Ningbo and Zhou Shan ports are in the same sea areas and have channels in common, due to some administrative reasons, both ports have been segmented in planning, constructions, and administrations, which has resulted in great waste of valuable port resources, and difficulties of resource optimizations. Therefore, on 20th of December 2005, with the permit of ministry of transport. From 1st January, Ningbo port and Zhou Shan port will be replaced by Ningbo- Zhou Shan port. At the same time, administration committee of Ningbo- Zhou Shan port has been set up. As time goes by, integration of Ningbo Zhou Shan port has achieved substantial processes on assets on 29th September 2015. Along with the establishment of Ningbo Zhou Shan port Group Company, Ningbo Zhou Shan port has completed its integration successfully.

4.2 Quantitative analysis of Ningbo Zhou Shan port

4.2.1 Linear regression

As rapid growth of Chinese economy, performance of ports have been impacted in different aspects. Especially for those ports who have been involved into horizontal port integration. It is necessary to find out how much percentage is caused by macro-economic growth, and how much is resulted by the behavior of integration itself.

Therefore I have chosen several ports who haven't been involved into port integration, or those figures before they are involved into a specific port integration. They are different ports in north, middle and south of China respectively including Lianyungang port, Ying Kou port, and Zhuhai port. Thus I am able to know how much percentage of port performance in average is caused by the macro-economic floats. Therefore in the case of Ningbo Zhou Shan port, these amount of percentage can be removed from the case to see to what extent the integration itself affects port performance.

ROE, rate of return on common stockholder's equity. It means how much can be

earned by per capital invested. The larger the ROE is, the more profit that the investment is going to make. Thus it shows profitability of capital investments. And ROE is the core indicator of DuPont analysis which is used to make comprehensive financial analysis of a specific company.

What I am going to do next is to make linear regression between ROE and Chinese GDP growth rate from 2009 to 2016, in port of Lianyungang port, Ying Kou port, Zhuhai port, to achieve an average level of to what extent macro economy affects port performance. In table 6 is data extracted from www.eastmoney.com to make financial analysis.

Table 6 Original data for linear progression

years	2016	2015	2014	2013	2012	2011	2010	2009
GDP growth rate	6.7%	6.90%	7.30%	7.80%	7.90%	9.50%	10.60%	9.40%
Jinzhou port ROE	0.94%	2.20%	3.86%	3.73%	3.26%	6.47%	5.92%	5.37%
Ying Kou port ROE	4.83%	5.13%	5.60%	5.36%	5.43%	6.44%	6.48%	6.01%
Dalian port ROE	3.11%	3.49%	3.84%	5.17%	4.68%	5.37%	8.31%	8.51%
Ningbo Zhou Shan port ROE	6.82%	8.19%	9.50%	10.17%	10.30%	10.33%	13.05%	12.87%

Source: www.eastmoney.com

Calculation result of Jinzhou port

Table 7: Y=-0.06086+1.216894X

Variable	Coefficient	t-statistics	Prob.		
Intercept	-0.06086	-3.17019	0.019314	R^2	82.41%

X variable	1.216894	5.30359	0.001824	Significance F	0.001824

Calculation result of Ying Kou port

Table 8: Y=0.02333+ 0.4025X

Variable	Coefficient	t-statistics	Prob.		
Intercept	0.02333	4.861948	0.002817	R^2	89.14%
X variable	0.4025	7.016578	0.000418	F-statistics	49.23237

Table 9: Calculation result of Dalian port

Y=-0.05628+1.323956X

Variable	Coefficient	t-statistics	Prob.		
Intercept	-0.05628	-2.57633	0.041976	R^2	81.08%
X variable	1.323956	5.070831	0.002286	F-statistics	25.71333

In the results shown in table 7 table 8 9. R^2 is selected to explain that how much percentage of ROE fluctuation can be explained by Chinese macro-economic growth. They are 82%, 89%, and 81% respectively. Therefore, the average level of how much GDP growth rate contributes to ROE fluctuation is 84%.

Therefore, it can be concluded that, except for the contribution that GDP growth rate does to ROE fluctuation. What's left is contribution provided from other factors including integration and some other ones. Therefore, we are able to say that the maximum influence of integration itself is around 16%.

As we can see from different results of different ports. It is concluded that fluctuations of port ROE is not that much affected by integration itself. Therefore, effects of horizontal integration are not that obvious, only 16% at most of which is contributed by integration and even some other factors inside.

4.2.2 Dummy Variable Regression model

In previous chapter, I have talked about how macro GDP growth rate affects the fluctuation of ROE .In order to better compare port performance pre and post integration. I would like to apply a dummy variable into the regression model. Which means, the figure which represents pre-integration is 1, while the figure which represents post-integration is 2. With the help of EVIEWS, I am able to check how some specific indicators are influenced by integration.

What I have done firstly is to compare ROE of Ningbo Zhou Shan port before and after integration. Because of some limitations of data resources, ROE of Zhou Shan port can't be found online, therefore I have only got comparisons of Ningbo port. And we can see from table 10, after integration, average ROE of Ningbo port has been decreased.

Table 10: comparisons of ROE of Ningbo port before and after integration

	Years	ROE	Average ROE
After integration	2017	7.51%	
	2016	6.82%	7.17%
Before integration	2015	8.19%	
	2014	9.50%	
	2013	10.17%	
	2012	10.30%	
	2011	10.33%	
	2010	13.05%	
	2009	12.87%	10.63%

Table 11: Y=0.203085-1.330006*X

Variable	Coefficient	Std error	t-statistics	Prob		
C	0.203085	0.024376	8.331466	0.0002	R^2	0.770663
X	-1.330006	2.970007	-4.490254	0.0041	F-statistics	20.16238

Secondly, except for the dummy variable analysis of integration before and after integration, I have also checked the linear relation between the dependent variable

ROE and the independent variable total throughput of Ningbo Zhou Shan port. The result is shown in Table 11. Which we are able to see that the higher the total throughput is, it may not definitely result higher ROE.

Thirdly by using analysis-of-variance model which involves a quantitative variable and a dummy variable, as we can see in table 13. GDP in the table is GDP of Ningbo Zhou Shan port which ranges from 2010 to 2017. Therefore, when GDP of Ningbo Zhou Shan port is a constant, before the integration the average net profit of Ningbo Zhou Shan port is around 1.5 billion yuan. While after the integration the average net profit is decreased to (15.55683-7.128811) around 800 million yuan. And the function of pre-integration is Y=15.55683+0.002461*X, function of post-integration is Y=8.428019+0.002461*X

Table 12: Y=15.55683+0.002461*X-7.128811*D1

Variable	Coefficient	Std error	t-statistics	Prob		
C	15.55683	2.421636	6.424099	0.0014		
GDP	0.002461	0.000423	5.817830	0.0021	R^2	0.871382
D1	-7.128811	1.562602	-4.562142	0.0060	F-statistics	0.005933

In addition to what I have done previously, I have also tried to analyze some other dependent variables like revenues, net profit rate etc. However calculated results are not that significant comparing with table 11, table 12. Therefore, I will not choose those indicators to illustrate my viewpoint.

4.2.3 Cash flow based DuPont analysis.

In previous chapter, traditional DuPont analysis is applied to Ningbo Zhou Shan port to find out how much percentage that GDP growth rate contributes to ROE fluctuation. However traditional DuPont analysis is based on the balance sheet and income statement, both of them are static statements. Thus, in order to further reflect financial information of a specific company, static statements and dynamic statements should be combined together to assess profitability and liquidity of the chosen company.

Therefore, cash recovery rate of net assets, is the most significant indicator during the comprehensive analysis. According to DuPont analysis, cash recovery rate of net assets can be divided into Cash ratio， asset turnover, and Equity multiplier. As it is shown in Figure 13.

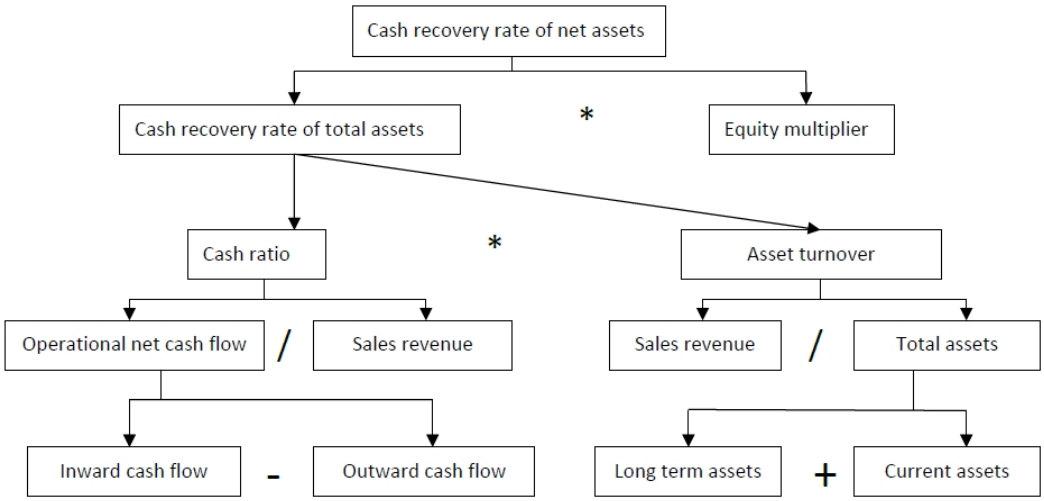

Figure13 Mechanism of Cash flow based DuPont analysis

Table 14: Detailed calculation of year 2017 of Ningbo Zhou Shan port

2017			
Cash recovery rate of net assets	7.16%		
Cash recovery rate of total assets	0.045491079		
Equity multiplier	1.574936709	average liability	227.1
Cash ratio	0.155665567	average assets	622.1
Operational net cash flow	28.3	average asset to liability ratio	0.36505385
Sales revenue	181.8		
Inward cash flow	195	current asset turnover rate	1.540677966
Outward cash flow	166.7	Time	236.9086909
Asset turnover	0.292235975		
Total assets	622.1		
Long term assets	504.1		
Current assets	118		
measurement: 100million			

Taking year 2017 as an example and showing detailed calculation processes. And other years will follow same pathway of it.

As we can see from the difference between two kinds of DuPont analysis following same pathway of the year 2017 which is shown in the Table 15. Comparing with traditional DuPont analysis, indicator of cash flow based analysis is smaller than traditional DuPont analysis. It means that the ability of drawing cash back is not as strong as how much per capital is able to earn which means liquidity is not that powerful as profitability does. Especially In years range from 2010 to 2015. After substantial integration has been taken place, the situation is gradually improved.

Table 15: Comparison between cash flow based DuPont analysis and traditional one

	Cash flow based DuPont	Traditional DuPont
2017	7.16%	7.51%
2016	12.88%	6.82%
2015	7.89%	8.19%
2014	8.27%	9.50%
2013	10.93%	10.17%
2012	2.84%	10.30%
2011	4.69%	10.33%
2010	9.04%	13.05%

4.3 Existing problems in horizontal integration of Ningbo Zhou Shan port

4.3.1 Horizontal integration has not been well performed.

As we can see from previous qualitative analysis on Ningbo Zhou Shan port. After the influence of macro economy has been removed from the integration performance, only 8% of ROE fluctuations can be explained by the integration itself.

Besides, in further analysis of financial indictors before and after integration. It is found that ROE of Ningbo Zhou Shan port is 3% lower comparing with that of pre-integration. With dummy variable analysis, net profit of pre-integration is also 700 million less than that of pre-integration.

Since the integration of Ningbo Zhou Shan port, the joint venture company has been established, but the real integration has not been accomplished yet. On division of logistics, these two ports are relatively independent, doing their own jobs. It is still difficult for these two ports to accomplish logistics optimization. Therefore, the

establishment of a functional division of jobs, is of great significance.

4.3.2 Assets related problems.

Judging from DuPont analysis shown above, we can see that current asset turnover rate is relatively low in Ningbo Zhou Shan port. As we can see in Table 16. The average current asset turnover days are 287 days which remains a problem of assets management of Ningbo-Zhou Shan port.

Table 16: Current asset turnover rate of Ningbo Zhou Shan port from 2010 to 2017

2017	1.540677966	236.9086909
2016	1.35970025	268.4415187
2015	1.844756948	197.8580432
2014	1.731836366	210.7589419
2013	1.804939835	202.222807
2012	1.651916155	220.9555242
2011	1.166360448	312.9392811
2010	0.563755869	647.4433711

Besides the asset turnover rate, there is another asset related problem. As we can see from the previous analysis of liner regression between ROE and total throughput, I find that the higher the total throughput may not necessarily lead to higher ROE, it may be resulted from the total container throughput capacity which is known as TCPC. It means handling capacity between quay and yard is different. If yard utilization exceeds a critical point, a berth throughput is affected accordingly. The higher the berth throughput, the higher the berth occupancy. Therefore in the port construction, both quay and yard should be considered at the same time. Thus, TCPC theory can be used to explain the negative relation between ROE and total throughput. In other words, infrastructure should keep up the pace with the increase of total throughput.

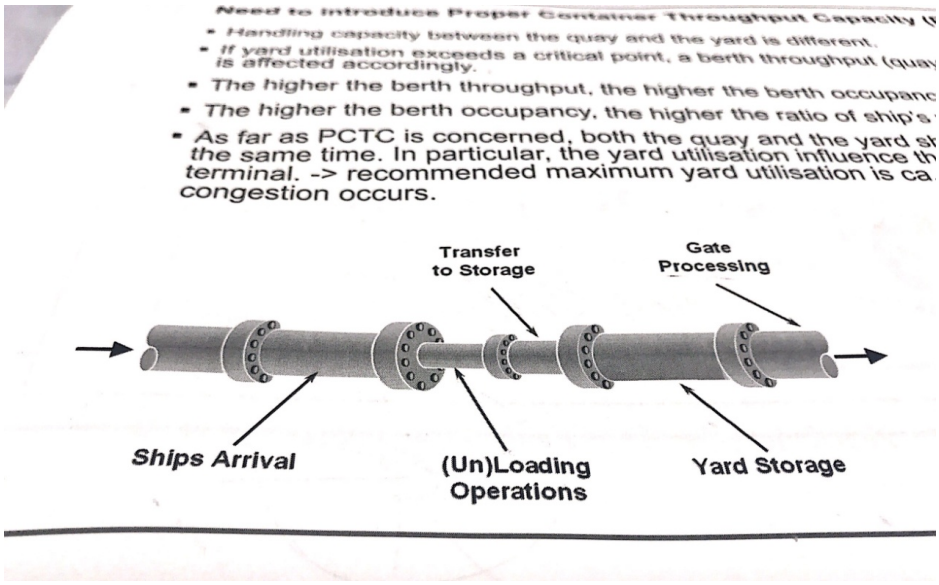

Figure 17 total container throughput capacity

Source: Daniel Seong-Hyeok Moon (2017). Port Logistics. Unpublished lecture handout, World maritime university and Shanghai maritime university. International Transport and Logistics.

4.3.3 Low ROE comparing with other competitors in port industry.

Table 18: Comparison within shipping industry

Port	ROE (% average in 3 years)	Net profit (% average in 3 years)
Ningbo Zhou Shan port	7.52	15.93
Average in Industry	6.11	21.00
Mid value in industry	6.83	10.84
SIPG	13.58	28.92
Tangshan port	11.76	23.56
Shenchi gulf A	11.48	33.03
Shenchi gulf B	11.48	33.03
Bohai ferry	8.49	19.41

Source: www.eastmoney.com

As we can see from table 18 which ranges from 2015 to 2017. In port industry, comparing with other competitors in the industry. ROE and net profit rates of Ningbo Zhou Shan port in recent 3 years are slightly higher than the average number within

the industry. However, it still has a long way to go to catch up with companies like SIPG. That is to say, port integration in short period doesn't bring obvious impacts to ports involved.

4.3.4 Great pressure from neighboring ports

In Yangtze Delta River, though Ningbo Zhou Shan port is possessed with many innate resources, and other requirements, competitions are still unavoidable. For instance, Shanghai port. With the support of the international hinterland Shanghai. Shanghai port will be much more favored by international entities. What's more, some traditional ports like Jiaxing, Wenzhou, they will also be challenges to Ningbo Zhou Shan port. Not only in domestic market, so does foreign markets including Ports in Japan and in Korea.

Besides, inadequate infrastructure, is also a major problem which is faced with Ningbo Zhou Shan port. With the import and export of coals, iron ores, and oil, logistics get developed rapidly. But, infrastructures like shipping repairing, financial insurance, fail to keep up with the pace of rapid development of logistics. In contrast, in order to be top level port in the whole world, Shanghai port has long been contributing to updates of these infrastructures. Therefore, the update of relevant infrastructures is also of great importance.

4.4 Policy implications from both domestic and global markets

Judging from what has been illustrated previously, there are some implications can be learned from both domestic and global markets.

In order to better connect with B&R policy, there are some suggestions for Ningbo Zhou Shan port. What's more, in accordance with the case of horizontal integration of Ningbo Zhou Shan, some lights can also be shed to enlighten the port industry in China.

4.4.1 Completion of integration management mechanism

Low level of integration has been mentioned before. Therefore, it is a must to

complete the integration management system between these two ports. Though department of transportation in Zhejiang province, has issued the overall planning of Ningbo Zhou Shan port on 5th September,2013, Ningbo Zhou Shan port has not been wholly integrated during that time. Now that these two ports have been formally integrated, measures should be taken place to be in accordance with the horizontal integration. One of the most important measures is to clearly make divisions on logistics transportation, so that resources in both two ports can be utilized in an efficient way.

Besides, as the development of B&R policy of Chinese government, Ningbo Zhou Shan port will definitely be a key node in the policy, therefore, in order to better connect with the macro policy, a comprehensive information system should be established. Now that the administrative barrier has been broken through, the information sharing system will be another key factor.

What should also be mentioned is that Ningbo Zhou Shan port is not only a critical node in B&R policy taken place in China, but it is located in Yangtze River Delta which is a developed area in China. Similarly, in Guangdong province, it is a cross province integration which also deserves attention by Ningbo Zhou Shan port, for Shanghai port is within the same geographic area too. With information sharing and cooperation paid by every entity in the same area, Yangtze River Delta is supposed to be a powerful port cluster in China and even in the whole world.

Except for information sharing system mentioned above, relevant laws should also be made like what happened in European countries. It should be given first priority to regulate ports development in a sustainable way. Maybe in the future, an organization like ESPO will be established to instruct but not interfering into port integration to better help Chinese ports on different aspects.

4.4.2 Optimization of cargo distribution and transportation system

Though it has been 10 years after integration of Ningbo Zhou Shan port, however there are not that many substantial changes between these two ports. Ningbo port has taken ores, oil, and other industrial materials, comparing with that, Zhou

Shan port hasn't benefited too much from that. The reason why it happened is that Zhou Shan Bridge opens in 2009, it is merely for buses. But transportation related to ores is usually for rail transportation. That is to say the reality is that road transport still takes large share of the whole transportation system.

And when it comes to the total throughput, like I have mentioned before, through theory of TCPC, port infrastructures should keep up with the pace of increase of total throughputs so that it may better improve port performance.

Therefore, in order to meet the increased cargo amounts, a reasonable cargo distribution and transportation system is definitely needed. With the help of the optimized system, can Ningbo Zhou Shan port actually seize the latest opportunity.

4.4.3 Further considerations

When I am doing relevant researches on port integration in Chinese port industry, there is a lack of indicator system to assess the overall port performances which results in a difficulty on comparisons of before and after integration. Admittedly, there are many indicators involved in a port. But it hasn't been formed into together in a comprehensive way. Therefore, as the pioneer of port integration in China, Ningbo Zhou Shan port is supposed to develop an indicator system to better evaluate port performances.

What's more, port integration will unavoidably result in operational monopoly, thus how to deal with monopoly issue is also a key factor in port integration in Chinese port industry.

Besides implications for Ningbo Zhou Shan port, the whole industry can also benefit from the case which will be shown in 4.4.4 and 4.4.5.

4.4.4 Strengthen the relationship with neighboring port

In current situation, cooperation is always much better than cut throat

competitions. Taking the example of Ningbo Zhou Shan port and Shanghai.

As the establishment of Ningbo Zhou Shan port, Shanghai port is no longer the largest port in China. However, the status of Shanghai port has not been affected. It is still regarded as an international shipping center. Thus, Ningbo Zhou Shan port should make full use of the opportunity. Yang Shan port which is inside Zhou Shan port is an example of cooperation between these Shanghai port and Ningbo Zhou Shan port. Yang Shan port has now become the largest iron ore imports port in China which greatly improved fame of Zhou Shan port. The setup of Yang Shan port not only relives stressed resources utilization of Shanghai port, it also provides great opportunities for the development of Ningbo Zhou Shan port. Mutual benefits have been really achieved.

4.4.5 Horizontal integration will not necessarily lead to better performance

As we can see from previous case of Ningbo Zhou Shan port, I used to regard that horizontal integration will definitely lead to better financial performance. However it is proved that the result is not that definite. Still, it takes some more years to make the conclusion whether it is good or not.

Therefore, though horizontal port integration has become a new trend all over the country, cautious investigations are needed in advance to check possible impacts it may bring to the port. Whether within the same area, the competition has already resulted into something out of control. Whether functional divisions can be achieved indeed. As we can see, there are no good or bad competition, what we can say is that whether the competition is legal or not. In one word, we should always regard the horizontal port integration in a cautious attitude.

5. Summary and conclusions

5.1 Conclusions

Horizontal port integrations have been taken place in China for several years. There are different dynamics from both micro and macro levels. From macro levels

are that central government has already released port authority to local governments even to companies themselves, therefore more operational space have been released to promote the horizontal integration in China. Besides, as the recession of macro economy, horizontal integration has been regarded as a positive strategy to get through the cold winter in this industry. While from micro levels, scarce shore line resources has been another factor to promote the integration to happen. Due to the limited resources, therefore, functional divisions of different ports within the same geographical region have also been promoted.

Through a series of both qualitative and quantitative analysis, we are able to see that with the help of horizontal integration, cut throat competitions within same area can be effectively eliminated, global status of the port cluster, or from the practical case of Ningbo Zhou Shan port, it can also be regarded as a port, has been greatly improved.

While it is not that absolute to say port integration will definitely improve the overall performance, at least within short period of time. Because from previous analysis, we are able to see that, after the factor on macro economy has been removed, the fluctuation of ROE is only affected by the horizontal integration by 8%. Besides, after integration, both ROE and net profit show a trend of decline comparing with those before integration. With the examining of cash flow based DuPont analysis, the overall indicator doesn't show satisfying results.

Admittedly, there are some general benefits brought by horizontal port integration. However, it still takes some time to see whether port integration does benefit Chinese port industry in a long term.

5.2 Possible extensions

Comparing with the conceptual framework I have mentioned before, and with the analysis of the latter case. We are able to fill the gap between concept and practice.

As we can see that port integration will not necessarily lead to overall

improvements to ports involved, it still takes some time. And when it comes to total throughput of a port, due to the reason of TCPC total container throughput capacity, it may outline a negative relation between total throughput and financial performance.

And in short period 2 or 3 years, after substantial integration of assets, the overall improvements may not be that obvious, which is represented by the decreasing ROE between pre and post integration. Therefore, time are needed to check whether the integration will benefit ports involved in a long term.

Besides, when it comes to regression model, more variables are supposed to be considered in order to better explain integration performance. What's more, game theory can also be used to analysis horizontal port integration in future analysis. With the help of game theory, like Cournot model, it is possible to check that whether overall integration does help to optimize the situation compared with that without integration. Landlord port is also an aspect that deserves to be further discussed.

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