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# Research on vertical relationships of enterprises in the shipping industrial chain

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## Research on Vertical Relationships of Enterprises In the Shipping Industrial Chain

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# Declaration

I hereby certify that all the material in this dissertation that is not my own work have all 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 not necessarily endorsed by the University.

(Signature):_____

(Date):_____

Supervised by Professor

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## Abstract

The theory of vertical relationship is always focused by western economist. Theoretically, many economists studied it from varied aspects and formed a series of vertical relationship theory. Practically, many multinational corporations become powerful by vertical expiation. During the past few years，therefore，more and more companies chose outsourcing instead of vertical integration which they chose before.

The form of the vertical relationship between enterprises in the shipping industry is also changing constantly. With the development of shipping industry, many enterprises begin to provide logistics services, and try to integrate the whole industrial chain. On the other hand，Some enterprises choose to focusing on their main business and stripping other business. Will vertical relations between enterprises in shipping industry change from vertical integration to vertical specialization? What influenced the changing of vertical relationship in shipping industry? How should enterprises in this industry choose the vertical relational actions? These problems should be studied seriously.

There are many studies on problems about how to provided logistics services by shipping companies，port business and problems about invest in port by shipping companies. But there is no article analyzed the relations between the enterprises and the change regulation of their behavior from the perspective of the entire industrial chain. This thesis，by reference to the research methodology and research ideas which used to study some other industry and the specificity of the shipping industrial chain，discussed the problems proposed above ，and made a conclusion that vertical integration will be the main form in shipping industry in a few years. The thesis studied about vertical relationships between enterprises in shipping industry form a

view of the whole chain for the first time. It will not only make companies clearer about their environment but also put forward a framework which could be used by enterprises in the chain to choose their action.

**Key Words**: shipping industrial chain, vertical relationship, vertical integration, vertical separation, vertical restrains

# Contents

# 1. Introduction

## 1.1 Research Background

As we all know, the financial crisis triggered by US subprime crisis swept around the world within the second half of the year 2008, is spreading from fictitious economy to real economy. It has led to the gravest global economic recession since the WWⅡ. The shipping industry is a concept of globalization. The international shipping, taking up more than 75% of the world's cargo trading, is dedicated to the international trading. It links closely with global economic and trading situation. The global economic recession has caused a sharp decrease in global trading, which in turn had an impact on shipping. Under this circumstance, there are several possible new patterns in the prospect of shipping.

### 1.1.1 A long period of annexation, reorganization and concordance

Currently, the weak recovery of shipping is due to the market overcapacity and the feature of the industry. Shipping was prosperous before the crisis, which led to its haste expansion---orders for new ships soared, which caused the grave overcapacity that we will suffer for a long period. It will also suppress the recovery and prosper of shipping. The crisis will change the international trading pattern in large scale, speeding up its pace into the period of restructure, and backward productivity will be sifted out. During this period, large scale annexations and reorganizations will prevail the industry, monopolize competition pattern will form in international shipping market.

### 1.1.2 Cooperation and alliance leading trend in future shipping market

Strengthening Cooperation may lower that cost, distribute risks in world's economy and improve competitiveness. During economic recession, enterprises of shipping, logistics and cargo owners should be interdependent and share resources, strive for

combined development. Although competition exists in giant shipping enterprises and synthesis logistic enterprises, we should also strive for cooperation; get through the difficulty in joint hands and achieve a win-win result. At present, only the top 3 of the biggest 20 liner companies still operate independently, others all launched alliance campaigns in large scale in the 3 major east-west seaways. Even the giants like Maersk, MSC and CMA-CGM have more or less started seaway cooperation with other liner container operators.

### 1.1.3 The further extension of shipping industrial chain

Generally speaking, shipping is part of logistics and shouldn't be separated. They are complementary in large extent. During the recession, to compensate for the fall in main business, shipping enterprises need to make combinations along supply chain and carry out comprehensive logistic service. To establish modern logistics service system will be the main orientation of shipping enterprises' operating and developing strategy, which is not only the result propelled by the development of world's economy and trading and market demands, but also the needs for shipping enterprises' own development. Therefore, shipping enterprises should work hard on the extension of service on both ends of shipping. That means to speed up the construction of inland lattice points; improve the channels for highway, railway, waterway and other ways of multimodal transport; and provide specially designed whole course logistics service to clients of special needs.

### 1.1.4 The transition of world shipping center towards China

Together with the transition of the world's economic center, world's shipping center is also undergoing the transition from Europe to America and then to Asia, especially China. Since China's policy of reform and opening up, international commodities, capital and factors of production have flown into Asia in an ever-increasing speed.

China, keeping its rapid economic growth, is gradually melting into the chain of global economic integration and has become one of the engines of world's economic development. Propelled by the boom in Asian economy and trading, Asian shipping prospered. International shipping resources concentrate even more in Asia, and its focus is moving towards East Asia, especially China. Currently, China is building 3 international shipping centers supported by the port groups in Bohai Gulf, Yangtze Delta and Canton River Delta, that is, the North Shipping Center and North-East Asia Shipping Center supported by ports in Tianjin and Dalian; Shanghai International Shipping Center which centers in Shanghai and supported by Jiangsu Province and Zhejiang Province. All those perfectly conform to the requirements of the eastward movement of world economic center and China's booming economy.

## 1.2 Research Purpose

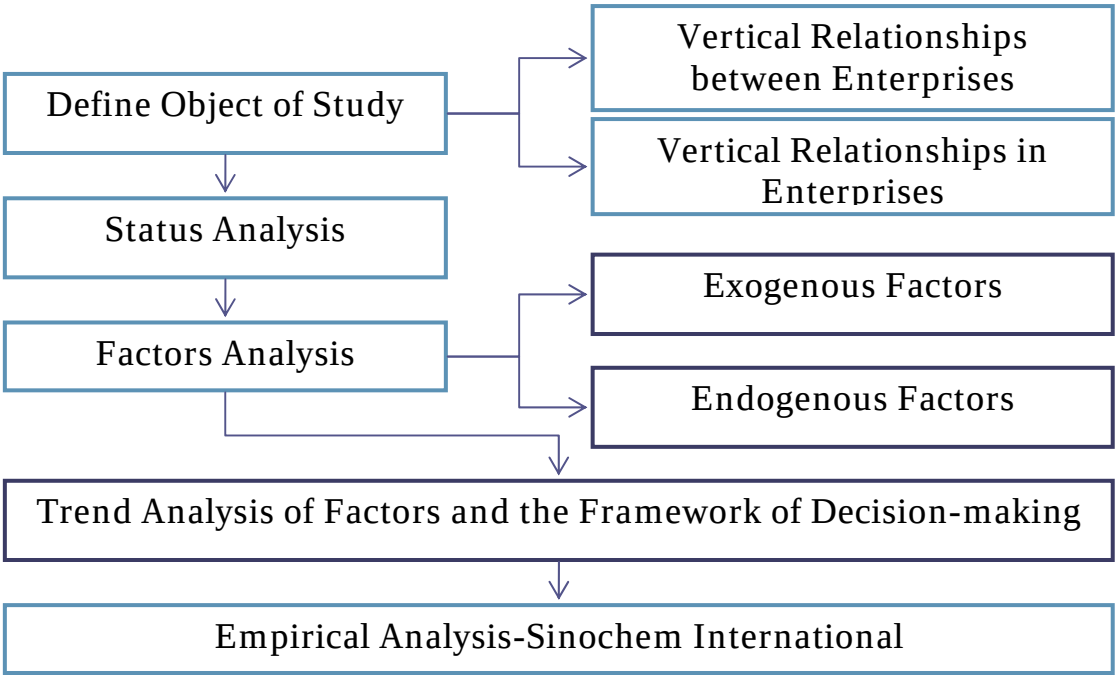
The vertical organization relationship is always the focus of western theory. Theoretically, economists from Industrial organization school, neo-institutional economics school and lots of other economic schools have a deep research from different angles on this issue and achieved a huge success, form a series of related theory. In practice, the huge development of modern large enterprises and large group all experienced this epic vertical expansion phase. Last century, America had broken out in a vertical acquisition of the second wave of merger. However, in recent years, the traditional form of vertical integration is under challenging, many multinational companies, especially the manufacturing enterprise is starting the outsourcing services, which breaks vertical organization and ankle to the vertical cooperation organizations and specialized organizations of the development of new forms. Therefore, vertical organization is just like all other things that follows the development of law.

According to the related analysis for the tendency of vertical organization, scholars in mainland China have research on automobile, railway, and telecommunication industry. Combined all the practical situations of these industries, scholars reach the agreement that companies should form their organizations into the formation of longitudinal dissociation which was from the form of vertical integration. There also many people has studied the global tourism industry, the analysis considered the relations between different industry contributes to the subject will be implemented in different forms.

With the development of marine market, many enterprises start developing logistics operations, and advocate integrating industry chain and reach the consolidation in the league, and property. Meantime, there are industries concentrate on certain connections' special investing, to set themselves free from the other industries. We will find out after analyzing from the angle of vertical industry: the vertical relationship between the industries of maritime area has been always changing, and it leads out several formations of enterprises' vertical relationship activities, such as, vertical acquisition and vertical alliance, vertical business divesting, vertical constraints and so on.

This article will be based on the combination of the specialty of maritime industry chain and vertical relationship theory to dig out the varieties of reasons that affect the vertical industrial organization. Meantime, enterprises have the determination for the formation of vertical industrial chain, and their decisions will be based on the transactions of industrial chain. Therefore, all the effectiveness will help make decisions for the enterprises vertical relationship. This article will help build the vertical decision structure based on all these elements.

### 1.3 Research Structure




## 2. Definition of Vertical Relationships of Enterprises in the Shipping Industrial Chain

In the development of Shipping Industry, there are always constant new features shown in the vertical relationships of enterprises. In order to clearly understand these characteristics, we must make a analysis of the constitution of the maritime industry chain and the definition of its vertical relationships.

### 2.1 General Constitution of Shipping Industry

#### 2.1.1 Definition of Industry and Industry Chain

Industry is a collection of concept between macro-economic and micro economic organizations. According to Marshall, Industry is considered as same as biological organization, which is a social organization that operates not only with the functional differentiation of various separate parts (division of labor within the enterprises and

in the society), but also with the close connection and union between different parts within the organization (corporate merging and potential merging).
Hence Industry is the collection of enterprises with certain kind of same business activity. Enterprises constitute the main body of Industry.

The division of Industry Chain is the division of vertical relations. It is the business activity that is based on the one kind of or certain kinds of products and services. The business activity covers from raw material supply till before and after marketing activity in order to make the product or service meeting the demand. Hence Industry chain is a collection of enterprises, in which an enterprise is an unit. Industry Chain is crisscross and associated system.

### 2.1.2 Composition of Shipping Industrial Chain

In summary, no matter what mode of transport, shipping industry chain can be divided into three main bodies: the cargo owner (the cargo owner involved in maritime operations), shipping companies, shipping services industry. This article will start analyze according to this division.

Cargo owner are the ones that specializes in import and export goods or import and export business, foreign trade sector business, organized for the implementation of trade contracts for import and export of goods transportation, as well as the shipper or the consignee of international cargo transportation. Although the cargo owner does not belong to the shipping industry enterprises, many large companies as cargo owner will also participate in the operation of the shipping industry, on an immense impact on shipping markets. To study the longitudinal relationship between the companies in shipping industry chain involved in shipping business operation, we must make the cargo owner as one body to be studied.

The shipping companies can be mainly divided into ship owner and ship operator. A ship owner is the owner of a merchant vessel (commercial ship). In the commercial sense of the term, a ship owner is someone who equips and exploits a ship, usually for delivering cargo at a certain freight rate, either as a per freight rate (given price for the transport of a certain cargo between two given ports) or based on hire (a rate per day). Ship owners typically hire a licensed crew and captain rather than take charge of the vessel in person. Usually the ship owner is organized through a company, but also people and investment funds can be ship owners. If owned by a ship company, the ship owner usually performs technical management of the vessel through the company, though this can also be outsourced or relayed onto the shipper through bareboat charter.A ship operator should take charge of business operating function but no need to be a real owner. In the modern shipping market, there are increasingly ship operators involved in the tramp shipping market which expand their fleet quicker than the traditional ship owner due to lower financing pressure.

Shipping service industry means all of shipping-related services, including: ship finance, marine insurance, maritime arbitration, shipping exchange, classification societies, ship technical management, port industry, ship agency, freight forwarding and other industries.

### 2.1.3 The Status of Various Research Subjects

#### 2.1.3.1 Cargo Owner

Cargo owner as the shipper is the final consumer in the shipping market, providing the transportation time and destination port on the time of consignment of goods. Thus the cargo owner has the right to choose the port and the carrier and freight forwarder, that is, the cargo owner has exchange relationship with the other two

bodies.

The exchange status of the cargo owner is influenced by many factors. First, the scale of the cargo owner makes great influence on itself: As the economies of scale, the larger cargo owners have the relatively stronger bargaining power, while most small and medium sized cargo owners have weak information and bargaining power. Second, the market conditions also makes great influence on cargo owners, as Shipping market has the characteristics of cyclical and seasonal fluctuations. In the case of shipping market economy, the owner's status is relatively low. Third, of course the exchange status of the cargo owner is influenced by the market power of the exchanging objective. For example, when the shipping company's market power is stronger, and more tend to monopoly market structure, the owner is no doubt in a relatively weak position. In addition, when the coastline under the control of the port business conditions is better, the stronger ports ability, cargo owner's choice will be small, as well as less bargaining power.

#### 2.1.3.2 Shipping Companies

Shipping companies are playing both the provider and consumer in the marine industry chain. Shipping company, as the as the cargo carrier, provide the transportation service for cargo owner or cargo agency. On the other hand, in the process of offering shipping service, shipping companies are unavoidable become the customers of harbors and the other shipping services companies. Therefore, these three main enterprises have the trading relationship.

The status of shipping companies in the trading is also not changing. Looking back to the shipping industry development, take it as a whole, in most cases, because most of the market shares are in the small part of shipping companies, which makes shipping

companies a better position under the trading situations compare with the cargo owners, sometimes shipping companies would take their monopoly advantage status while doing business. However, shipping companies treat harbor enterprises differently while under the trading. Generally, cargo owner would pointed the harbor where to handling goods, but mostly, harbor companies has monopoly position, which make shipping companies under an disadvantage situation while negotiating with harbor companies.

#### 2.1.3.3 Shipping services industry

The agency organization in shipping service industry is different from the other two. The main trading mean is not direct trading but finding agency to negotiate the business in the marine market. There are several theories of the position of Agency organization in the market. One of the theories believes that with the development of information technology, the direct exchange ability provide by internet will have increase the welfares for providers and consumers, which will mark a tendency that providers will directly doing business with the consumers. This action will cause the disappear of the middleman, no one need agency any more during the business deal: first, the development of technology make the communication between providers and consumers become possible, for example, such as the using of EDI and the worldwide internet. Secondly, direct trading could decrease the trading cost. Skip the middleman will save the money which needs to pay to the agency. Chandler made a practical analyze in his “A Visible Hand”, which was from enterprises’ perspectives to give out the suggestion of the sale force inside a company. Analysis pointed out that after building companies own sale network, which will make the company more independent on itself and not the agencies. On the other hand, there is a theory which advocates the existence of middleman. This theory believes that there is a historical reason for the agency to be there in development of economics. The developments of

information technology will somewhere affect the status of agency however will not cause it's disappearing. On the other hand, middleman would use information technology to improve its services: first, the decision process of choose which company to doing business with could also cost a lot. Agency at this point could focus on offering information services; help company avoid its financial problems. Second, agencies have more professional experiences on the process of searching and processing marketing information, which will eliminate the risk for companies. Third, information technology could help agency improve their business ability, in order to provide better services which in a lower cost.

## 2.2 Literature Review on Vertical Relationships

### 2.2.1 Definition of Vertical Relationships

Vertical relationship itself has two meanings: One is that the existing state structure, I. e. a single operation over the main stage to a product of the degree of extension; the other is that strategic behavior of an enterprise, I. e. business through vertical mergers or create new production or distribution facilities into the processing or marketing stage behavior (Clark, 1990). Through several stages of a product in the process became the final product, every interaction between the participating enterprises, the link for this product presents a "vertical relationship." Vertical relationship is also an economic organization, Williamson thought that the vertical relationship is the core issue of concern to organizational economics, to explain the existence of economic activity a business, market and some tears together over allocation between economic organizations.

Vertical relationship is in the form of property relations characterized by vertical integration, Characteristics of the contract in the form of vertical restraints, the gradual integration of transaction-based vertical market specialization, and many in

between property rights and contract forms; enterprises vertical relationship includes vertical mergers, vertical relationships, vertical exclusion, vertical separation, outsourcing, customization and network sales.

### 2.2.2 Morphological latitude of Vertical Relationships

Harry root of the enterprise vertical relationship, Vertical relations proposed to describe the four latitude of company: integration processes, integration of the width, depth of integration, integration of forms. According to modern management theory, firstly it needs to determine the enterprise's core competitiveness, and accordingly determine the strategic business units, then, as the core strategic business units, business through the four variables measure the longitudinal development of the overall strategy and the form of the final forms of enterprises.

### 2.2.3 Division of Labor Theory

Longitudinal study the relationship between some enterprises involved in business-related, so it is based on its analysis produced by the division of labor. Therefore, the relationship between longitudinal researches should be traced back to the first division of the Theory of: Adam Smith in "Wealth of Nations" that the division of labor promotes the economic growth. The vertically integrated research began on the Smith (1776) put forward in Smith Theorem: "division of labor limited by the market". From classical economics to neoclassical economics, the discussion is the formation of the division of labor and specialization (also early forms of vertical relationship), and Marxist political economy expounded the relationship between division of labor within the industry is well-known after following the Smith on the division of labor, handicrafts and machinery, large-scale industrial workshops described profoundly. Marshall who made further study of the division of labor and specialization constructed the framework of neoclassical economics on the

basis of Smith's analysis of the division of labor, which further restricted the extent of the division limited by market demand for the of a Yang theorem of Smith.

### 2.2.4 Vertical Contractual Relationships

The literature on vertical contractual relations is part of the theory of contracts (Tirole, 1988; Kreps, 1990). This literature focuses on the articulation between an upstream level (supplier) and a downstream level (client). Each level can be characterized by different degrees of competition (monopoly, duopoly, oligopoly), associated with different degrees of strategic behaviors and different structures of information. Strategic behaviors emerge as soon as there is more than one firm either at the upstream or downstream level, and essentially come in the form of fierce price competition among firms with the highest level of fixed/sunk costs, dedicated to force the exit rivals (real or potential, upstream or downstream). The more (respectively the less) similar are firms in terms of size or influence on the market, the higher (respectively the lower) strategic behaviors will be.

The different models of vertical contractual relations are based on a common assumption (for an exhaustive survey of these models, see Katz, 1989; Perry, 1989). Since the price paid by customers in the final market essentially reflects the high fixed/sunk costs of firms (located upstream or downstream, in charge of R&D, development of physical infrastructures, production of a basic commodity to be further developed and distributed), the industry structure is ultimately determined in large part by the market forces driving competition among these high costs firms. As such, these firms may have specific incentives to shape the industry structure (via vertical integration or via vertical specialization) in respect of their optimal strategy (Stabell & Fjeldstad, 1998; Abbate, 1999; Ramirez, 1999). The problem is then to focus on the sustainability of a given industry structure when vertical contractual

relations are taken into account, and to assess the outcome in terms of global competition and customers' welfare. These models also rely on a common procedure. The first step is to determine the optimal strategy that rational players have to implement, high cost firms playing first. The second step is concerned with a comparative analysis of the potential vertical structures in terms of prices on the final and intermediate market, profits for each firm, and customers' welfare. The third step is to determine the existence of 'sufficient' vertical restraints, that is vertical restraints that may replicate the most efficient results obtained in the second step, either by vertical integration or vertical specialization.

Mainstream economic approaches tell us that it is possible to determine an optimal vertical structure of the industry. Depending on the conditions of supply (degree and nature of competition) and demand (degree and nature of standardization), dominant economic models attempt to determine the organizational structure between the upstream and the downstream level which guarantees the best allocation of resources in terms of prices, quantities, profits and welfare. The optimal vertical structure of the industry basically depends primarily on the market structure (number of firms) and the cost structure (high or low fixed/sunk costs) which prevail in the vertically related units of analysis (upstream and downstream levels), and which drive firms to adopt, or not, strategic behaviors in terms of price competition. The optimal vertical structure also depends on the information structure (perfect or imperfect) concerning final demand which command the opportunity for firms to make use of an informational rent (which results from an informational asymmetry between firms), and which reflects the degree of standardization of the final market.

## 2.3 Connotation of Vertical Relationships of Enterprises in the Shipping Industrial Chain

The product of the Shipping industry chain is service. Vertical transaction is the whole process from the shipper to the consignee, including the three main businesses: cargo owners, shipping companies, shipping services industry. In this article the vertical relationship in the shipping industry chain will be discussed between the two main areas: one is vertical trade forms between the three main businesses; the other is, the three main vertical transactions between enterprises in different kinds of market conditions to select strategies of vertical merger, vertical control, or vertical separation.

Vertical relationships between the shipping industry chain mainly includes the form of vertical integration, vertical restraints, vertical specialization. Generally speaking, the vertical integration in the shipping industry chain can be integration from the owner's entire chain, that is, the cargo owner take charge throughout the transportation process. Otherwise, it could be extension of the business of any one or more link in the chain. While the vertical restraints in the industry chain are generally three main companies in the rest of their transactions entered into between the companies as long-term, binding contract, contract with rate specified in (freight), trading or other terms. In between these two forms of implicit contract usually has a vertical form of alliance.

## 3. Current Situation of Vertical Relationships of Enterprises in the Shipping Industrial Chain

In the recent year marine transportation industry between each function's enterprise's transaction relations fluctuate infinitely, presents the characteristic according to be possible to divide into: vertical integration, vertical restraint, vertical specialization.

### 3.1 Vertical Integration of Enterprises in the Shipping Industrial Chain

Vertical Integration refers to the combination of different technical production, distribution and other business process in the range of a certain enterprise. Vertical Integration shows the decision of an enterprise to use internal or management control to replace market transaction in order to achieve its commercial purpose.

Vertical exchange relationships in Vertical Integration of Shipping Industry refers to the fact that an enterprise in the shipping industry chain controls the decision of several links in the vertical organization based on property owning. Vertical integration in shipping industry can be separated into Integration of Shipping Entity and Brokering (secondary industry of shipping), and the integration of different shipping entities.

### 3.1.1 Vertical Integration of Cargo Owners

Vertical integration of Cargo Owners refers to the downstream extension in shipping industry chain, which can be separated into self-owned fleet and self-owned terminal.

#### 3.1.1.1 Self-owned Fleet

Before 2007 and 2009 when the economic crisis happened, there was a severe rate increase of dry bulk ships. CVRD faced a severe pressure for a sudden increasing shipping cost since their Iron Ore were sold on FOB terms. The company hence decided to build self-owned fleet in order to avoid risk for rate fluctuation. CVRD on one hand charter-in vessel with lower rate in spot market, and at the same time order new-buildings and purchase second-hand vessels.

CVRD captured the opportunity of sudden price decrease of second-hand vessel in the beginning of last year. The company purchased the several capsize vessels and at the same time speeded up their self-owned fleet in order to carry their cargo by their

self-owned fleet within three years. According to statistics from professionals, the company has planned to invest 9.3 billion US dollars on the self-owned fleet, including expenses for 28 VLOC ordered in Asian shipyards, purchasing and conversion of 10 VLCC and a COA contract (at USD 5.8 billion) with STX in Korea for 25 years. The recent purchased five single-hull VLCC purchased from Vela International Marine will be converted to Iron Ore Ship in Asian shipyards.

CVRD has ordered and owned 16 VLOC, first delivery of which will be in 2011, and one new VLOC every quarter afterwards. Most of these vessels will be used to carry iron ore from Brazil to Asia, especially to China. CVRD will hence reduce dependence on spot charter market on these routes.

CNPC is also planning to build self-owned tanker fleet for preparation of international crude oil shipping market. In order to carry out this strategy, China Oil has already ordered two 320,000Dwt VLCC from Bohai Shipyard with another 2 VLCC as option. The first delivery will be in 2012. China Oil planned to build self-owned fleet two years ago, and expressed that the company would order two VLCC in Bohai Shipyard for delivery in 2011. Meanwhile, China Oil has controlled six VLCC via a Shipping company called Glasford in Beijing. This is the first time the Chinese Oil Company investing in VLCC until now. This clearly shows the transform from being carried by others to self-transportation in the production upstream and downstream of oil enterprises.

#### 3.1.1.2 Self-built Terminal by Cargo Owner

In August 2008 and January 2010, the Bao Steel Group purchased 8% stock share of Zhanjiang Port and 20% stock share of Yantai Port respectively, became the third largest stock holder of the two ports. Prior to this, the Bao Steel Group also invested

in the construction of iron ore terminal in the Majishan Port at Zhoushan of Zhejiang province. The company unloaded iron ore imported from Australia and Brazil at this terminal, then transfer them to the factory of the company in Shanghai. Besides, the Bao Steel Group once planed to become a shareholder of Chongqing Port owning to the facts that they are in procession of a steel process centre specialized for Chang'an Automobile Company.

With the amount of iron ore imported growing dramatically, the discharging capacity of ports in China is facing great challenge. Due to the fact that many traditional steel factories were not built besides the seashore, the iron ore imported by the steel enterprises would arrive the steel factories after many times of land transportation from discharging port, which may cause not only the expenditure on transportation, terminal handling charge and potential demmurage, but also cause the overstock of iron ore at the discharging ports resulting in proper supply of steel production. The construction or purchasing stock of terminals may ensure the transportation of steel factories, as the stable transportation is the key factor to company profits, and the logistic cost of iron ore can be reduced.

### 3.1.2 Vertical Integration of Shipping Companies

Generally regarding the shipping company, the vertical integration strategy which adopts mainly involves two aspects: To downstream development of logistics service and wharf service.

#### 3.1.2.1 The shipping company develops the logistics service

The delivery service in the true sense not only contains the entire marine transportation flow to include outside the marine transportation link's service, therefore in this case, the marine transportation industry chain's vertical relational

form becomes simple: cargo the cargo owner-shipping company.

Until now, it is a substantial number in the domestic development logistics service's transnational Shipping companies. After specially China joins WTO, the international Shipping companies speeds up to enter China's logistics market. The biggest action is naturally from the Maersk Logistics. At present, it already set up 13 subsidiary companies in China, the service has covered the Chinese nearly all priority goods currency area. Sealand Corporation as early as in January 14, 1997, has established a capitalization third party logistics company in China. Certainly, the domestic large-scale shipping company does not show weakness. COSCO, China Shipping in abundance has also established own logistics company. For the adaptation international physical distribution trend of development, the far group formulated “transformed to be as the global logistics operator by the developmental strategy from the global carrier”, the group tried hard through to develop the whole world delivery service, regarding to the adjustment, the optimized shipping industry chain, each link in value chain, and further conformity group's all related services.

It is noteworthy that although the majority of shipping enterprises in abundance establish their logistics company or related department, but their concrete strategy has the difference, some shipping company's logistics department (subsidiary company) or/and Group's other department cooperation provides many delivery services together using the Group original resources for the cargo owner, but some shipping company's logistics company is in independence in Group’s other services, with company’s other service contacting inevitably. In this kind of situation, the strategy which this enterprise uses materially has not been one kind of multiplex strategy, but non-vertical relational strategy.

### 3.1.2.2 Shipping companies participated port business

The COSCO Group put attention on the development of container terminal development since 1980s, and studied in the investment strategy of terminal investment while took part in the investment in this field. In order to cater for the ever changing international shipping market and the demand of self-development, the COSCO Group is paying increasing premium on terminal business, for now the terminal business has become an essential part of COSCO all-in-one and multi-function international transportation strategy and achieved reward and scale.

So far, the COSCO is in procession of 34 terminals covering Ports in Hongkong, Shanghai, Qingdao, Shenzhen as well as regions in the USA and ITALY, with the annual throughput reaching 13 million TEU. According to the rank list made by the world renowned Drury Lane shipping consulting company of terminal operator worldwide, COSCO has become the 8th largest container terminal operator. In the year 2002, the COSCO international prepared and organized a 5 year of 2 billion refunding syndicated loan in expending their terminal business. By the end of 2004, the China Shipping Group planned to recapitalize its subsidiary China Shipping Terminal Development Company Limited with 5 billion RMB in investment in key terminal projects abroad or domestically. The China Shipping Group cherished a plan to fulfill before 2010, which is to enhance its joint venture terminal container throughput from 2.5 million-3million TEU to 10 million TEU.

The main styles of shipping companies' investment on terminals are as following:

First, shipping companies explore and purchase terminal business in a single proprietorship manner, such as the Maersk-Sealand invested 200 million US dollars expanding New York/New Jersey port to build up a world-class sea terminal as main

track terminal; the Evergreen Group spent 3 billion New Taiwan dollar building up the 5# terminal at Kaohsiung port—the 3rd largest container port worldwide to ensure their main track vessels receiving favorable services than others; The OOCL Group owned 3 self-operated terminals in New York port, Vancouver and Long Beach; The China Shipping Company established its own terminal operating companies at Dalian, Lianyungang, Shanghai and Zhanjiang ports, and is expanding its business abroad.

Second, shipping company pool co-capitalization with ports in exploring terminal business, such as Maersk pooled the capital with Bremen Port in constructing the North Sea terminal; The Royal P&O Nedlloyd pooled capital with Qingdao Port Administration in Qianwan container terminal construction 2# project.

Third, shipping companies purchase stock share of ports from international port operators. The Hutchison China Trade Holdings and Singapore port Group are actively part of stock share to shipping companies, such as, The Hutchison China Trade Holdings has transferred part of stock share of Yiantian international container terminal, Hongkong international container terminal and Shanghai international container terminal to shipping companies to ensure the utilization of these ports by shipping companies. According to a statement made by the largest port in Greek Piraeus Port Administration（PRA) in February 2006, the COSCO Group has established agency there, and was planning to purchase stock share of Greek Port to develop its intermediate port in Mediterranean sea.

### 3.1.3 Vertical Integration of Shipping Services Industry

However, in the marine transportation industry chain, the port's vertical integrated strategy manifests generally for to port district logistics domain extending. The ports

usually depended upon own geographical position, the deep water condition, the loading and unloading efficiency to take the competition in the past the chip. Since the competition the present ports faced was day by day intense, the customer set a higher request to the harbor enterprise, moreover followed the port industrial park, and the logistics park. The port enterprise must usually strengthen own competition strength through the development of logistics service. Moreover, other shipping service industry is also positively developing own function. Although as a result of shipping service industry intermediary nature, it is very difficult to upstream development from constructs the fleet or carries on the trade.

## 3.2 Vertical Specialization of Enterprises in the Shipping Industrial Chain

The vertical relationship is based on the division of labor; the original vertical relationship came along through finer and finer division of labor. Lots of different business links thereby generated business connection，therefore, vertical relationship is characterized by specialization in the early days. Along with the development of various industries, the changes of economic and competition environment, enterprises carried out all kinds of strategies, such as vertical integration, vertical restraints, etc. It seems to be no boundary in the division of labor of industries. However, vertical separation also comes up recently in the development of vertical relationship; vertical specialization reappeared in some kinds of industries.

Shipping industry is exception，it also turned up that in some large enterprise groups, some business have been stripped from the original business of the vertical chain. Generally speaking, enterprises may achieve the form of vertical specialization by vertical separation and outsourcing.

### 3.2.1 Vertical Separation

Vertical separation in the shipping market generally appears as the strips of some certain link of business in some enterprise groups which have lots of business in the original vertical chain. For example, in the case of Maersk purchasing P&O, the vertical separation of P&O also showed up. Now the P&O has much clearer business and became stronger. P&O owns more than 10 wharfs and 27 container terminals in 18 countries; it already became the world leading terminal operator, and the investment in China also focused a lot on it. The port service of the group continued to rise steadily in the first half year of 2003, which had an increase of 12% above that of the corresponding period of 2002 and 7% growth rates compared with 2002. Meanwhile, the group started to sell the shipping share right of P&O. In 2005, the UK group declared to sell 25% stock rights they hold of P&O to A.P.Moller-Maersk Group, then thoroughly dropped out container shipping business. CEO of P&O Smith pointed out that the fund would be used for debts at first, and then invested in the port business subordinated which was developed rapidly, to expansion global port business， hope the strong business growth in Asia could make up for that weakness in UK and Australia and get 7% to 8% increase in yearly port business; In 1999, America Sealand sold the regular shipping liner and related 18 port business to Maersk, then vigorously developed the other port business and logistics business.

### 3.2.2 Outsourcing

An important act of enterprises to implement vertical specialization is out sourcing. Out sourcing is an effective organization method under the division and integration model. Subcontract the business which is non-core competence business and former presided by the enterprise itself to other enterprises have professional advantages, and then centralize resource to focus on structure the core competence of enterprise. Since the 80s of the 20$^{th}$ century, more and more enterprises became to adopt out sourcing. Lots of enterprises in the shipping industry strived to transfer to logistics

enterprises, which is to carry out business in the shipping chain and realize the business integration in an even wider range, but suffered from all kinds of restriction in the operation process such as resource, cost, etc. As a result, many enterprises have to subcontract the business of some links to other enterprises after realized the business integration. But the substance of out sourcing at present is gradually become alliance.

## 3.3 Vertical Restraints of Enterprises in the Shipping Industrial Chain

Vertical restraint is the choice made by enterprises between the fully internalization transaction and market transaction. Vertical restraint refers to long-term and binding contract signed by non-vertically integrated manufactures and upstream & downstream manufactures, in which evidencing retail price, sales quantity, others clauses or behavioral pattern, etc. Vertical restraints can be divided into forward constraints （the constraints on the upstream & downstream manufactures） and backward constraints（the constraints on the downstream manufactures）. Therefore the vertical constraint is a vertical relationship realized by contract. Generally speaking, the form of vertical restraint exist is that in the shipping industry chain, the implement of enterprises vertical restraints may involve prices, areas and supplies. And the behavior enterprises would adopt to realize vertical restraints includes:

### 3.3.1 The cargo owner charters the fleet from the same shipping company to sign the exclusive contract or the low price contract for a long time

As Bao Steel's annual development report pointed out that in 2004 the Baoshan Steel Corporation Group successively signed the long-term transportation agreement with COSCO, MOL and other domestic and foreign well-known ship owners or the strategic partner, guaranteeing the long-term stability of the resources transportation. On February 8, 2006, Sinopec and COSCO officially signed crude oil transportation

cooperation in terms of long-term agreement in Beijing, thus it had determined in the long-term cooperation to fix the fluctuation of the market transportation charges and the adjustment mechanism, locked the year freight volume which both sides cooperate, and determined in the future along with the ample capacity. However, it will momentarily adjust transportation amount growth way.

### 3.3.2 The shipping company rents the wharf or other facilities for a long time

Forms this kind vertical relationship is as a result of the local marine transportation related to policy restraint. Like the present Japanese port system, the foreign shipping company can only rent the wharf, without right to manage wharf services and handling operation. The US and Australia port authority do not directly manages the wharf and handling operation, despite the port bureau manages the quay berth hiring for the loading and unloading company or the shipping company, signing renting agreement of management legally. The companies involved in the wharf operation business have no right to construct the wharf independently. On December 10, 2004, Yangming Lines signed an agreement with the American West-coast, Port of the Tacoma to rent NO.7D wharf of the port.

### 3.3.3 The transnational port enterprises and the shipping company form the alliance, while the shipping company, the cargo owner, and the logistics enterprise form the alliance

The third party logistics is a kind of typical strategic alliance form itself. The alliance is typical one taking the contract as the method longitudinal relational strategy. COSCO Logistics in its development strategy pointed out: COSCO must transform from “transaction relationship” to “the partnership”. Regarding the logistics enterprise, with the customer establishment mutually beneficial interaction and the long-term cooperation partnership, in fact is forms to other competitors which

entered the barrier. Not only the shipping company is seeking the alliance positively, the port enterprise positively is similarly also seeking the alliance.

## 3.4 The Analysis on Vertical Relationship of Different Shipping Markets

When studying shipping market, we usually divide it into several different types. By the way of shipping, it can be divided into liner market, tramp market and purpose designed ship market. The business links of main trading parts on the shipping industrial chain differ in the three markets. By freight type, the market can be divided as dry bulk cargo market, tanker market and container market. The vertical relationships on industrial lines also differ in those markets.

### 3.4.1 Vertical Relationships in the Tanker Market

Many cargo owners have built their own fleets, docks and agency, thus they can hire their own agents as chartering brokers. Cargo owners tend to take property right as their vertical relationship strategy. To guarantee their capital, oil tanker enterprises usually prefer time charter market and extended and stable contracts of carriage. Extended contracts are often negotiated between cargo owner and ship owner directly without broker. We can conclude that oil tanker enterprises tend to achieve vertical bound by contracts.

### 3.4.2 Vertical Relationships in the Dry Bulk Market

The same as oil tanker transport, giant cargo owners prefer property right integration and operate other business independently while the carrier taking active part in building and investment of ports and docks. However, the major vertical relations and behaviors are still vertically bonded by contracts.

### 3.4.3 Vertical Relationships in the Container Market

Container shipping market is related to many auxiliaries, which not only includes port agents and freight forwarders, but also its specific auxiliaries like container chartering. Besides, as the container shipping booms, the profit space of these auxiliaries is shrinking. As a result, they start seeking fortune on vertical chains. Under the increasing pressure of fierce competition, ports and docks operators are constantly seeking opportunities of development. Many giant international port enterprises come into alliance with international container enterprises, which are strategic alliance by contracts. Meanwhile, port enterprises are all actively developing logistics business in other harbor district on land.

### 3.5 Summary

The development of anything is subject to the certain regularity, as well as the vertical relationships between enterprises in the shipping industry chain. The change of some factors is dominated by external factors, relatively stable, while some factors are decided by all links within the industry and the characteristics of enterprises business, changing in relatively active.

Based on this characteristic, the following chapters will be divided into exogenous factors affecting factors and endogenous factors. Exogenous factors include: lifecycle of shipping industrial chain and national industry policy. The other hand, exogenous factors include: horizontal market structure, informationization, switching costs of vertical relationships and Barriers to Vertical Entry.

## 4. Exogenous Factors of Vertical Relationships of Enterprises in the Shipping Industrial Chain

### 4.1 Lifecycle of International Shipping Industry

With the expectation of industry recession or prosperity, industrial chain on profit

margins will change, thus, enterprises can take advantage of the choice of longitudinal relationship to enlarge or reduce their productivity, and lower the risk of volatility dispersion industry. From the description by Chandler (1997) and other scholars on the history of industrial development, industrial historic development stage is one of the most obvious factors in the choice of vertical relationship of enterprise.

While industrial development phase of the full content can be led by using the concept of industrial life cycle. Schumpeter proposed the concept of industrial life cycle in 1942. He thought the early age of industry is growing and expanding, then comes into mature stage, and finally into recession. Industrial development can be divided into three stages: emerging industries, industry into maturation and declining industries. To analyze the life cycle of marine industry on longitudinal relationship, at first, we need to verify the existence of shipping industry lifecycle and then analyze its characteristics.

### 4.1.1 Cyclic Analysis of International Shipping Industry

Because of its specific characteristics, Maritime industry will not wither away when completing but rather into the next cycle. Sea transportation is the derived demand from international trade, so the effect of economic cycles in the world, there is a period of prosperity. Economic cycle is a wave based on a global or a country's overall economic activity, a cycle including resuscitation, expansion, fall, recession four stages. Recovery is the next round of the prelude of periodic expansion phase, or you can simply divided into expansion and recession in two stages.

Looking back on the world economic development in the last century, 1960-1970 world economy develops rapidly in the world based on the heavy industry and

implementation of the energy of petroleum-base. The broke out of oil crisis in 1973 caused a severe economic crisis. Western economies into "stagflation" period with the traditional industrial production capacity in excess, the slowdown in economic growth, inflation dramatically intensified and oil prices raising dramatically, the economic crisis burst in 1980 to 1982. World economy began to moderate revival in 1983, economic development into the low speed of the period. From 1992, the world economy remains a faster growth. Europe and the major capitalist countries enhance the control in economic development, with the characteristics of “the smoother the recession to shorten, extend the period of expansion”. However, the Asian financial crisis in 1998 and the ending of new economic era, the world economy has experienced two fluctuations.

World economy on the world's maritime trading volumes is notable, basically the more rapid growth of the world economy, the more rapid growth of maritime trade, vice versa. furthermore, the world economy on maritime trade volumes have a zoom function, which is the world's maritime trading volume growth rate changes are much faster than the growth rate in the world economy. The world economy determines the shipping of long-period and the relationship between supply and demand determines shipping of short-period. The shipping market totally experienced 12 cycles, each cycle average 7 years from1869 until now, and this can be divided into 4 phases: downturn period, convalescence, prosperity and decline in the period. It is another fact that since the length of the maritime cycle may be invariable due to other aspects of transport market development cycle.

### 4.1.2 Vertical Relationship Strategy in Different Shipping Lifecycle

From the analysis above we can see that the development of shipping industry has a cyclical characteristic, and its life cycle is a long-term cyclical volatility. After the

cyclical volatility, the industry will enter a new development stage. So changes in demand function of any main business can be assumed as: qt=f(t)D(pt),t=1,2,3,……, ∞>f(t) ≥1.

In this equation, qt is the enterprises demand in shipping industry chain during period t. pt is the unit price of services Enterprises provided during period t. f (t) is a function that indicates cyclical growth.

The life cycle of shipping industry can be divided into four phases: steady ebb period, industrial growth period, steady climax period and industrial recession period. The period cycles, and goes through the life cycle at a new starting point in size and morphology to the next stage (industry spiral).

Therefore, if we take D(p) as the demand curve of the first phase, then f(t) is the absolute growth rate of demand relative to the first phase on the same price level, f'(t) is the growth rate compared with the same period of the previous period, f "(t) is the change rate of f'(t). In every phase, there exist the following relationships:

1. Industrial growth period: market is at the turning point of the rising economy, and there is maximum growth rate year on year. f'max (t), f "(t) =0.
2. Steady climax period: it has the largest cumulative growth. fmax (t), f (t)=0.
3. Industrial recession period: market is at the turning point of the recession economy, and there is maximum decline rate year on year. f'min (t), f "(t) =0.
4. Steady ebb period: it has the largest cumulative decline. fmin (t), f (t)=0.

Now, according to the analysis of collusion between the upstream and downstream industry chain under different life cycle we can see the changes of vertical relationships in industry chain. Consider the upstream enterprise U and downstream enterprise D, U services to D, so we let U be upstream industry 1; D provides sales to upstream and downstream sectors in the industry chain, so we let D be downstream industry 2.

We assume that there are many enterprises in industry 1 and industry 2, enterprise U or D is the market information recipient, and we don't consider the horizontal expansion and monopolistic factors which are called scale economy factors.

Expansion of industrial demand is transmitted from downstream to upstream, that is, industry 2 first enters the industry business cycle, and then industry 2 does.
The demand function of enterprise D is: qtD=fD(t)DD(ptD),t=1,2,3,……, ∞>fD(t) ≥1. The demand function of enterprise U is: qtU=fU(t)DU(ptU),t=1,2,3,……, ∞>fU(t) ≥1.The profit function of enterprise D during period t is :∏t+1D=fD(t) ∏tD. The profit function of enterprise U during period t is: ∏t+1U=fU(t) ∏tU.
Model assumptions are as follows:

(1) The life cycle of the shipping industry is divided into n time periods, with t=1, 2, 3 ... ... n, when t=1 the industry enters the life cycle.
(2) Industry 2 first enters the business cycle to industry 1, business cycles of enterprise D ahead enterprise U a period.
(3) The two enterprises faced the same cyclical fluctuation function in market demand.

Suppose enterprise U and enterprise D reached an agreement. They reach agreement on the distribution of profits (conspiracy) from the contract date, and the two enterprises share the joint profits as a consortium. We assume that the profit of enterprise D is equal to the profit of enterprise U, that is, ∏D=∏U. Contract requires the realization of profits as follows: enterprise U first provide services to enterprise D, in the next period enterprise D informs the market price and the resulting profits to enterprise U, and pays income to enterprise D according to the contract. It is required that enterprise U gets the same profit as enterprise D. So according to the contract there is: ∏t+1U=∏tD.

In period k, enterprise U only knows the market price of the previous period due to asymmetric information. The enterprise D informs enterprise U according to the lower one of the previous market prices and the current market price, and U for clearing and businesses. It does not want enterprise U get higher profit than ∏kD.

From the analysis above we know that the initiative of contract lies in the hands of enterprise D.

In the kth period of the industry decline cycle, enterprise D faces decrease of market price or trade volume, and it may delay or deduce the payment of enterprise U, and reports enterprise U more pessimistic data than the market's profit. Here we can still reasonably assume that the market decline rate is proportional to the default level of enterprise D.

In the steady climax period and steady ebb period, when the condition of $|\Phi| \leq \varepsilon$ is relatively easy to satisfy, the market volatility is small, and the market is easy to reach agreement. As shown in Figure 4-1:

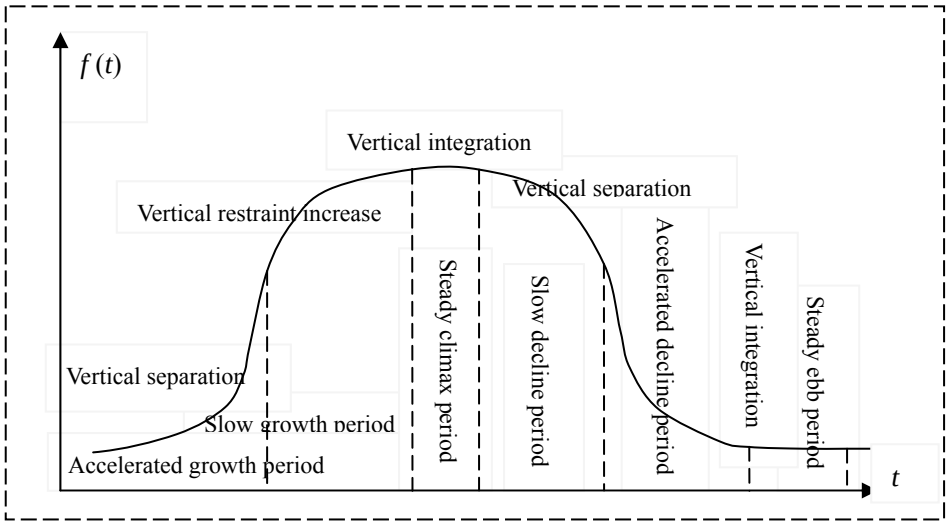



Figure 4-1: Diagram of change relationship between Shipping industry life cycle and form of vertical relationship

In the initial stage, vertical integration is the main enterprise feature. When the industry entered the growth stage, enterprise vertical function separates. When it grows slowly close to the boom stage, vertical conspiracy increases, and enterprise enters the most prosperous steady climax period, vertical integration is the main enterprise feature. When the industry enters the recession stage, enterprise vertical function separates. With the slowdown of industrial recession, enterprise begins to consider vertical restraints, vertical integration. When the recession enters the steady ebb period, vertical integration will bring more profit, which is the main feature of the current period.

### 4.1.3 Initiative of Vertical Relationship in Different Shipping Lifecycle

Different enterprises in maritime industry chain will choose different vertical relations, thus, a disputable question arises which is which sides more favorable, the owner of enterprises active integration or shipping companies or ports enterprise vertical integration more favorable.

From the Hart's remaining theory for expansion, we need to put more focus on the different maritime industry lifecycle and the industrial chain businesses on the other link on the chain into the preferences in discussing the property rights of enterprise. Hart discusses vertical relationship mainly from assets complementarities. Hart (1995) pointed out in the application of the model that: industry is too small to provide specialized services for "merged into" early development stage. However, as the industry's expansion, it will eventually be subject to a specialized supplier. It is the best to merge when only few competitors in the industry as the demand and supply of complementarities are very large. But when the market reaches sufficient to support a lot of buyers and suppliers, any one individual buyers and providers of the complementarities become very small, which means that non-merge is the best.

In General, early in the development of industry, the technology leader takes initiative in integrated vertical relations, however, in the shipping industry such as large multinational shipping companies, port enterprises, technology leader is well-funded large-scale enterprises, and generally these enterprises have the initiative for the integration of longitudinal relationship, in other words, these enterprises at this stage is in more preference to vertical integration or vertical restraints.

When the industry comes into maturity, the technical, organizational, production costs has been relatively transparent, thus, technology is no longer a profitable factor, and on the contrary, the information is vital for shippers, stable supply of large shippers is more likely to implement vertical integration.

## 4.2 National Shipping Industry Policy

### 4.2.1 The Stage of Domestic Market Cultivation

From the mid-1950s to the initial period of 1980s, our shipping industry was in an initial stage of development. Our shipping industry were determined by the special background, we call this period is a developing stage of the life cycle of Chinese Shipping Industry. All policies developed from scratch and the main goal of these policies is cultivating our shipping industry. Not all marine transportation service has formed a perfect standardized system, which means the marine transportation industry's service was dividing with the development of industry, the auxiliary maritime industry, port Services and so on were also in the culturing stage. The government set up specialized shipping companies (such as COSCO), specialized freight forwarding company(Sinotrans established in 1955 also known outside of China National Chartering Corporation, were responsible for arranging international transportation, CIQ, international railway, import and export customs declaration, inspection, transfer, distribution to the acceptance of goods became a comprehensive

international freight forwarding, regional special port service operating unit (Port Authority), specialized shipping agency (external generation) are in the monopoly in every market. The vertical relationships were vertical specialized, in the angle of vertical relations.

### 4.2.2 Transformation of Shipping Management System and The Reduction of Vertical Barrier

After the 1980s, an important goal of our nation's shipping policy was changing the operating mechanism of the shipping companies, separating the government administration from enterprise management, separating the administration function from the management function.

In 1984, the State Council issued "on the reform of Chinese international maritime transport management notice" marked the beginning of the process of international shipping system. The main content was separating the government administration from enterprise management, administrating simplification and delegating downward of authority, encouraging competition, encouraging domestic enterprises to enter international market shipping. Under the impetus of the notice, Chinese international shipping industry and the exclusive monopoly of the old rigid system began a considerable loosening and changes in the shipping business gradually developed into an independent economic entity, and there were a number of operating situation of Chinese foreign trade shipping. From this year, the Chinese freight forwarding enterprises from a business into two operations (Sinotrans and COSCO). Freight forwarding and shipping agency under the provisions can be concurrently, the original in the China Ocean Shipping Agency began operating a small number of freight forwarding business, followed by COSCO has also established a major international ocean freight forwarding business sector, then Chase International

Transport Co., Ltd. was set up. After 1988, appeared a large number of freight forwarding. November 10, 1992, the State Council issued “on the further reform of the international maritime transport management notice” it carried on a series of deep level important reforms to Chinese international shipping industry, it made some provisions to the market for various services: Open freight forwarding, shipping agency, Allow multi-management, Encourage competition, Improve service quality, Cargo owners and shipping companies have free right to choose loans credit and ship credit, Carrier and cargo owner can establish a direct supporting relationship without and departments intervention; Fully mobilize the enthusiasm develops international marine transportation enterprise, Enterprise(Including large enterprise groups and professional import and export companies) can establish shipping companies and engage in international maritime transportation business; According to “state ownership of industrial enterprises transform their operating mechanism Ordinance” expand business ownership of Shipping companies, the shipping companies can decide route management, ship configuration, capacity change, ships renewal independently; Ministry of Communications, Ministry of Foreign Trade use macro and law, economy macro-manage international marine transportation boating company and goods generation and ship generation, and develop a fair and reasonable eligibility criteria and approval procedures for operation, and provide a fair competitive market environment; Enterprise of Ministry of Communications and Enterprise should give full play to their strengths and to take equity participation and other forms of joint venture or joint development of horizontal.

These operate mode about shipping industry, the relevant provisions of business competition make the vertical division of labor more clearly, make the industry chain gradually formed, and all aspects of the market in the industry chain gradually open up, reduce the access restrictions of market, the quantity of maritime auxiliary

enterprises and shipping industry with various nature and scale quickly increased, The traditional single-business enterprises began to expand its business scope. Enterprises can choose vertical trading enterprises, from the initial stage of specialization began to appear a certain degree of integration.

# 5. Endogenous Factors of Vertical Relationships of Enterprises in the Shipping Industrial Chain

## 5.1 Informationization

### 5.1.1 Industry-based informationization and corporation-based informationization

Informationization could be classified into: informationization in corporation, in industry, and in domestic economy or to say, in society. Among which,corporation-based informationization construes the basis for industrial informationization, which reflects current status of corporation informationization at the meantime.

Distinct from others, Industry-based informationization takes an industrial perspective, which affects approach of implementation, ratio of informationization on optimum structure and resource distribution.

### 5.1.2 Industry-based informationization reshaped industrial chain

Information technology performs on maritime industry in the following aspects: First, shipping industry, such as advanced navigation system; Second, navigation , such as: electronic charts, route design, arrival at port and etc; Third, E-business in maritime transportation: information gathering, customer information analysis, corporation resources analysis, and controlling business flow, logistics, information flow and capital flow among customers, corporation and third-party service provider

to achieve rapid response to market at the lowest cost .Hence industry-based informationization in the maritime transportations illustrates new features:

#### 5.1.2.1 Shortened and visualized trading session

The core of production in information society lies in shortening distances and reducing processes (between production and consumption), in this way, information society obtains greater values by staying close to target. E-shipping industry advances in Shortened and visualized trading session, therefore, unnecessary secondary and triad freight agency could be avoided, thus, transaction costs less while more personalized services could be provided.

#### 5.1.2.2 Flattened inter working structure

In E-shipping industry, communication will no longer be restrained by space and time. Sale, design, transportation among departments will proceed smoothly. Meanwhile, boundary of departments becomes fuzzy while management extends. Therefore, management network turns from Pyramid to flat, in which, services department performs as the longitude and manufacture, market and administrative as the latitude. What flattened network brings in are reduced management cost and uplifted response to customer demand and market.

#### 5.1.2.3 New created values by information

In E-shipping industry, information takes the initiative in gathering, organization, selection, synthesis and assignment to create new values. Corporation increases value in 3 stages by taking advantages of information: The first stage is management visualization; the second -- reflectivity: and third -- establishment of new alliance. Industrial informationization reshapes transaction operation of the entire industrial chain, provides condition for virtual alliance to form longitudinal network, and

facilitates emergence of the virtual alliance. Meanwhile it changes corporation's service range to achieve reconstruction of corporation relation on longitudinal chain.

### 5.1.3 Analysis on Impact of Corporation-based Informationization

After analyzing on business application of information technology on enterprise, we can clearly identify its relationship behavior in vertical chain. However, there are two opposed views on how information technology affects the current boundaries: one view of information technology and network development reduces market transaction costs, companies tend to be small and specialized, that is, enterprises border reduced (Malone, 1987); The other view is that the development of information technology and networks so that enterprises tend to scale and integration, the boundary is growing (Harasim, 1993; Konsynski and Karimi, 1993).

Information technology is changing vertical relationships through the impact of cost. IT reduces transaction costs and external costs which tends to make business specialization; reduce internal coordination costs and production costs which makes companies more inclined to integration, the final act on the impact of vertical relations depends on the comparison situation of these costs affect the business.

The cost of information technology influenced the decision process, other relevant organizations also have an effect characteristic. The main features of these organizations, including structural features, cultural features, technical features, and information processing characteristics.

#### 5.1.3.1 Information technology impact on production costs

High and low production costs in shipping industry chain are mainly determined by the quantity of labor amount of funds. With the extensive application of information

techniques, the required quantity of these two elements is in decreasing. For example, with the using of EDI system in shipping-related businesses, the original large number of complex paper documents changes to electronic documents, the system will not only reduces the demand for workers, but also saves the coordination and communication among staff.

We can draw the following conclusion that: 1: the invention and application of information technology can provide services to reduce the required number of funds and labor, so the relative enterprises are able to reduce production costs.

#### 5.1.3.2 Information Technology on the impact of transaction costs

Information technology on transaction costs is to achieve on information asymmetry, degree of asset specificity and opportunistic behavior. Web-based e-commerce development can make business transactions, information search costs reduce, and thus weaken asymmetric information and incomplete information. However, exclusion has uncertain affection. Many transactions information and information technology will not be achieved in IT platform within more enterprises, especially in the tanker and the bulk market. Many shippers and transportation companies often signed long-term transportation contracts, and rate and freight are generally confidential. In the container shipping market, information technology, especially the use of network technology, can usually achieve synchronization of information sharing and use, thereby reducing the exclusion.

Meanwhile, the use of information technology can master trading and trading history of the seller and the buyer's credit status, performance and other detailed understanding. In this way, buyers and sellers can select the most reliable transactions, thereby reducing the transaction process and occurrence of

opportunistic behavior, to ensure smooth transactions.

It can be concluded that 2: In the container market, the application of information technology can reduce the degree of asset specificity and information asymmetry, reducing the incidence of opportunistic behavior, thus reducing transaction costs. In the tanker and dry bulk cargo transport market, the role of the reduction of transaction costs is less obvious.

#### 5.1.3.3 Information Technology on the impact of coordination costs

When a shipping business is becoming an internal one, it will cause agency costs and decision information costs. The agency cost depends on the monitoring and reporting mechanism for the cost and efficiency, And now many of the application of information technology, makes timely and convenient way to track and analyze the behavior of agents, they are able to reduce agency costs. Decision-making information cost, the internal information management system will improve the efficiency of business process information and improve the quality of communication between various departments to improve or maintain the quality of information and reduce business decisions troubles, thus reducing coordination costs.

This conclusion 3: Information technology can reduce the enterprise's internal coordination costs.

#### 5.1.3.4 Characteristics of the organizational structure

The main features of the organizational structure of enterprises have a degree of professional division, degree of organization’s layer level, degree of formalization and centralization.

Organizational development is always accompanied by specialization, and with continuous improvement of organization hierarchical level, a lot of coordination and communication needs, greatly increased the costs of enterprises. Business specialization, and management of the higher hierarchical levels, coordination and communication work becomes more complex, larger workload, so the application of information technology from the law of increasing returns to see the cost savings has the more obvious effects. More and more studies suggest that under Internet-based information technology environment, the decentralized organizational structure allows application of information technology to bring better results, mainly in two aspects:

First, with the utilization of information technology managers at all levels, it can quickly and accurately obtain and analyze market information, improving the quality and efficiency of decision-making.

Second, with the infrastructure support of the next generation information, companies' decision-making departments and decision makers share and communicate the same information which improves greatly. (Dewett and Jones, 2001). Obviously, these two aspects are related to production cost and transaction cost savings are closely related.

Conclusion from the above analysis, 4: degree of specialization of enterprises, organizations, hierarchical level, degree of formalization and decentralization, the degree of information technology can reduce production costs and transaction costs.

#### 5.1.3.5 Characteristics of information processing

Characteristics of business information processing are reflected in the dependence

extent and how much information can be encoded. Dependence on corporate information actually means that source of company's profits. Shipping industry, maritime services, in particular, shipping companies, brokerage companies have a relatively high dependence on information, shippers and port enterprises have low reliance.

Informationization can be coded is another application of information technology. Encodes of information and knowledge are often hidden in corporate practices and behavior of employees which is time-dependent accumulation and formation. For example, a corporate culture which is a typical example of tacit knowledge; another example, both the staff's intuition, it relies on employees long working experience, through "learning by doing" to form a closer investigation. Encodes of tacit knowledge is difficult to pass in the network, since it can only be made through long experience, face to face observation and learning in order to be delivered and accepted. When a main use of company knowledge is such knowledge, the role of information technology is not so obvious.

The resulting Conclusion 5: When the business dependence on information and information can be encoded at higher levels, information technology can reduce production costs consequently. Enterprise Informationization in maritime industry chain mainly affects vertical relationship between the various corporate. After the adoption of information technology, to expand its borders or may reduce its borders, actual resulting in information technology on business. In general, higher levels and large-scale shipping companies, such as port companies, tend to expand the vertical boundary, and the small maritime auxiliary enterprises will choose to reduce vertical border, but expand further specialization.

## 5.2 Switching Costs of Vertical Relationships

### 5.2.1 Definition of the Switching Costs of Vertical Relationships

The switching costs of vertical structure are possible costs undertaken by enterprises when switching the form of vertical relationships in the shipping industrial chain. They refer to the difference between the enterprises' original business operating costs, processing costs and new establishment and operating costs in switching the vertical relationships in the shipping industrial chain. The costs affect the decision-making process of the enterprise of whether to switch vertically or not. The switching costs of vertical structure include two aspects: transaction costs and switching technologies costs. For enterprises, the smaller the switching costs, the greater probability it has to switch the vertical relationships.

### 5.2.2 Comparison of Switching Costs of Vertical Relationships

| Types | Cost | Suitability |
|---|---|---|
| Cargo Owner to Shipping Company | Medium | Giant State-owned Cargo Owners |
| Shipping Company to Cargo Owner | Medium | Giant State-owned Shipping Companies |
| Cargo Owner to Shipping Services Industry | Very Low | Medium and Small Cargo Owners |
| Shipping Services Industry to Cargo Owner | Very High | Giant Shipping Services Companies |
| Shipping Company to Shipping Services Industry | Low | Majority of Shipping Companies |
| Shipping Services Industry to Shipping Company | High | Minority of Shipping Services Companies |

Table 5-1 Comparison of Switching Costs of Vertical Relationships

## 5.3 Barriers to Vertical Entry

Barrier to entry is an enterprise which controls the industry relative to the potential of existing enterprises into business advantages. Barriers to entry are generally divided into static barriers to entry and strategic barriers to entry (liquid magic wall). The former includes product differentiation, absolute cost advantages and scale advantages. The latter refers to block other actions taken by enterprises to enter the market, including increasing competition rivals costs, increase alternative brand, pre-production and so on.

### 5.3.1 Structural Barriers to Vertical Entry

Structural barriers to vertical entry: business assets, fixed assets and intangible assets. Physical capital and intangible capital can help enterprises create entry barriers. In shipping industry, the vertical static barriers to entry include: fixed and intangible costs of enterprises.

#### 5.3.1.1 Fixed Costs Barriers to Entry

Fixed entry costs imply that the size of a minimum capital level. In Shipping industry, the fixed costs in the end from high to the low : ship financing costs, port facilities, warehouses and other facilities, agency business, so the highest vertical barriers to entry are shipping companies, port companies, followed by a physical device supporting industry, the smallest is the intermediary agency.

#### 5.3.1.2 Intangible Costs Barriers to Entry

Particularly popular in the logistics concept, the owner pays more and more attention to the overall quality of service, combined with maritime business which is an experience invisible producers. Experience products are products after the inspection.

Incumbent firm's intangible assets such as the brand, and the owner of relationship management into the enterprise on the longitudinal effects of the structural barriers which is greater than the barriers in fixed assets.

#### 5.3.1.3 The visit of every segments barriers in the chain

The total asset of Shipping and port industry is large, but the total is well known that the shipping services sector is much smaller than the total asset size. Therefore, the vertical barrier to entry shipping and port industry is higher, while the majority of maritime services is small. It does not need the number of physical assets, lower barriers to entry.

### 5.3.2 Strategic Barriers to Vertical Entry

The maritime industry strategic entry barriers can be called vertical strategic entry barriers. These strategies include:

#### 5.3.2.1 Horizontal Expansion

The larger horizontal enterprise, the higher the effect of strategic entry barriers. This is most obvious in the shipping business. Especially in recent years, shipping companies continue to buy new ships, expanded their operational capabilities, but also mergers other shipping companies to expand their scale. Improve the shipping market access barriers which make the other companies hard to compete with. Port companies have the same approach, especially large multinational port group, expanding the scope of their investments and expand port capacity.

#### 5.3.2.2 Increase the Cost of Competitors

Another business strategy to prevent vertical access is to improve the cost of competitors. On the one hand, business and other segments of the shipping industry

chain, the companies signed a cooperation agreement for the downstream business lower than the market prices of other enterprises, but also enjoy the lower price of the upstream business. Competitors will face a problem, such as it is so easy for shipping companies to put their ships into their own co-terminal position of priority services and rival the competitor's ships into the disadvantage.

#### 5.3.2.3 Brand Line Expansion

Another way is to restrict the needs of new entry enterprises. The way is before the new enterprises to enter into a proliferation of brands, the current enterprises expand their own products to occupy space for existing products, not to give new entrants an opportunity to exploit. New entrants to the enterprise are not sold to achieve break-even production.

#### 5.3.2.4 Structural Reputation Barriers to Entry

Select vertical business partner is very concerned about corporate reputation. Some large multinational companies can take advantage of other markets in the host country's reputation to win new market partners trust. Vertical barriers to entry within the higher part of the vertical relationship have been chosen the greater the initiative, whereas the anti-is. The lower vertical barriers to entry, the more vulnerable to other links on the integration of enterprises to enter the property, while other sectors with high barriers to companies wishing to enter, it will be more use of vertical contracts in the form of realization. Overall, in the industry, the higher barriers to entry in the vertical, resulted in the lower the degree of vertical integration and there will be more vertical restraints and vertical specialization therefore.

## 6. Decision-making Model of Vertical Relationships and Empirical Analysis of Sinochem International

## 6.1 Trend Analysis of Vertical Relationships in the Shipping Industrial Chain

| Factors | Dynamic Trends | Trends of Vertical Relationship |
|---|---|---|
| Lifecycle of Shipping Industry | Recession | Vertical Integration |
| National Shipping Policy | Open and Free | Flexible and Diverse |
| Informationization | Accelerating | Virtual Alliance and Vertical Constraints |
| Vertical Switching Costs | Increasing | Vertical Separation |
| Barriers to Vertical Entry | Increasing | Weak Vertical Integration regarding to Small Companies |

Table 6-1 Trend Analysis of Vertical Relationships in the Shipping Industrial Chain

Table 6-1 summarizes the dynamic trends of influential factors and the resulting changes in the trends of enterprises' vertical relations in the shipping industry chain. Among them, no switching costs of vertical relationships are listed, because the factors are mainly suitable specific enterprises. That's why the overall trend analysis does not include this factor. Seen from the analysis of how trends of different factors affect the trend of vertical relationships, shipping companies will have the biggest initiative to select the vertical relationships in the industrial chain, among which the vertical relationship behaviors will account for the leading factors. While the paper holds the view that, after the wave of horizontal mergers and acquisitions, large-scale shipping companies' strategic focus will shift to vertical integration of industrial chain, during which, the property right -oriented control will be given priority to. That is to say shipping companies' recent investment behaviors in port construction, involving terminal operations, development of land-based logistics (Ancillary service

section) will continue. Meanwhile, shipping companies and cargo owners will achieve binding by forming alliances. On the other hand, middle-sized and relatively small shipping companies will seek more vertical chain extension through new forms of coalition as virtual alliances.

## 6.2 Framework of the Decision-making Model of Vertical Relationships

### 6.2.1 Adaptive Decision-making Mechanism of Vertical Relationships

The choice of the enterprise in vertical strategic market in the shipping industrial chain depends on the endogenous variables, exogenous variables and other factors that decide the vertical relationships. By and large, the correlation between the various element and strategic market, trading strategies follows the adaptive decision-making mechanism.

As an adaptive system, in order to response to unpredictable environment, a enterprise should make its action substantial in flexibility. Flexibility contains an enterprise's coordinating abilities, namely allocating resources accurately and rapidly. Such strategies are called adaptive strategies. Adaptive strategies do not have a clear form of strategy, and with changes in the environment and the market, they pick up different combinations. As far as the content is concerned, adaptive strategies include all forms of strategies. Enterprises' decision-making of vertical transaction in the shipping industrial chain includes: leading strategy, associate leading strategy, portfolio of strategic channels, and the market decision-making.

### 6.2.2 Decision-making Process of Vertical Relationships

| Decision-making Factors | | | Adaptive Strategy |
|---|---|---|---|
| Exogenous Factors | Lifecycle of Shipping Industry | Growth<br>Climax<br>Decrease<br>Recession | Leading Strategy and Associate Leading Strategy: |
| | National Shipping Policy | Open<br>Restricted | Vertical Integration |
| Endogenous Factors | Informationization | Industry-high<br>Industry-low<br>Enterprise-high<br>Enterprise-low | Investment to Build<br>Long-period Contract |
| | Vertical Switching Costs | High<br>Medium<br>Low | Vertical Alliance<br>Vertical Separation |
| | Barriers to Vertical Entry | High<br>Medium<br>Low | Outsourcing |

Table 6-2 Decision-making Process of Vertical Relationships

## 6.3 Empirical Analysis of Sinochem International

### 6.3.1 Introduction of Sinochem International

In December 1998, Sinochem International Corporation, which was derived from the business of rubber, plastics, chemical products & logistics and transportation operations, was founded in Beijing, and it publicly issues A share 120 million at Shanghai Stock Exchange, financing 946 million Yuan in the next December. In March 2000, Sinochem International Corporation was listed.

Be marketing operation-oriented, Sinochem International Corporation conducted strategically southern move with its headquarter to Pudong Shanghai in July 2001, as to address the expectations of major customers and the petrochemical markets as well. For six years, the company has been pursuing the development strategies of extending to industrial upstream and downstream; also, the company endeavors on its transformation from a foreign trade agent company to an integrated solution supplier with sound marketing capability and stable profitability. With the continuous advancement of the four core operating sectors: rubber, chemical engineering, metallurgy energy, chemical logistics, the company has customers over 100 countries and regions in the world, and the sales revenue has reached 1.9 billion USD.

### 6.3.2 Introduction of Business of Sinochem Shipping

Sinochem Shipping Co., Ltd.(Hainan) is a subsidiary of Sinochem International Corporation. Founded in 1994, it is now the largest business for liquid chemical shipping at home. It mainly deals in far-and near-sea international navigation routes and liquid chemical transport and ship management along the coastline of China. It has rich experience in ship operation and management for liquid chemicals and boasts a professional management team. Currently the company has 31 DWT 1000-14000 IMO II and III professional liquid chemical ships, with a total shipping capacity of over 200000 DWT; and another 12 ships are still under construction. During its long years of business, it has built a close cooperative relationship with big petrochemical corporations at home and abroad; it has undertaken the transport of various kinds of finished oil products, liquid chemicals, acids, animal and plant oil, edible oil and other special products, with its navigation routes covering Europe, America, Middle East and the Indian Ocean.

Based on the Stoltchem Ship Management (Shanghai) Ltd. jointly founded with Shanghai Sinochem-Stolt Shipping Ltd., Sinochem Shipping Co., Ltd.(Hainan) has established a "safety management system mechanism" which can meet the international standards and can be constantly improved. It has obtained the Safety Management Certificate (SMC) and is capable of the operation and management of oil tankers, bulk cargo ships, chemical ships and liquefied gas carriers of various tones. It has also been awarded the International Ship Safety Management Certificate in China and Panama, and the recognition of DNV ISO 9001--2000 quality management system. Its ship management has won the recognition of the International Safety Management Code (ISMC), big petroleum companies like SHELL and BP, and Europe Chemical Distribution Institution (CDI).

Sep 2005 saw the official establishment of Shanghai Sinochem-Stolt Shipping Ltd., jointly invested by Sinochem Shipping Co., Ltd.(Hainan) and Stolt Shipping Group. As one of the five shipping joint ventures approved by the Ministry of Communications for chemical distribution and transport (CDT) between ports inside China, Sinochem-Stolt, with its top-notch service, has become the logistic partner with internationally renowned petrochemical enterprises, such as Secco Shanghai, BASF Shanghai, Shell Petrochemicals Huizhou and Yangtse-BASF Nanjing.

### 6.3.3 Decision-making Analysis of Vertical Relationship of Sinochem Shipping

<table>
<tr><td colspan="3">Decision-making Factors</td><td>Adaptive Strategy</td></tr>
<tr><td rowspan="2">Exogenous Factors</td><td>Lifecycle of Shipping Industry</td><td>Growth<br>Climax<br>Decrease<br>Recession</td><td>Leading Strategy and Associate Leading Strategy:</td></tr>
<tr><td>National Shipping Policy</td><td>Open<br>Restricted</td><td rowspan="4">Vertical Integration<br><br>Investment to Build<br><br>Long-period Contract<br><br>Vertical Alliance<br><br>Vertical Separation<br><br>Outsourcing</td></tr>
<tr><td rowspan="3">Endogenous Factors</td><td>Informationization</td><td>Industry-high<br>Industry-low<br>Enterprise-high<br>Enterprise-low</td></tr>
<tr><td>Vertical Switching Costs</td><td>High<br>Medium<br>Low</td></tr>
<tr><td>Barriers to Vertical Entry</td><td>High<br>Medium<br>Low</td></tr>
</table>

Table 6-3 Decision-making Analysis of Vertical Relationship of Sinochem Shipping

## 7. Conclusion

This paper started from the analysis of status quo in shipping enterprises along the industrial chain, summed up the features of enterprises' vertical relationships in shipping industrial chain. According to these features and the original theory on vertical relationships combined with the specialty of shipping industrial chain, we have drawn two external causes and four internal causes ,analyzed respectively the possible effect these causes may have on vertical relationships and shed light on the

cause of the features in status quo. What's more the paper has made a prediction for the vertical relationships among the enterprises' developmental tendency in the next period according to the change of these causes, the conclusions are as follow:

First, the priority lies in giant ship companies. As their tendency of integration is ever stronger, property right will be the leading form of the vertical relationships on the chain. Vertical separation may exist, but will never be the major tendency.

Second, giant cargo owners, usually in oil tanker market and dry bulk cargo market, prefer vertical bound with ship companies by contract, while realize integration with port and dock enterprises by property right.

Third, Alliance among enterprises of medium and small size will boom on industrial chain. The links among enterprises will be closer along the chain.

Meanwhile, as the same factor can cause different results to different enterprises, the enterprises may adopt different vertical relationship strategy. At the end of the paper, we can see the common frame enterprises may choose to fit their own strategies according to the factors.

Although we have affluent theories on vertical relationship, but we haven't yet built up a complete and mature system. So the paper mainly established an analytical frame according to the combination of those theories based on my own understanding considering the unique characters of shipping industrial chain. Because of the limitation of my research level, there may be some bias and inadequacy in my frame. Besides, I couldn't make a quantitative analysis as status is limited. These issues still need further discussion.

Reference

1. Jean Tirole, The Theory of Industrial Organization, The MIT Press, 1998.1

2. Michael E. Porter, Competitive Strategy, Simon & Schuster Ltd, 2004.1

3. Hans Gersbach, Vertical Relationship in Automotive Industry, International Journal of Economics of Business, 1996.3

4. P. Cantos Sanchez, Vertical Relationships for the European railway industry, Transport Policy, 2001.8

5. Waterman D., A. Weiss, The Effects of Vertical Integration between Cable Television System and Pay Cable Network, Journal of Econometrics, 1996.1

6. Pio Baake, Ulrich Kamecke, Hans-Theo Normann, Vertical Integration and Market foreclosure with Convex Downstream Cost, Journal of Economics, 2002.2

7. Ferdinand Jaspers, Jan van den Ende, The organizational form of vertical relationships: Dimensions of integration, Industrial Marketing Management, Volume 35, Issue 7, October 2006, Pages 819-828

8. Yvonne Durham, An experimental examination of double marginalization and vertical relationships, Journal of Economic Behavior & Organization, Volume 42, Issue 2, June 2000, Pages 207-229

9. W.R.E. Laird, Vertical relationships of edentulous jaws during swallowing, Journal of Dentistry, Volume 4, Issue 1, January 1976, Pages 5-10

10. Gianni De Fraja, Claudio A. G. Piga, Strategic debt in vertical relationships: theory and evidence, The Journal of Prosthetic Dentistry, Volume 65, Issue 4, April 1991, Pages 547-553

11. Jackie Krafft, Vertical structure of the industry and competition: an analysis of the evolution of the info-communications industry, Telecommunications Policy, Volume 27, Issues 8-9, September-October 2003, Pages 625-649

12. Jeanine Miklós-Thal, Patrick Rey, Thibaud Vergé, Vertical Relations,

International Journal of Industrial Organization, In Press, Accepted Manuscript, Available online 24 February 2010

13. Stephen F. Hamilton, Till Requate, Vertical structure and strategic environmental trade policy, Journal of Environmental Economics and Management, Volume 47, Issue 2, March 2004, Pages 260-269

14. Boge Gulbrandsen, Kåre Sandvik, Sven A. Haugland, Antecedents of vertical integration: Transaction cost economics and resource-based explanations, Journal of Purchasing and Supply Management, Volume 15, Issue 2, June 2009, Pages 89-102

15. Ayako Suzuki, Market foreclosure and vertical merger: A case study of the vertical merger between Turner Broadcasting and Time Warner, International Journal of Industrial Organization, Volume 27, Issue 4, July 2009, Pages 532-543

16. Diane J. Reyniers, The effect of vertical integration on consumer price in the presence of inventory costs, European Journal of Operational Research, Volume 130, Issue 1, 1 April 2001, Pages 83-89

17. Deok-joo Lee, Hiroshi Katayama, Hyung-sik Oh, Vertical integration in the telecommunication market, Computers & Industrial Engineering, Volume 33, Issues 3-4, December 1997, Pages 841-844

18. Howard P. Marvel, Stephen McCafferty, Comparing vertical restraints, Journal of Economics and Business, Volume 48, Issue 5, December 1996, Pages 473-486

19. Horst Raff, Nicolas Schmitt, Endogenous vertical restraints in international trade, European Economic Review, Volume 49, Issue 7, October 2005, Pages 1877-1889

20. David Flath, Vertical restraints in Japan, Japan and the World Economy, Volume 1, Issue 2, March 1989, Pages 187-203

21. Patrick Rey, Joseph Stiglitz, Vertical restraints and producers' competition, European Economic Review, Volume 32, Issues 2-3, March 1988, Pages 561-568

22. J. A. Kay, Vertical restraints in European competition policy, European Economic Review, Volume 34, Issues 2-3, May 1990, Pages 551-561

23. João Amador, Sónia Cabral, Vertical specialization across the world: A relative measure, The North American Journal of Economics and Finance, Volume 20, Issue 3, December 2009, Pages 267-280

24. David Hummels, Jun Ishii, Kei-Mu Yi, The nature and growth of vertical specialization in world trade, Journal of International Economics, Volume 54, Issue 1, June 2001, Pages 75-96

25. Hogan Chen, Matthew Kondratowicz, Kei-Mu Yi, Vertical specialization and three facts about U.S. international trade, The North American Journal of Economics and Finance, Volume 16, Issue 1, March 2005, Pages 35-59

26. Ching-chong Lai, Chi-ting Chin, Shu-hua Chang, Vertical separation versus vertical integration in a macroeconomic model with imperfect competition, International Review of Economics & Finance, In Press, Corrected Proof, Available online 15 January 2010

27. Jos Jansen, Coexistence of strategic vertical separation and integration, International Journal of Industrial Organization, Volume 21, Issue 5, May 2003, Pages 699-716

28. Esther Gal-Or, Vertical integration or separation of the sales function as implied by competitive forces, International Journal of Industrial Organization, Volume 17, Issue 5, July 1999, Pages 641-662

29. Rajan Varadarajan, Outsourcing: Think more expansively, Journal of Business Research, Volume 62, Issue 11, November 2009, Pages 1165-1172

30. H.I. Hsiao, R.G.M. Kemp, J.G.A.J. van der Vorst, S.W.F. (Onno) Omta, A classification of logistic outsourcing levels and their impact on service performance: Evidence from the food processing industry, International Journal of Production Economics, Volume 124, Issue 1, March 2010, Pages 75-86

31. Salla Lutz, Thomas Ritter, Outsourcing, supply chain upgrading and connectedness of a firm's competencies, Industrial Marketing Management, Volume 38, Issue 4, May 2009, Pages 387-393

32. Layek Abdel-Malek, Tarathorn Kullpattaranirun, Suebsak Nanthavanij, A framework for comparing outsourcing strategies in multi-layered supply chains, International Journal of Production Economics, Volume 97, Issue 3, 18

September 2005, Pages 318-328

33. Marco Benacchio, Claudio Ferrari, Enrico Musso, The liner shipping industry and EU competition rules, Transport Policy, Volume 14, Issue 1, January 2007, Pages 1-10

34. David Ronen, The potential of commercial intelligence in the ocean shipping industry, Information & Management, Volume 4, Issue 3, 1981, Pages 127-131

35. Ioannis N. Lagoudis, Ioannis Theotokas, Chapter 4 The Competitive Advantage in the Greek Shipping Industry, Research in Transportation Economics, Volume 21, 2007, Pages 95-120

36. A. J. Taylor, The modelling of supply in the shipping industry, Omega, Volume 4, Issue 2, 1976, Pages 175-180

37. Yann Alix, Brian Slack, Claude Comtois, Alliance or acquisition? Strategies for growth in the container shipping industry, the case of CP ships, Journal of Transport Geography, Volume 7, Issue 3, September 1999, Pages 203-208

38. Xu jianhua, Qu linchi, International Shipping economy, People Transportation Press,1997

39. Xu junfeng, Market Analysis of Chemical Tanker and Research on the Fleet Development of Sinochem Shipping, Shanghai Maritime University, 2005

40. Liu hongsheng, Strategy Positioning of Sinochem Logistics Service and Implementation Plan, Shanghai Maritime University, 2005

41. Annual Report of Sinochem International, 2002

42. Annual Report of Sinochem International, 2008

43. Annual Report of Sinochem International, 2009

44. http://www.sinochemintl.com/

45. http://www.drewry.co.uk/

46. http://www.tradewinds.no/

47. http://www.bimco.org/

48. http://www.fairplay.com/

49. http://www.cosco.com.cn/

50. http://www.maersk.com/

51. http://sisi-smu.org

52. http://www.simic.net.cn/