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**WORLD MARITIME UNIVERSITY**

Shanghai, China

**Research on Information Integration of  
Zhoushan Port and Its External Environment**

By

**Lu Peiyao**

**China**

A research paper submitted to the World Maritime University in partial fulfillment of  
the requirements for the award of the degree of

**MASTER OF SCIENCE**

In

**INTERNATIONAL TRANSPORT AND LOGISTICS**

**2008**

## **DECLARATION**

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

Lu Peiyao

.....

2008

.....

### **Supervised by**

Professor Zhen Hong

Shanghai Maritime University

### **Assessor**

World Maritime University

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I am thankful to the World Maritime University and Shanghai Maritime University to give this opportunity to the study. And I would like to give my deepest appreciation to my supervision, Professor Zhen Hong. His guidance and advice help me finish this dissertation.

I am also thankful to my uncle give me so great support to complete this dissertation. He gives me a good chance to study in Zhoushan Port Administration Bureau, and discuss the information technology for shipping industry with me. And I would like to acknowledge my classmates who help me collect and sort out resources for this paper.

Last but not least, I wish to extend my indebtedness to my beloved parents, who offered me full support and encouragement during the studies period.

## **ABSTRACT**

Title of Dissertation: **Research on Information Integration of Zhoushan Port and Its External Environment**

Degree: Master of Science in International Transport and Logistics

With the growth of global economic integration, the position of port has become outstanding, which is a core node of international logistics for various transport modes. Zhoushan Port encounters intense competition and challenges. This article applies the theory of SCM to the Zhoushan Port's production and marketing, integrates the shipping logistics channel through Information Management to build port supply chain. A high efficient and convenient modern port is emergently needed in China to enhance its own competitive ability.

This dissertation will study the construction of information integration for Zhoushan Port business. The present information situation of Chinese port and the reasons for choosing this topic will be illustrated in the first chapter. The mean time, it will also introduce the study methods of this dissertation. It will introduce the Zhoushan Port in the 2<sup>nd</sup> chapter, and the situation of EDI will be simply introduced in chapter3. In the 4<sup>th</sup> chapter, it will analyze the detail application of the information technology---EDI in Zhoushan Port business environment. In the 5<sup>th</sup> chapter, it shows the demand and realization methods for Zhoushan Port EDI system. And it also will illustrate risks and countermeasures exist in Zhoushan Port EDI system in the 6<sup>th</sup> chapter. In the end, this author will comprehensive review the information integration of Zhoushan Port and its external environment, and the information management

strategy of Zhoushan Port for the next step. At the same time, this article will also forward the future needs and trends of information technology for the management and operation of port industry.

**KEY WORDS:** EDI, Internet, manage strategy, information integration

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## **LIST OF ABBREVIATIONS**

EDI	Electronic Data Interchange
XML	eXtensible Markup Language
SIPG	Shanghai International Port Group
ISO	International Organization for Standardization
VAN	Value Added Network
ISP	Internet Server Provider
HTTP	Hyper Text Transfer Protocol
SCM	Supply Chain Management
IT	Information Technology
UNCTAD	United National Conference on Trade and Development
GDP	Gross Domestic Product
COSCO	China Ocean Shipping Company
ADM	Aid in Decision Making

# **CHAPTER1. INTRODUCTION**

## **1.1 Background of This Dissertation**

With the acceleration of global economic integration, the trade between our country and other countries is blooming. The position of port is more and more important since that port is the collection node for various transport modes. Port must build a good Information System to increase operation efficiency and reduce cost, which aim to enhance port's comprehensive competitiveness.

Zhoushan Port is an opening port which the main body is a seaport. It opened in April 1987. Zhoushan Port is located in the North part of the East China Sea, South-East of Hangzhou Bay and adjacent to Ningbo. Its water transport is very convenient; backs at the economic developed Yangtze River Delta; is the gateway to the sea for Jiangsu and Zhejiang provinces and the Yangtze River valley. Zhoushan Port has rich deep water coastline resources and superior natural conditions for building port. The main cargoes handled are bulk cargoes like crude oil, product oil, coal, ore, cement, timber and stone. With the continuous development and construction of Ningbo-Zhoushan Port, Zhoushan Port has been gradually formed into a comprehensive port, whose main function is water-to-water transshipment. With the completion of Hangzhou Bay Bridge, it will bring a huge chance and challenge to Zhoushan Port. It is now preparing for using the EDI system to operate its daily business.

Traditional EDI has been used for three decades and has brought a lot significant advantages. It reduces the cost; allocates the resources; optimizes production

processes; improve the competitiveness of enterprises. However, middle and small companies cannot bear the high cost to build this information system. And there also appear some problems in application.

Internet technology can integrate the port and its external environment through the public resource --- Web. It can share information resources all over the world. And each company can enter into Internet easily and cheaply. There are lots of technologies been introduced into traditional EDI system or substituted to traditional EDI system now. The newest technology in this field is the system of RosettaNet which is based on the XML language.

Ministry of Communication has programmed about 20 EDI centers which are based on port. Shanghai, Qingdao EDI system are typically good examples. Shanghai EDI system is constructed by SIPG (Shanghai International Port Group), Shanghai Government and Shanghai Customs. The principle is “Government direction, industry coordination, Enterprise operation”. It is charging system which faced to the society. Qingdao EDI system is free of charge. It services only its internal departments.

## **1.2 Literature Review**

With the globalization of economic and trade, port has become the centre of different transport modes and the powerful integrated hub in logistics. People begin to focus on logistics supply chain in which port is the centre. We aim to integrate this business structure through information technology, which could increase the efficiency of the port operation and saving the resource. Traditional paper based data exchange cannot

satisfy the business need in such dramatic developed world trade. Then people introduced information technology.

By reviewing the previous works on information port operations with its business partners, this author find that EDI technology is the popular way to improve the operation efficiency and save all the partners' cost. ISO defines EDI an electronic transmission method. According to a recognized standard, EDI translates commercial or administrative messages to a structural data format. Then the structural data will be transmitted from a computer to another computer through network.

Traditional EDI technology, which is established on the Value Added Network (VAN), has been used for almost three decades and has brought its users significant advantages resulting in increased productivity and efficiency. And then using Internet to be the carrier instead of VAN in EDI system is the development trend. The cost will be lower, the cover will be wider, and the service will be better. Wang Sha introduced four methods for combination of Internet and EDI in the article *EDI Based on Internet*. 1) Internet Mail: It is the earliest method to introduce Internet technology into EDI system. It substitutes VAN by ISP. 2) Standard IC: Only using the same edition of IC that can realize the EDI exchange on Internet. Standard IC is a special cross-industry international standard. 3) Web-EDI: This method permit middle and small companies realize EDI exchange by connecting Internet through browser. And it changes little for present enterprises application to be EDI application. 4) XML-EDI: XML can be transmitted on HTTP protocol. It is simple and cost less, so it has rapidly been used by the middle and small companies to exchange electronic data with the large enterprises.

With the opening of trade market, each port wants to enlarge their hinterland and

attracts more cargo from all over the world. An open EDI system is the develop trend. Ports can enhance their competitiveness by the development of information technologies. So there is no doubt to develop EDI system continuously. XML technology is a new trend of Internet base EDI system. It can be combined with other technologies to improve the EDI system. Wu Nianwei (2007) studied a new model of EDI Based on XML, E-mail and CA. It can solve the problems about compatibility, security, asynchronous, flexibility in traditional EDI system. Zhang Xuedong (2006) proposed a new model of EDI based on the JMS (Java Message Service) and XML. Its characteristics are cross-platform, asynchronous, loose coupling and reliability. And now, the newest software is RosettaNet. Lots of people are researching on this. As a leading EC standard system in high-tech field, RosettaNet standard has already applied in many sizable enterprises in the world, and as is proved, it may realize core value of the entire industry. It focuses on cross-platform, cross-application and cross-network.

EDI is the major tool used by port and related companies to facilitate supply chain relationships. Business conditions and information infrastructure is weak and start late in China. The investment of EDI is very large, and the cost for entrance is very high. According to the present situation of port industry and information infrastructure in China, the direct and fast channel to realize the electronic trade between enterprises along the port supply chain is enter into the world information express --- Internet. But Internet-Based EDI is so open that we should pay more attention on the security problem.

### **1.3 The Basic Ideas and Study Methods of this Dissertation**

This author believes that port is the core role in the environment of international logistics. Shipping market will still be blooming for the need of more and more international trade. The most competitive advantage of shipping is the low cost for transportation. Port as the basic ingredient of shipping industry must enhance its competitiveness to attract customers. Customers mainly pay attention on the cost and operation efficiency of a port, which including the port itself and its external business environment.

What customers' need is what suppliers' goal. This article integrates the port and its external business environment as one unit, and focus on optimization of this logistic unit's operation. It uses the SCM (Supply Chain Management) concept which looks the port as the center and look for an Information System to realize seamless integration.

The present situation for port information is using the EDI system. It appears lots of advantages and solves the data integration problem in the business environment. However, there also have some defects during the traditional EDI application process. People are finding a more effective method to improve the information system to make the whole operation environment smooth, unhindered and less waste. Internet technology is widely be used in which XML Language has the most potential.

In this article, the author will show the information system of Zhoushan Port. And search for the drawbacks and deficiencies in this system. Then introduce the available solutions.



## **1.4 Organization & Structure of this Dissertation**

The organization of this dissertation is as follows. This dissertation will study the construction of information integration for Zhoushan Port business environment. The present IT situation of Chinese port and the reasons for choosing this topic will be illustrated in the first chapter. The mean time, it will also introduce the study methods for this dissertation. It will introduce the Zhoushan Port and the concept of EDI in the 2<sup>nd</sup> chapter and the 3<sup>rd</sup> chapter respectively. And then, it will analyze the detail application of the information technology---EDI in Zhoushan Port business environment in the 4<sup>th</sup> chapter. It presents the overall objective and scope of Zhoushan Port EDI system, and also the necessity and feasibility of this dissertation. In the 5<sup>th</sup> chapter, it shows the demand and realization methods for Zhoushan Port EDI system. And it also will illustrate risks and countermeasures exist in Zhoushan Port EDI system in the 6<sup>th</sup> chapter. In the end, this author will comprehensive review the information integration of Zhoushan Port and its external environment, and the information management strategy of Zhoushan Port for the next step. At the same time, this article will also forward the future needs and trends of information technology for the management and operation of port industry.

The structure of this dissertation is displayed in figure1.

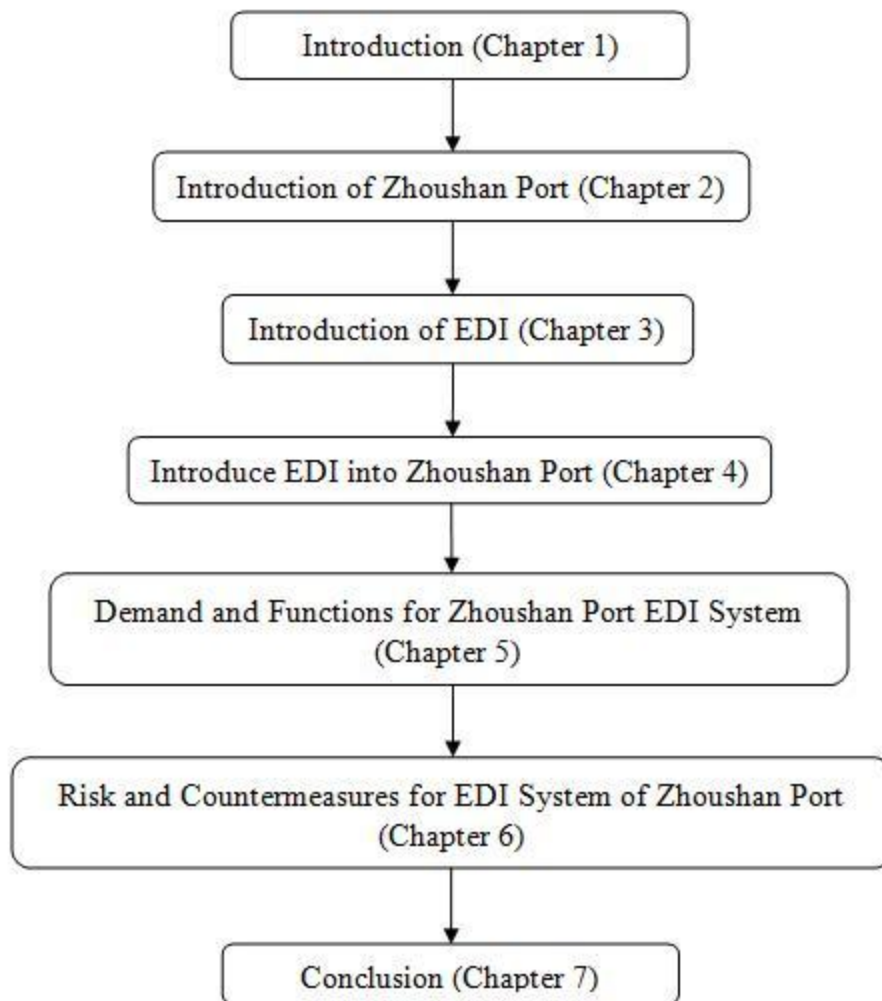


Figure1. Structure of the Dissertation

## **CHAPTER2. INTRODUCTION OF ZHOUSHAN PORT**

### **2.1 Concept and functions of port**

The concept of port is difficult to define. From the horizontal comparison, the size of port is different; the degree of progress is various; the management system also is different. From the vertical comparison, the characteristic and function of port is continuously development and will be go on. It is not easy to define what a port is. (Liu Gui-yun, Zhen Hong, 2007)

Port Law of the People's Republic of China (2003) states that:

The term "port" means a region comprising certain water and land areas, having the functions for vessels to enter, leave, lies at anchor and moor, for passengers to embark and disembark, and for goods to be loaded, unloaded, lightered and stored, and being equipped with the necessary dock facilities.

With the globalization of economic and development of supply chain management, port has changed a lot in position, function, operation and service. In the report of port development and improving the modernization of the port management and organizational principles by UNCTAD in 1992, the development of the port function is divided into three generations.

The first generation mainly refers to the port before 1950. Port is the hub of transportation. Its functions are sea-land transshipment and temporary storage for sea cargo, and cargo transceiver, etc.

The second generation is the port from 1950s to 1980s. Port has become the centre of

loading/unloading and service. It added the industrial and commercial value-added functions on the basis of the first generation.

The third generation appeared after 1980s. Port is the logistics centre for world trade. It strengthens the connection between port and the local city and its users, except for the functions of the first and the second generation port. Port supplies lots of comprehensive service such as information service about transportation and trade and cargo distribution, which beyond original scope.

The present port has changed a lot compared with the third generation. The role of port acted in supply chain is more and more important with the mature of supply chain management. The fourth generation of port must be introduced. Combined with the theory and practice of modern supply chain management and acts as a core node of supply chain, the fourth generation port should supply lean operation and agile service to form the flexible port, which could improve the seamless connection between port and its external environment. (Zhen Hong, 2005)

## **2.2 Information Port**

Transportation is the basic infrastructure and important industry for national economy and social development. Information is the only way to realize transportation intelligence. Port is a core ingredient of transportation.

Fan Liming (2007) pointed out the Valencia Port using the SIC Port Public Information System. It takes Port authority as the centre, and integrates all relational partners. We aim to build global port network by expanding information from port to

hinterland, even to the world port. This system shows the develop orientation of information port of China: takes advantage of information and virtual simulation technology based on the present EDI system. By identifying the outstanding characteristics of internal and external relationship for port industry, building a comprehensive information platform for the different roles of port in social environment. Satisfy the sharing of port information and optimizing the system operation and decision.

## **2.3 Zhoushan Port Introduction**

### **2.3.1 Summary of Zhoushan Port**

Being situated at west of Pacific Ocean, centre of far-east shipping net, the Port of Zhoushan is at intercourse hub of China coastal south-to-north shipping route and Yangtze River “Golden Water Way”. It forms an equal-distance shipping net with large ports at Japan, Korea and countries of Southeast Asia. The Port has abundant deep-water coastal lines and advantageous natural conditions for construction of ports. There are 1538km costal lines can be constructed for docks, 183.2km of which are deep water coastal lines deeper than 20m. According to “General Distribution Plan of the Port of Zhoushan”, the Port consists of 8 port areas of Dinghai, Shenjiamen, Laotangshan, Gaoting, Qushan, Sijiao, Luhuashan and Yangshan.

Zhoushan is the top 100 cities of the most powerful integration strength in China. It is included in the first group of costal economic developing cities and the program and development in advance cities along Yangtze River and seashore in China. It is the most important ship building and repairing base, the aquatic products processing base, the staple cargoes transferring base and the maritime shipping and tourism base

in China. During the tenth five-year period, the average growth of Zhoushan national economic is 15%, and the GDP per person is beyond 3300 USD.

With intensification of the port development and infrastructure construction, Zhoushan Port has introduced the water-to-water transferring project of large cargoes as oil, coal, ore sand and so on. Basic installations of the port have taken on a new look, passenger and cargo transportation installations have been improved obviously. Now the port has 352 docks and berths, among these, there are 11 docks and berths of 10,000-ton-class, two 250,000-ton-class docks, with an annual throughput of over 32 million tons. From 1999, output of Zhoushan Port has become one of the ten largest coastal ports of mainland of China.

Zhoushan Port has perfect handling and transportation and auxiliary system, rich experience of transferring and storing large amount of cargoes. In recent years, transferring of crude oil, coal, building materials, timber, steel, frozen products have been developed and regular ships for international container in branch lines to Shanghai, Ningbo have been opened. Handling capacity of the port is developed constantly.

With its outstanding geographic advantage, Zhoushan Port not only communicates with coastal provinces and cities of the country and areas at Yangtze River basin, but locates at radial axle point of the main oceangoing routes of Asia to Europe, Asia to America and Far East. It is an ideal hub connecting domestic and foreign trade and interflow of commodities. The development of water power supply and transportation has provided good foundation for opening-up and development of Zhoushan Port. Zhoushan Port is now stepping on an express traffic line of continuous development.



Resource from: <http://port.zhoushan.gov.cn>

Figure2. Plans of the port of Zhoushan

### 2.3.2 Laotangshan Port Area

Laotangshan Port Area is the largest public comprehensive port area in Zhoushan. A 10,000-ton-class and a 5,000-ton-class grocery docks have been constructed in the first period. In the second period, a 25,000-ton-class and 3,000-ton-class docks for coal completed with special installations of coal loading and piling have been built. Now, the engineering of the third period is under construction, a 50,000-ton-class multiple-use berth, a 5,000-ton-class berth and the related supporting installation will be constructed. Backing against Laotangshan, the industrial zone near the port will

engage in developing processing industries of cereal, coal and timber.



Resource from: <http://port.zhoushan.gov.cn>

Figure3. Laotangshan Port Area

### 2.3.3 Aoshan Oil Staging Base

Aoshan Oil Staging Base, the largest commercial oil staging base in the country, engages in load, store, and transfer oil products and bond business. There are a 250,000-ton-class, a 100,000-ton-class and a 10,000-ton-class dock, and 1.2 million cubic meters oil storing area. Now, 7 oil tanks and their accessories with a total capacity of 380,000 cubic meters are under construction. The annual oil staging capacity will reach 2.6 million tons. COSCO, China Shipping and China Petroleum



& Chemical Corporation all have their oil staging base at Aoshan.



*Resource from: <http://port.zhoushan.gov.cn>*

Figure4. Aoshan Oil Staging Base

#### **2.3.4 Majishan Ore Sand Staging Base**

Majishan Ore Sand Staging Base, the largest deep-water ore staging port area, covers an area of 485,000 square meters, has a 250,000-ton-class also for berthing of 300,000-ton-class unloading dock, and a 35,000-ton-class loading dock with complete installations, the annual handling capacity reaches 20 million tons. The

base not only unloads imported iron ore of Bao Steel Company but provides trade services for the society.



Resource from: <http://port.zhoushan.gov.cn>

Figure5. Majishan Ore Sand Staging Base

## 2.4 Development of Zhoushan Port

During the 11<sup>th</sup> Five-Year Plan, Zhoushan Port Area has developed quickly. Because of the advantageous natural conditions and the good chance, the port infrastructure improved obviously and the cargo throughput enhanced largely. It has become one of the main ports in Yangtze River Delta Region. With the determination of the development strategy that “Booming the city depends on port” by Zhoushan city

party committee and government, it provides more room for the development of the port in Zhoushan City.

At present, the projects of “Islands Connecting Bridge” and “Jintang Container Harbor” are building. With the completing of these projects, it will bring long term meaning to the development of Zhoushan economy and port industry, and it also will drive the whole development of foreign trade and port-shipping logistics. Zhoushan Port will become a comprehensive port which integrates bulk cargo, liquid chemical and container logistics. Such huge business will be a big challenge to the current operation situation of Zhoushan Port.

Zhoushan Port has lots of wharfs situated at so much small islands, and they are managed by its area manage bureau respectively. A main characteristic of Zhoushan wharf is that much of these wharf belong to the cargo owner.

## **CHAPTER3. INTRODUCTION OF EDI**

### **3.1 Concept of EDI**

EDI is the abbreviation of Electronic Data Interchange. It is the organization-to-organization, computer-to-computer exchange of business data in a structured, machine-process format. The purpose of EDI is to eliminate duplicate data entry and to improve the speed and accuracy of information flow by linking computer applications between companies. (Coyle, Bardi, Langley, 2003)

EDI is an electronic method, which using an international recognized standard to format trade, logistics, insurance, banking, customs, and other industry information, to transmit documents such as orders and invoices between enterprises. It achieves the data exchanging and processing between enterprises, and completes the entire process based on the trade through computer network. It is the outcome of combination of computer, communication and modern management technology.

ISO defines EDI that, “According to an international recognized standard, EDI translates commercial or administrative messages to a structural data format. Then the structural data will be transmitted from a computer to another computer through network.”

From the definition, EDI has three contents: Computer application, Communication and Network, Data standardization. Computer application is the condition; Communication environment is the base of EDI application; Standardization is the characteristic. The three facts constitute the foundation framework that shown as following:

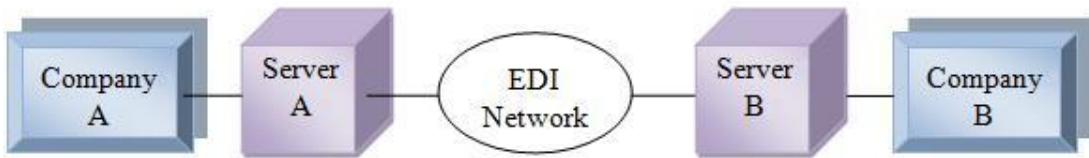


Figure6. EDI System Model

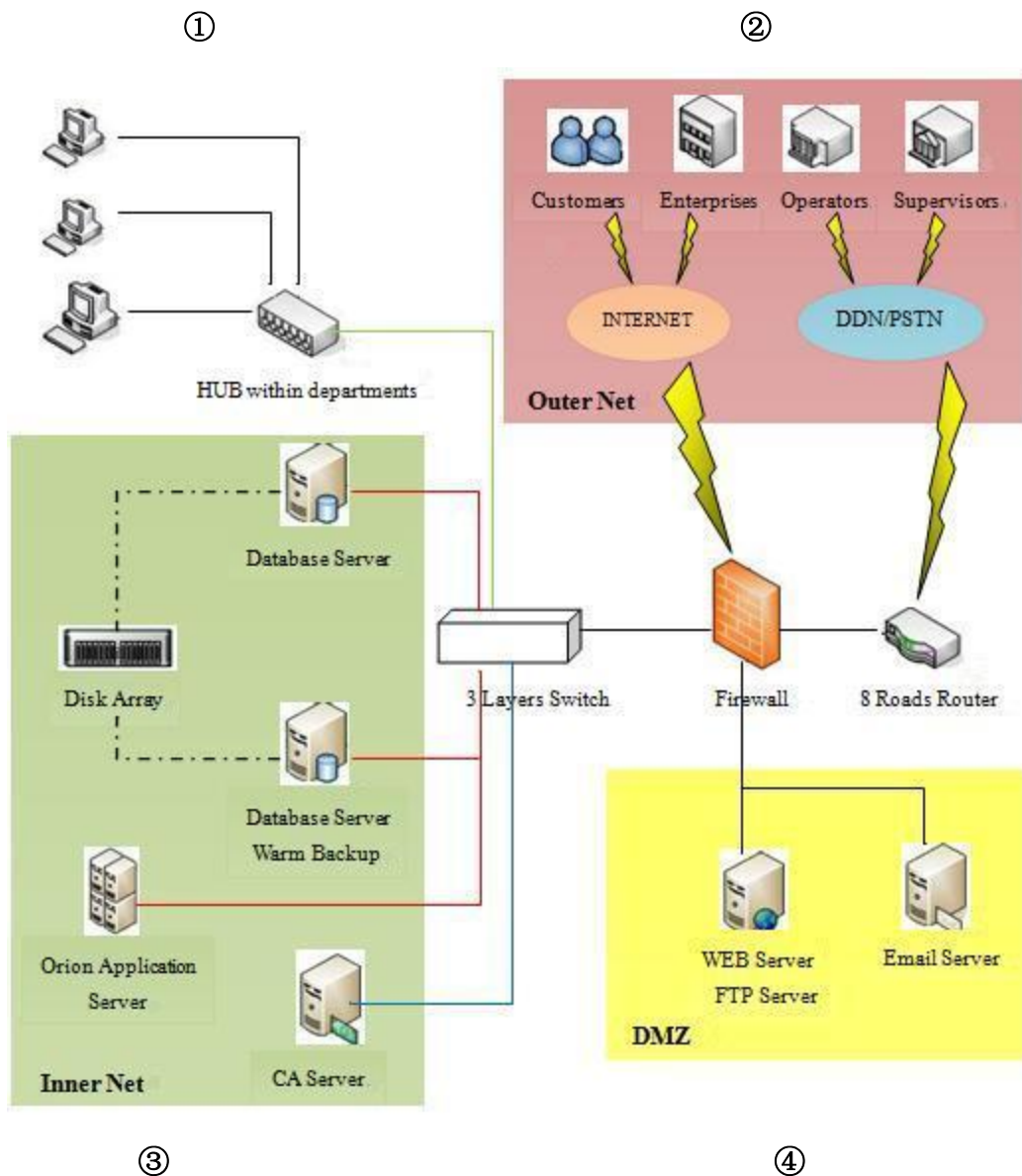


Figure7. A Typical Port EDI System Topography

- ①---Firewall protects the communication safety for the whole system platform
- ②---It provides two communication methods of switch-in of Internet and 8 roads dials
- ③---It places the core application services and database services of the whole system

④---It places service that provides different services based on Internet  
Red lines are VLAN1; Blue line is VLAN2; Green line is VLAN3

## **3.2 Characteristics of EDI**

### **3.2.1 Functions of EDI**

To achieve the functions of EDI, it needs the following four aspects:

- 1) Data communication network is the technical base.
- 2) Communication application is the internal condition.
- 3) Standardize is the key part.
- 4) EDI legislation is the guarantee for the smooth operation of EDI system.

EDI system uses the standard document structure. Computer can identify and choose the useful data from that, and write in enterprise's internal system database directory. This can reduce the intermediate links of trade activities, the use of papers, and even more important the manual work. It decreases the possibility of errors and shortens the response time.

Functions of EDI system are as follows:

1. Exchanging of electronic data and recording the data transmission.
2. Conversion of standard document format.
3. Providing information inquiry.
4. Providing service of technical advice.
5. Providing service of information value added.

### **3.2.2 Advantages of EDI**

1. Making the business transaction automotive.
2. Shortening transaction time and increasing operation efficiency.
3. Avoiding repetitive operation, reducing man-made mistakes and increasing operation quality.
4. Cutting down inventory.
5. Saving transaction cost.
6. Enlarging application scale.



## **CHAPTER4. INTRODUCE EDI INTO ZHOUSHAN PORT**

### **4.1 Overall objective**

Building EDI system is one of the most important acts for constructing a modern port logistics base for Zhoushan Port. Taking service as a principle; taking development of Zhoushan Port and logistics industry as basic start point; taking building up "The system platform of EDI in Zhoushan Port" as the start. As the port logistics platform and gate of the information commutation of the business enterprise, this Port EDI system should realize and take charge of the connection and transmission between departments' information platforms, and raising the management level and social service ability of Zhoushan Port completely; In the meantime, establishing and perfecting information standardized system, law system, operation system and management system. Developing to be the public logistics information platform of Zhoushan Port gradually, and carrying out functions of information sharing and releasing, on-line bargain and electronic commerce etc. Finally, it will build a public information platform which in accordance with the development of Zhoushan modern logistics and foreign economic trade industry.

### **4.2 Building scope**

#### **4.2.1 The position and development of Zhoushan Port EDI System**

EDI system of Zhoushan Port should be positioned in the logistics information system that regards the Port-Shipping logistics business as the core. It is based on setting up an information transmission platform of Port-Shipping logistics and carrying out two main functions of data delivering and value-added application. And

it is assisted with the information publication system and safe authentication system, which face to the Internet customer. The application scope includes Port-Shipping logistics enterprises, the management departments of harbor and port.

According to the long view target of system building, we aim to extend the system application to the highway, aviation and other logistics business enterprises gradually based on the port EDI system, and carry out the conjunction with Zhejiang Electronic Seaport System. Make it to be the seaport EDI system which serves the whole Zhoushan seaport logistics industry. While the condition is mature, the system could be expanded to the cargo owners, economic trade business enterprises, bank, insurance...etc. and further to other realm which related to the logistics information, and realize the connection with the government network. It should gradually developed to be a public information platform that sharing and publishing information, on-line bargain and electronic commerce etc. all in one. It will expand and improve constantly to become the system that matches the development request of logistics industry.

#### **4.2.2 The scope of Zhoushan Port EDI system**

Generally, EDI system has three connections to realize data sharing and exchange: government with government, government with enterprise, and enterprise with enterprise. Government has the advantage of administration control power. Each government can use its power to smooth each benefit. And it could use the advantage to restrict enterprises, but also will cause resistance from them. It can realize the contact between shipping company and wharf.

Zhoushan Port EDI system is a logistics information system that regards Port-Shipping logistics business as its center duty. The service scope of this system includes the business of container and bulk cargo, port management, customs clearance and supervision business etc. The function includes electronic document transmission, data delivery and sharing, information collection and statistics, and value-added applications. Referring to the construction experience of other port's EDI system and the present situation of Zhoushan Port, the scope of this system will include wharf, company of cargo arrangement, forwarder, stocking yard, port administration bureau, Zhoushan Marine Bureau, Zhoushan Customs, Zhoushan Frontier and National Examination etc. and the other enterprises that related to the Port logistics.

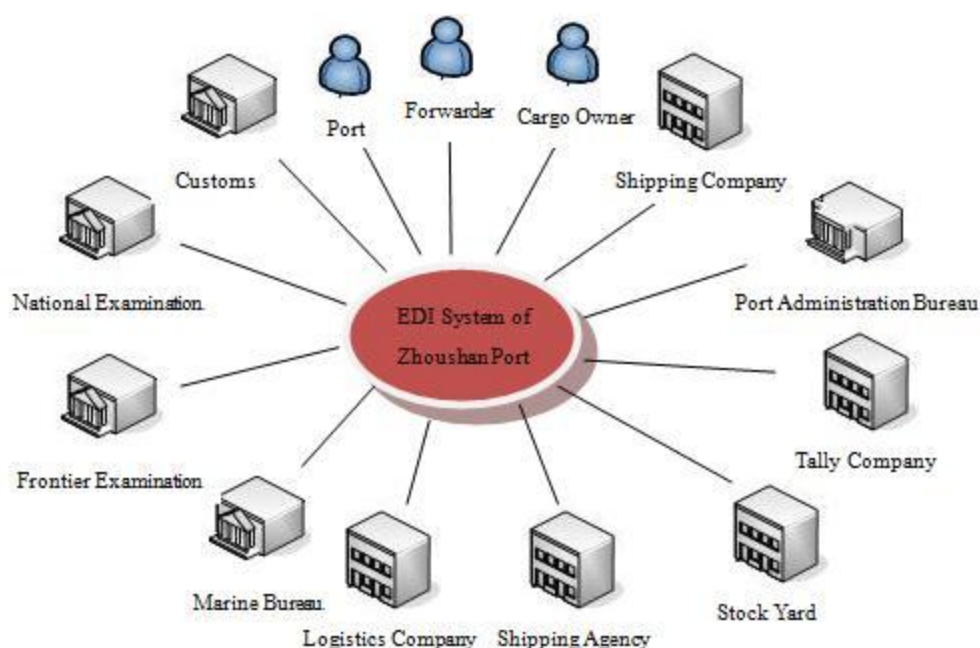


Figure8. The scope of Zhoushan Port EDI system

Zhoushan Port EDI system could connect with Zhejiang Electronic Seaport System to realize the data exchange of the logistics companies and import-export trade companies between the two electronic systems. Zhoushan Port EDI system collects information during the process of Zhoushan Port Shipping Logistics and transmits them to Zhejiang Electronic Seaport System; at the same time, it also receives the feedback information from Zhejiang Electronic Seaport System and delivers to each related unit respectively. This way could achieve the smooth information transmission.

### **4.3 The necessity of EDI for Zhoushan Port**

#### **4.3.1 The need for development of Zhoushan Port Logistics**

The development of logistics is closely related to modern information technology. The fast development of Zhoushan economy provides advantageous development conditions for Zhoushan Port logistics, and claims higher requests for information level at the same time. For the more and more business and information communication between port administration department and its business partners, they urgently need a port EDI system.

#### **4.3.2 The demand for integer plan of Ningbo-Zhoushan Port**

Information is an important symbol for modern logistics, and port is the hub of shipping logistics system. No matter the production of itself or the business communication of shipping logistics need a method that can collect, process and deliver information accurately, efficiently, conveniently. Ningbo-Zhoushan Port Area

should have the functions of modern logistics and communication in the future. So it is the inexorable requirements to build a modern port EDI system, which could fully display its advantages.

#### **4.3.3 The pre-condition for development of Container in Zhoushan Port**

With the completion and operation of Jintang Container Harbor, it will bring higher requisition to the information level of Zhoushan Port, especially the business related to container transportation such as wharf work, cargo arrangement, loading and unloading, stocking and clearance, examination. If it has not an advanced information exchange platform, there must be brought heavy operation pressure to every departments. And it will lead to the decrease of work efficiency and increase of cost. So we should introduce a modern information technology and equipment, which using advanced method substitute for traditional man-made method to process information and deliver information to satisfy the real demand of each department.

#### **4.3.4 Increase efficiency for management of port and government**

Zhoushan Port has lots of berth that distributed at ten port areas: Dinghai, Laotangshan, Jintang, Maa, Shenjiamen, Liuheng, Gaoting, Qushan, Sijiao, Yangshan. They are managed by Zhoushan Port Administration Bureau and its sub-bureau of Dinghai, Putuo, Daishan, Shengsi respectively. There are nearly 350 berths in Zhoushan Port area. As the number of wharf is a lot and the location is disparate, it brings more difficulties to the management. Building EDI system can realize the data collection real-time, accurately and conveniently to greatly enhance the work efficiency of port and government, and push the whole management level

and operation efficiency of Zhoushan Port area.

#### **4.4 The feasibility of EDI for Zhoushan Port**

##### **4.4.1 Meet the requirement of Ministry of Communication to speed up the development of electronic seaport**

The construction of information communication develops fast currently. As it is the important part of building information communication, electronic communication seaport has been paid more and more attention by the country and the whole industry. In the past period time, Ministry of Communication has built EDI system in more than 20 ports or shipping companies. The level of EDI system of the coastal port has reached the advanced international level. Port electronic data exchange has the significant economic and social benefits. It has been an indispensable technical in the ports and shipping industry.

Recently, Ministry of Communication has established the leading group for construction of electronic communication. Its general idea for work is to faster the construction of port EDI system in the recent time. Linking the existing port and shipping EDI system to realize electronic data sharing and auto exchanging of information, which aim to build the overall platform for electronic data exchanging and centre database. For the long term, we plan to expand the application of EDI system. Building and improving the sea transport unexpected emergent public transportation information network; realizing information value added service and realizing its information linking and sharing with road, marine, each national ministries of electronic seaports gradually.

Thinking from the reality of port development, we could see that building the EDI system of Zhoushan Port meets the business needs of port units. Supply the high efficiency and convenient information service for the harbors, logistics companies and supervisor departments in Zhoushan through the advanced EDI system. Based on that, we should improve the functions of Zhoushan EDI system and expand the value added service to achieve the information sharing of cross-sections, inter-departments and inter-regions. Promote Zhoushan and the Yangtze River Delta region's logistics industry and foreign trade industry rapid developing. It meets the requirement of Ministry of Communication to speed up the development of electronic seaport.

#### **4.4.2 Agree with the policy of Zhoushan government**

In recent years, government of Zhoushan city attaches great importance on promoting the development of modern port logistics industry. There is document that pointed that: "Zhoushan is going to accelerate the building of modern port logistics facilities, strengthen the building of container logistics and actively participate in the construction of Shanghai International Shipping Centre. It should form to be a deep water port of the world-class port logistics centre in a short time."

In 2006, Zhoushan government issued documents that clearly claim to strengthen the building of "Da Tong Guan" organization mechanisms and infrastructure construction, and actively explore the clearance model which meet the reality of island. Make the effective monitoring, convenient and quick work as the goal. And actively create a public information platform to closely connect the port information building with "Da Tong Guan" project construction, and to maximize the sharing of

port information resources and electronic network. So building the EDI system of Zhoushan Port is the need for implementation of Zhoushan government's instruction on building a modern port logistics base. It has the positive effect to Zhoushan Port, Port-Shipping logistics industry and the development of foreign trade and economy cooperation.

#### **4.4.3 Widely supported by the related enterprises**

Terminal units, logistics companies and supervise departments will be the users of the port EDI system. The original thinking for Zhoushan Port EDI system construction is to increase the efficiency of information exchanging, data transmission and documents circulation among the logistics companies of Zhoushan Port through the advanced information technology, and to increase the efficiency of Port-Shipping industry. It benefits the whole Zhoushan Port business partners.

From the early study of port information technology, each related unit of Zhoushan Port urgently needs the EDI system. They actively support the construction of Zhoushan Port EDI system. For instance, logistics companies, Zhoushan Ocean Shipping Agency and Zhoushan Ocean Shipping Tally Company, hope to reduce the pressure of data duplicate input and achieve the documents electronically delivery; the requirements of port units mainly focus on these aspects of port schedule information, instructions, the electronic transmission data of port charges and its timely access; and supervise units like customs and national examination hope to collect the data and information through EDI system, which speeding up the work efficiency and clearance rate, and reduce the pressure due to the business increasing.



From that on, the original start point for building a port EDI system is to satisfy the business requirement of each units of Zhoushan Port. So it will get the widely support from them.

#### **4.4.4 The technology condition for EDI system is mature**

Analyses from the technology face, EDI system is a comprehensive information platform which includes software, hardware and network technologies. From my study on Zhoushan Port present situation and other port's experience on application of EDI system, the technical conditions for building Zhoushan Port EDI system is mature. It expresses in the following aspects:

- 1) The information level of Zhoushan Port units is generally good. They have the ability to implement the port EDI system.
- 2) The information technologies related to this EDI system is very mature. They are reliable and steady.
- 3) There are several successful examples of other port's EDI system that can be reference.

#### **4.4.5 Zhoushan Port EDI system has the characteristic of sustainable development**

It needs large number of funds to operate and maintain this port EDI system. Because Zhoushan Port EDI system operates the style of enterprise and market-oriented management, which provides funding guarantee for this system. There is a successful example of Shanghai E&P International, INC. It uses the principle of "Benefit pays"

that provide their service to who pays. It not only guarantees the funds for system operation and maintain, but also a useful method to recover system construction investment. And because Zhoushan Port EDI system is a market-oriented operation, users will have higher requirements on the system functions and service quality. It develops and optimizes the system. And it achieves the common benefit for implementation enterprises and the system users.

## **CHAPTER5. DEMAND AND REALIZATION METHODS FOR ZHOUZHAN PORT EDI SYSTEM**

### **5.1 Demand Description of Zhoushan Port EDI System**

From the study of lots of port related units such as Zhoushan Port Administration Bureau, Zhoushan Customs, Zhoushan National Examination, Zhoushan Marine Bureau, Zhoushan Frontier Examination, Zhoushan Ocean Shipping Agency, Zhoushan Ocean Shipping Tally Company, Sinotrans Zhoushan Branch, etc., there exists strong demand as follows:

#### **5.1.1 Information sharing and data transmission**

Most of departments pay much attention on information construction at present. And they have already got a certain basis of information level through a period time of information construction. But each unit's information system is relatively independent. The phenomenon of "Information Island" is serious. Information sharing and data transmission are also using the methods of traditional telephone, fax, email and paper documents. The efficiency and accuracy are significantly lag compared with the business development.

More important is that container logistics business must bring large number of workload with the accomplishment and implementation of Jintang Container Harbor. It must request higher demand on the convenience, accuracy and reliability of information sharing and data transmission of the whole Zhoushan Port.

If there is no such transmission platform, it must seriously influence the normal operation. So each unit especially for the container related parts urgently need this advanced technology.

### **5.1.2 Electronic clearance**

Port regulatory departments like Zhoushan Customs, Zhoushan National Examination, Zhoushan Marine Bureau and Zhoushan Frontier Examination have a higher information application level. Declaring, inspection and supervision and other business have the corresponding support system. But there is no uniform platform to support these. So it is still using paper documents and method of client input to complete the data collection. With the increasing of port business, especially container business, it will bring great challenges to the current operation method of business like declare. At the mean time, each logistics companies also will meet the huge pressure of data duplicate input, which will cause the serious decrease of business efficiency.

### **5.1.3 Supervision of government and port**

Zhoushan Port Administration Bureau is the administration unit of Zhoushan Port. It has lots of direct and subordinate units. Because of the objective causes such as geographical factor that the wharfs and units are dispersive, it is difficult to manage them. And business like port dispatch, business statistics, and charge are only manually operation. So port managers want to gain the necessary information for port management, policy public, statistics, and to increase the manage efficiency and service ability through the EDI system.

#### **5.1.4 Information publication**

Port logistics is an information-intensive industry. EDI system platform will bring great convenience to the related units by realizing public information release, information inquiring and business dynamic track. And logistics enterprises also could promote the development of Zhoushan Port.

#### **5.2 Realization of Zhoushan Port EDI System**

The main idea for this EDI system is achieving the “one stop service” for Port-Shipping logistics information. Users could finish the electronic transmission of logistics documents and information through the port EDI system. Government departments and enterprises all could see the information on the information platform.

Further, other industries --- manufacturing, commerce companies and some import and export trade companies could join in this system. Multimodal transport business could be developed by the extension to aviation, shipping, railroad, road industry. Customs, Inspection and Quarantine, Taxing, Bank, Insurance all could do its job at the same platform.

The realization functions could be classified to be three parts: the basic function, the miscellaneous function and the long-term function.

### **5.2.1 The basic function**

#### 1) Data processing

It's the core function. It includes the transform, delivery, saving of electronic documents and the exchanging of other information.

#### 2) Information publication

The information includes: news and announcement from customs, port, trade; relevant policy and government affairs guide; the price of shipping, road, railroad transportation; sailing, road, railroad schedule; information about cargo and ship; technology training.

#### 3) Member service

This system adopts member system. It manages members' documents, track and statistics for the members' transaction.

#### 4) On-line transaction

It supplies a virtual bargain market for the supply and demand of transportation. Users could finish the whole bargain flow on this platform including inquiry and offer.

### **5.2.2 The miscellaneous function**

#### 1) Financial service

Under the improvement of relevant rules and network safety technology, some financial business could be involved in this EDI system platform like insurance, bank, taxing. But this system just supplies an intermediary platform to deliver the

information for customers.

2) Data statistics

It unified storages and manages the logistics data, port management data, companies' data. And it supplies different data report form for the need of its customers.

3) ADM

It integrates the whole supply chain through the analysis of large number of history data, and builds relevant mathematics model of logistics business. This could help the managers identify, evaluate and compare logistics strategies.

### **5.2.3 The long-term function**

1) "One stop" trade information

This public information platform could supply information service for the entire procedure of Zhoushan economy and trade. Realized the electronic and automation of the procedure, which enhances the flexibility and convenience.

2) "One stop" logistics information

This system makes every nodes be involved in the logistics procedure electronic link. It integrates the storage, transport, delivery, customs of cargo, which enhances the efficiency and quality of logistics.

3) Centralized inspection and service

This EDI system links the system of government departments, port supervise

units, tax, banks, insurance. Each part could link to the EDI system platform to gain the useful information by its own system timely.



## **CHAPTER6. RISKS AND COUNTERMEASURES FOR EDI SYSTEM OF ZHOUSHAN PORT**

### **6.1 Risks for EDI system application**

#### **6.1.1 The attention on system construction subject to be strength**

Ningbo-Zhoushan Port should be equipped a smooth and safe information network system; have an on time and accurate method for information collection, handling and transmission; could provide communication and information services. More important, it will bring higher demand on the information level of Zhoushan Port with the implementation of Jintang Container Harbor. But as Jintang Container Harbor is also in building and it has not bring any impact on the present business mode, some companies and departments have not aware of the necessity and urgency of EDI system construction, and they pay little attention on its future development. It will bring negative effect on EDI construction and development.

#### **6.1.2 Each port unit has not formed a common sense for the system construction**

Port EDI system construction involves a wide range of parts, including lots of port logistics enterprises, regulator departments and government agencies. The business contents, manage mode and information level of each unit has big differences. During the process of port EDI system construction, they must think more about their own benefit. They lack a uniform leadership and coordination. For this reason, there must have some interest conflicts which will effects the port EDI system construction, ever the failure of the system construction.

### **6.1.3 It is inadequate for relevant person of EDI system construction and operation**

Building and application of EDI system need large number of multi-ability person and practiced operation person who know information and network technologies and also familiar with logistics business. But relevant enterprises are lacking of this resources. The number and level of IT talents by now cannot reach so large requirement of Zhoushan Port EDI system.

### **6.1.4 Information level of part of port units is low**

Some units like Zhoushan Ocean Shipping Tally Company have no application system to support their daily business. EDI system transmits electronic data through the connection between system and system to achieve the accuracy, safety and real time. It requires every relevant units has a relative high level of information degree. If there is one unit cannot reach such level, it cannot achieve the real sense of data auto transmission.

### **6.1.5 This EDI system need the continuous investment for 3 to 5 years**

Because of the large number of investment that been put into this port EDI system construction and the high cost for operation, it cannot create corresponding profit at the start period time. So this EDI system also needs investment in the short time about 3 to 5 years.

### **6.1.6 Time for system construction is urgent**

- 1) This EDI system construction should be kept up with the building of Jintang Container Harbor. As the general plan of Zhoushan Port, Jintang Container Harbor will be completed in the early 2009. EDI system should be finished and put into operation before that time.
- 2) It needs a period of time for test this port EDI system before its formal operation. Before the formal operation of Jintang Container Harbor, we should test the EDI system on exist bulk cargo terminal to prepare for the operation of the future container terminal.
- 3) The service of Zhoushan EDI system is faced to the whole Port-Shipping logistics industry and foreign trade in Zhoushan City. This system will involve different industries and enterprises. Its scale and technology complexity will be very high. So this EDI system needs a period of time to finish the software development, system struction and network building.

## **6.2 Pre-cautionary measures for risks and safeguards of project implementation**

### **6.2.1 Establish a project team that dominated by Zhoushan Government**

According to other port's experience, it relates to the success or failure of this plan if there is a good leadership and coordination mechanism. We could suggest Zhoushan government act as the leader to coordinate and process the connection between logistics companies and regulators units. And they can use executive order to enforce these enterprises if necessary. So we could organize a team that the main leaders of

Zhoushan city government to be the team leader and the managers of each port units to be the members. It coordinately arranges the communication during the process of port EDI system construction and guarantees the smooth building of this EDI system.

### **6.2.2 Increasing the attention on EDI system construction**

The port EDI system will benefit every relevant department, so it has very important meaning to the development of Zhoushan Port. It must be pointed out that the EDI system construction is not only the work of a certain department. It needs the cooperation of every relevant units and departments. It requires the Port Authority department, the Port Group and other departments pay more attention on the construction, actively take part in it, and complete this project together.

### **6.2.3 Designing a science implementation plan and operation system**

There must have a complete implementation plan before the start of EDI system building. It should include the target, contents, time arrangement, needed conditions, implement steps, person arrangement and acceptance conditions. Such plan could guarantee the science and feasibility of the whole building progress.

Building an operation system that “Government-lead, Port Administration Bureau-supervision, Enterprises-operation” during the application of port EDI system. With the principle of “Benefit pays”, provide the paid information services to users. It not only guarantees the large number of investment, but also promotes the optimization and development of the system, and achieves the both-win of operation enterprises and users.

#### **6.2.4 Providing the necessary fund support to Zhoushan Port EDI system construction**

The investment of EDI system is a huge number. At the initial stage, it also needs large number of fund to maintain the operation of this system. So we could suggest the following methods to solve the fund problem:

- 1) Government gives some necessary policy support, and provides the appropriate support measures in financial and taxation, etc...
- 2) Port Administration Bureau increases the capital input to the port EDI system to guarantee the smooth implementation of this EDI system. The pre-investment could be recovered from the economical benefit of system operation.
- 3) It could attract large enterprises all over the world to take part in this system implementation. It will forms market-oriented diversified investment mechanism gradually.

#### **6.2.5 Increasing every units' information level as fast as possible**

EDI system requires each relevant department having a high information level to achieve the real data auto transmission between systems. So every departments related to Zhoushan EDI system should enhance its own information level as soon as possible to meet the upcoming container business.

### **6.2.6 Speeding the building of personnel team and training mechanism**

- 1) Allocation special funds to the personnel training plan to speeding up the building of personnel team.
- 2) Providing some necessary training and learning conditions such as assignment to the technical person.
- 3) Using methods like professional learning and targeted training to enhance the business and technical level of the staffs.
- 4) Carrying out the necessary social and internal recruitment explore to strength the technical team.

## **CHAPTER7. CONCLUSION**

Zhoushan Port has an outstanding geographic to be a good water-to-water, deep water port. It would be “The Garden” of Shanghai Port and Yangshan Deepwater Port. With the completion of Jintang Container Harbor, Zhoushan Port will change to be a comprehensive port, which the original main business is bulk cargo and oil. And Zhoushan City pays much attention on its shipping industry. It takes the Port business to bloom the whole city.

The main contribution of this dissertation is establishing an EDI system that suitable for Zhoushan Port, which combines the practical situation of Zhoushan Port and the previous experience of other ports like Shanghai Port and Ningbo Port. According to the basic rule in service the whole logistics, we could plan a new model of EDI system that different from others. It is according to the “Government is the leader and the Port Authority Department is the core part”. It will show the fair and justice, and could carry out more convenience. We shall adopt the centralization of management and coordination of operation to well arrange each part of the logistics supply chain. And government could promote the external environment of Zhoushan Port to actively take part in the management system under the integration of government leader. We just do some improvements on the present information basic.

Operating under such EDI system, Zhoushan Port could much improve its work efficiency and work environment. Each part of its port supply chain could involve into this information system. It supplies Zhoushan Port a potential competitive advantage in the port industry. At the time of cooperation with other ports in Yangtze River Delta Region, Zhoushan Port also could highlight its characteristics.

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Zhoushan Port web site gives further information on Zhoushan Port.  
<http://port.zhoushan.gov.cn/website/zsgh/index.aspx>