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## Study on how to succeed in 3PL for electronic appliance companies

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WORLD MARITIME UNIVERSITY

Shanghai, China

**STUDY ON HOW TO SUCCEED IN 3PL FOR  
ELECTRONIC APPLIANCE COMPANIES**

By

**ZHANG LI**

**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**

**INTERNATIONAL TRANSPORT AND LOGISTICS**

2006

## 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.

.....

.....

### **Supervised by**

Professor Zhao Gang  
Shanghai Maritime University

### **Assessor**

Professor Stefansson  
Chalmers University, Sweden

### **Co-Assessor**

Professor Liu Wei  
Shanghai Maritime University

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I will also show my gratitude to my former colleagues, who teach me a lot of practical experiences. Without their help, the modules in my dissertation couldn't be built at last.

My classmates always give me great support during these six months. They are also my good friends in my life and will be forever.

At last I am going to thank my parents. During these years, they continuously give me love and support in my life and study.

## ABSTRACTS

Title of research paper: **Study on how to succeed in 3PL for electronic appliance companies**

Degree: **MSc**

For more than 20 years' management, the electronic appliance industry in China has already entered a very ripe phase. However, as the rapid growth of this industry since 1990, at present it has been facing the predicament. Looking around the domestic market of electric appliance, it's easy for us to find that the electronic appliance' market is still rising with the economic growth. And these products become similar in the way of function and type, the costs of producing for enterprises are also very similar and pure price competition is meaningless. The profit is also compressed to a small figure; secondly, the current market of some electronic appliance has the trend of saturation in China. The domestic market is being changed from seller's market into a buyer's market slowly. In order to catch the limited customers, the competition between enterprises turns white-hot day by day. Third, the expansion of import electronic appliance and the risk from overseas enterprises strike the domestic market. In the international market, because of the good performance of cost, domestic enterprises have gained some market share, but the shade of trade friction is always perplexing domestic enterprises in China all the time. It slows down the speed of expanding the overseas market shares for China's electronic appliance industry.

The deterioration of market environment aggravates the competition of electronic appliance. The original way, which is to reduce operating costs for expanding the profit, has lost its efficiency. The investment for R&D is so little that it directly

influences the electronic appliance. For looking for a new profit point of growth, electronic appliance makers have been paying their attention to the logistics part which is not noticed all the time. They use all sorts of logistics strategies and make great efforts to reduce the expenses of the logistics link. Through several famous industrial and commercial enterprises, the study will focus on the 3PL companies which can bring electronic appliance company a great profit.

**KEYWORDS:** SCM, 3PL, Electronic Appliance, Inventory, Outsourcing

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## LIST OF ABBREVIATIONS

3PL	Third party logistics
EDI	Electronic data interchange
GPS	Global position system
ERP	Enterprise resource planning
CRM	Customer relationship management
RF	Radio frequency
VRP	Vehicle routes problems

## **1 INTRODUCTION**

### **1.1 Background and purpose of choosing this topic**

In recent years, with the forming of buyers' market, the enterprises have recognized the effect of optimizing internal logistics management as well as reducing logistics cost. A large number of professional logistics companies are developing quickly. Meanwhile, with the introduction of international logistics company, the whole service level in China has made a great step with international process. Comparing with past decades of years, the electronic appliance industry has changed a lot. The market is being changed from sellers' market to buyers' market, from high profitability to low profitability; the products are being changed from simple to various. Nowadays, the manufacture cost of raw material is just 53% of total cost while the marketing cost covers up to 46%. Although china's electronic appliance industry has competitive advantages in manufacture cost, trade cost is still very high. With the effective forming of brand nationally and internationally, the traditional competitive mode cannot help the enterprises to get their competitive advantages. The electronic appliance companies are seeking the new way of gaining profit, when the traditional electronic appliance industry is facing the low profit. This kind of company becomes interested in 3PL Companies. As 3PL Company is becoming more and more popular in China as well as the 3PL ideas; electronic appliance companies are beginning outsourcing their logistics part to 3PL companies. They would like to reduce their logistics cost by choosing logistics

company, so that they can control their total cost and gain competitive advantages.

Considering that 3PL companies become more important to electronic appliance industry, I think the requirements for 3PL companies are higher. 3PL companies should provide some modern management idea and decision making to the electronic appliance enterprises so as to satisfy their needs.

## **1.2 The meaning of this dissertation**

The concept of 3PL is popular now and always mentioned anywhere. However, this concept cannot be fully understood for people in China nowadays, as it's just come into China, although it has been existing for a long time in the foreign countries. We can find that a lot of companies in China are doing their best to follow this logistics trend without grasping the management methods of logistics field. A large number of freight forwarders, transportation companies and warehouse companies quickly change their company names by adding Logistics. They are called logistics companies but the main bodies of them are still freight forwarders, transportation companies and warehouse companies. These so-called Logistics companies can not be called 3PL because the management cant reach the logistics level.

Electronic appliance industry has a great need of logistics service in recent years. It is not that 3PL can reduce their cost but make them focus on their own business as well. So it is very important to find a right 3PL company in order to gain the competitive advantages for electronic appliance companies. This study will stand by the sight of 3PL, and give the right solution to deal with the problems of electronic appliance companies in China. I hope after reading my dissertation, the

readers can have a right concept of 3PL and know how to apply the 3PL concept into electronic appliance logistics.

### **1.3 The content and structure of this dissertation**

#### **The content**

This paper contains three parts with six chapters. Firstly, the author gives a brief introduction and purpose of the dissertation as well as the background and introduction of electronic appliance industry. Then the author gives the basic concept of 3PL, the characteristics of 3PL. secondly, the author raises some problems of 3PL companies when they deal with electronic appliance logistics. at last, the author uses a module to solve one of these problems and some ideas, suggestion to the other problems.

#### **The structure**

Through the analysis of the logistics companies existing in China nowadays and the characteristics of electronic appliance logistics, the author finds some problems in this area, which need to be improved.

In this paper, the author gives several solutions to these problems. One is the VRP module, which can optimize the routes for the 3PL companies. Others such as the information system and workflow are shown depending on the author's working experience.

The structure is shown as follows:

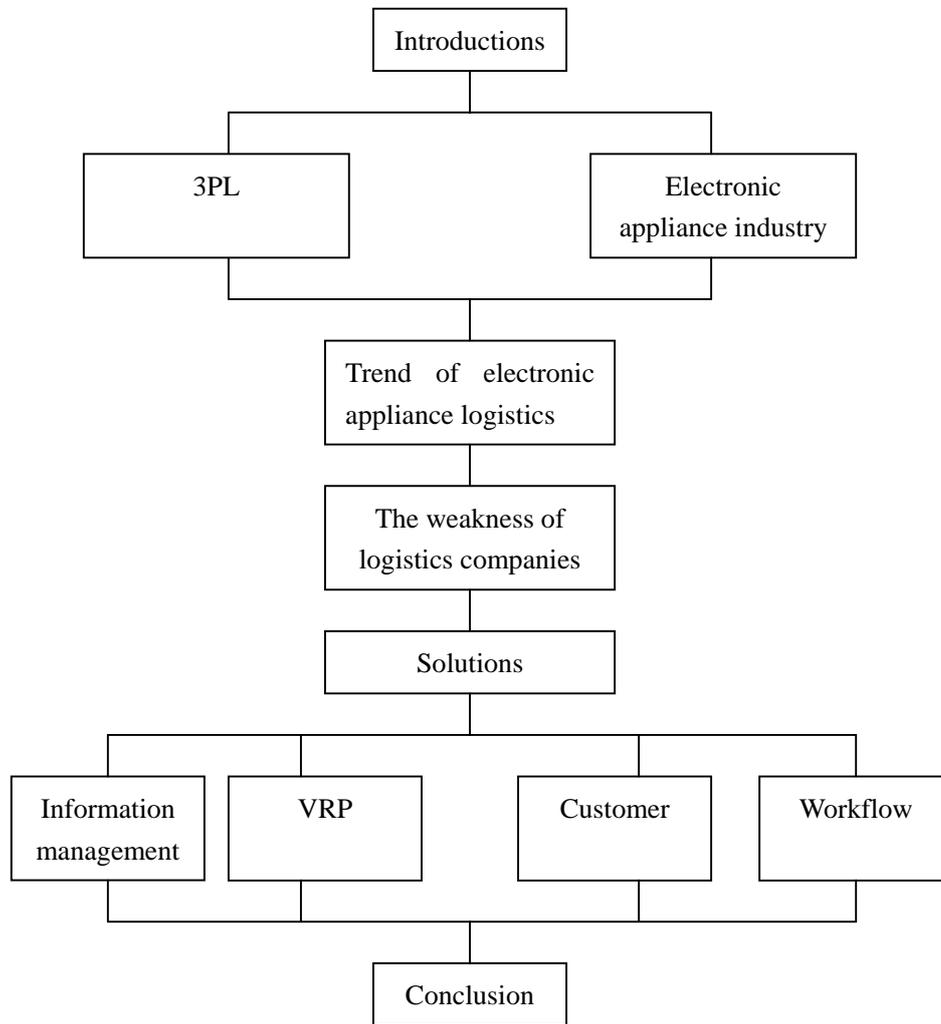


Figure 1 The structure of this paper

## **2 THE LATEST STATUS AND TREND OF DOMESTIC ELECTRONIC APPLIANCE LOGISTICS**

### **2.1 The introduction of 3PL**

#### **2.1.1 The concept of 3PL**

After its appearances in developed Europe countries since 1880s, 3PL is welcome by many enterprises and develops quickly. It is called 21<sup>st</sup> century golden industry.

The so-called 3PL refers to the company which makes manufacturers focus on their own core business, outsource their logistics parts to the professional logistics companies by means of contract. Meanwhile, they keep contact with logistics service companies through network communication technology in order to manage and control the whole workflow. So, 3PL companies are also called contract logistics. The ancestor of the companies, which provide 3PL service is transportation and warehousing companies or other related companies. The business scope of 3PL is changed from simple warehousing and transportation business to all-round logistics services under the push of clients' demand, including organization, coordination and management, design the optimized logistics scenario, gathering and management of logistics information, etc. Nowadays, the concept of 3PL is widely accepted by many industries.

### **2.1.2 The characteristics of 3PL**

Comparing with the traditional logistics, the characteristics of 3PL which is better than the traditional ones are shown bellows:

1) 3PL integrates more than one logistics functions and makes logistics a centralized work. This can promote the status of logistics in company management and customer service.

2) 3PL can provide all the human resources and management service as well as special service, for instance, inventory management, assemblage and consolidated transportation. So the human resource cost and process can be reduced, which improves the managing efficiency.

3) The transportation facilitates, warehouse, etc. are invested and managed by 3PL, which raises the specialized service level and improve the capital status of both parties.

4) 3PL provides the individuality service. Considering the needs for the 3PL service are different from each other, we need 3PL to provide different service according to the workflow of different

5) The relationship between companies is alliance. Depending on the support of modern electronic information technologies, the information is fully shared by the 3PL companies and customers. They also share the risks and profits by contract as a bridge to achieve mutual benefits.

### **2.1.3 The advantages of 3PL**

1) Reduce cost and enhance the competitive advantages of an enterprise. As for the 3PL companies have more competitive scale economics, comparing with the company with self-running logistics, as well as they have the capability of getting cheaper logistics finished products, it is relatively cheap to buy logistics service from 3PL companies for enterprises. Meanwhile, the enterprises needn't to invest their capital on the hardware and software of logistics by using 3PL service. It reduces the total cost of the company and incents the competition in the market.

2) Raise the service level and achieve the effective, quick, accurate operation of customer supply chain. Nowadays, the increasing 3PL supplier break through the traditional logistics activities such as warehousing and transportation, it gradually extents to the whole supply chain of the customer. By its professional development, the alliance between 3PL companies and other enterprises will be helpful for the efficient, accurate, fast operation of supply chain.

3) Focusing on their central business management to achieve economics of scale. If the 3PL companies are responsible for the part or whole of logistics operations, they can attend to do their own businesses and gather the resources on the central businesses. It's no doubt that the efficiency can be improved and the economics of scales can be reached by this means.

4) Assist customers to manage and check the information conveniently. The modern 3PL service should be built on a good information network, which can

reduce the investment and risk of information management system and make customers more convenient to checking and managing. It can also result in raising the service level.

Integrate the logistics resources in the whole society and promote the logistics more rationalized and efficient. Thus, the modern logistics network can be set up between companies and industries, which can further achieve social logistics rationalization. <sup>1</sup>

## **2.2 Three modes of electronic appliance logistics**

### **2. 2.1 Operated by electronic company itself**

Haier is the typical example in this kind of logistics mode. As the biggest electronic appliance manufacturer in China, Haier occupied the market share as follows: TV sets 10.4%, refrigerators 33.4%, washing machines 30.5%, air conditionals 30.6%. As for the international market, Haier covers 12% America refrigerator market, 10% Europe air conditional market and 10% middle east washing machine market. Facing such a big market share, Haier brings up the rebuilding of logistics business to the strategy level. In 2000, Haier rebuilt the business workflow and set up an advanced logistics system. <sup>2</sup>

The start of Haier's logistics system is order. The enterprise treats the orders as its operation drive, origin of the business workflow. It organizes the procurement, manufacture and marketing absolutely according to the orders. From receiving the

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<sup>1</sup> "3PL service marketing" Song Jinchen 1<sup>st</sup> Mar 2004, Dalian Maritime University

<sup>2</sup> "The study on the operation mode of electronic appliance industry in China"

orders, it begins its synchronous process of procurement, distribution and logistics. Because of the support of the logistics technology and IT management, Haier logistics realized the synchronous process operation speed through three JITs: JIT procurement, JIT distribution, JIT logistics, which make Haier win the continuous orders.

Haier logistics presents the character of modern logistics by “one stream, three nets”. “One stream” means the information of orders; “three nets” means the global supply chain resource network, global delivery resource network and IT network. The three nets give information stream strong support.

After Haier rebuilt the business process, it changed the reservoir function of traditional warehouse to a moving “river”, which can realize JIT to optimize the logistics operation efficiency. The codes of products in warehouse are uniform, while using the bar code technology, automatic scanning technology and standard package.

It is clearly that Haier logistics approaches the center logistics of developed countries. However, with the background of china’s economics environment, Haier met some problems of cost, speed and revenue after 2 years operation. Other electronic appliance companies can’t copy Haier’s logistics mode for the different business scale.

## **2.2.2 Outsource logistics part to 3PL companies**

There are 2 reasons to outsource their logistics part to 3PL companies. Firstly, it can make firms concentrate on their main competitive advantages and gain the

maximum return of investment. Those, which don't belong to the advantages should be weakened or outsourced. From this point of view, considering logistics are not looked as center competition, enterprises begin to outsource their logistics part. Secondly, it's very hard for a company to reduce the logistics cost by itself. Although electronic appliance companies have made a great progress in logistics, it's quite difficult for them to further improve this part.

Usually, 3PL companies have market knowledge, networks and information technology as well as agility, which can meet needs of logistics part in electronic appliance company. However, 3PL companies have some shortcomings, as every coin has 2 sides. The scenario of 3PL company is built for different customers so that most of them can not be copied. Moreover, when a company outsources their logistics to other companies, it's easy for it to be bounded. Further more, since there aren't many 3PL companies in China now and 3PL market is not mature enough, a lot of electronic appliance companies hold cautious attitude to cooperate with 3PL companies.

### **2.2.3 Setting up a 3PL company by using their own capital**

This mode refers to the electronic appliance company relying on the specialized 3PL supplier and is combined with their own company by setting up an independent logistics company. This kind of mode can solve the problems of investing large amount of capital and the safety of information.

### **2.2.4 Analyses of these 3 modes**

The three electronic appliance logistics modes existing in China now can basically

accord with development of enterprise itself. Haier mode origins from the international development strategy and its fast expansion, so Haier devoted a lot of energy in this mode which makes great progress for Haier's development. However, this mode has some disadvantages. Firstly, in order to build some advanced logistics network, enterprise should invest a big deal of resource, which must make some effect to the research and development of product, manufacture and expansion of scale. Considering the limitation of resources, although Haier has invested a great deal of money to build Qingdao warehouse, it's impossible for it to invest the logistics warehouse all over China. Secondly, they are lacking of person with ability and management experience, which results in a relatively high logistics cost. Thirdly, although Haier has built an advanced logistics system, there aren't enough integrations and connections in the whole supply chain. Haier logistics doesn't achieved socialization but still keep on their traditional operation mode and idea, increasing the logistics cost.

As for the high expectation, apparent economics of scale and high technology of logistics management system, while most manufacturers haven't self-running abilities with high efficiency and low cost, it gives them a big market space of socialized and specialized logistics services and drives the 3PL company to extend production scale. Actually, this mode still has a lot of limitations for the companies in China. Firstly, 3PL is still in primary phase; the amount, scale and power are still weak; percentage in the market is still very small. As 3PL company hasn't built up a high-level credit system, a lot of manufacturers are still keep on waiting for the result. Secondly, the rules and laws, which are related to logistics in China, are not as developed well as those in the foreign countries. Thirdly, the service scope of logistics in China has some limitations, for example, single functions, difficulties in forming networks, unavailability in integrated logistics service: bad reliability for

products during circulating, especially the percentage of currency cost is higher than that of the developed countries<sup>3</sup>.

The advantages of the third mode as I mentioned before are that it makes full use of shareholders' resources to build a modern logistics operation platform. It also uses the advanced management approach and information technologies to achieve the optimized workflow, which can result in the saving of total logistics cost, and improves the logistics service level. If this kind of logistics company only deals with logistics business of their related companies, there would only be the reduction of logistics cost, no profit. However, it provides services as 3PL.

In a word, companies that are using the third mode will introduce strategy partners to seek a new operation point during development. However, with the trend of division and cooperation in working, 3PL will be more and more popular. Strategy alliance between manufacturers and 3PL companies will be the world tendency undoubtedly.

## **2.3 The trend of electronic appliance industry logistics**

### **2.3.1 The trend of international logistics**

With the development of information technology and communication technology, all the partners within the supply chain can make full use of these technologies to deliver information quickly and communicate well. So, all the partners can create a tough supply chain alliance so that the competitive advantages of this alliance will be intensified. Whereas, the highly development of IT also brings alliance some

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<sup>3</sup> "The report of China's logistics development" 2003, P86

disturbance. For instance, it will be so easy to deliver information. Since information can be delivered to everywhere by using different technologies, some companies have problems in controlling key information. So we can get the conclusion that it's very important to have an entire and proper supervised mechanism. In order to make the secret information of a specific company exchanged safely and speedily, building a mechanism that can supervise information communication in the whole supply chain alliance is the key factor to guarantee the supply chain alliance working in a harmonious environment.

The traditional management mode used to separate the organization into different departments; each department is regarded as a cost center to manage. But this kind of management method will lead to inside problems. This will seriously influence the existence of an organization. So we can suppose that the future management methods will make organization as a living body, inside the bodies there are a lot of mechanisms to support their lives, for example, procurement, manufacture, sales and distribution. These mechanisms need an effective connection to meet the customers' needs. The new management mode is that we can manage every activity as a chain. Through the integrated management, the enterprise can arrange every activity accurately. Meanwhile, the organizations can response to the change of outside environment in a shorter time under the integrated management.<sup>4</sup>

Later on, with the globalization of world economics, the distant between manufacturer and customer is becoming farther and farther. In order to deliver the products to ultimate customers fleetly, logistics play a more and more important role in the business. At that time, such kind of enterprise witch can integrate the upriver

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<sup>4</sup> "modern logistics development report of China" 2002, P189

and downriver logistics activities appeared, which is called global 3PL. This kind of company can integrate the global related logistics distribution from the beginning of manufacture to the delivery of the products to customers on time. Therefore, the rise of 3PL supplier will have great effect on the future development of globalized economics.

### **2.3.2 The strategic background of china's electronic appliance logistics**

Both economics globalization and territorial economy integration have great effects on the world economy and social life. All kinds of globalized and territorial trade organizations are set up one after another, which brings into more intensive competition among enterprises. It requests higher requirements of operation ability within the more white-hot competitions for the companies. If a company wants to gain the competitive advantages in the international market, it's very important to combine logistics strategy with marketing and sales strategy. In this 21<sup>st</sup> century, Asia and Pacific area will become the fastest increasing of economics area, which will bring a nice developing challenge to China's logistics industry.

After China's entering WTO, it makes a significant progress in China's economy globalization. With the accelerated globalization, the communications of international technology are becoming more and more frequent. The developed countries rush to invest high-tech industry in order to maintain their leading status in competition. Thus, the labor-intensive industries are turning to developing countries. The working procedure is a value chain, including research development, design, procedure, inventory, marketing and transportation, etc. It would stop working if one of them missed. As for the manufacture part, China is one of the

most competitive countries or regions in the world and it is becoming the world manufacture center gradually.

World manufacture center will be a place which gathers a lot of related productions and trades. The raw materials, products, equipments and related information which come from all over the world will gather here together and then are delivered to other places in the world. The modern logistics industry has three characters: globalization, specialization and electronic. The development of modern logistics industry will provide opportunities and support for China's ultimately becoming a world manufacture center. Of course, it will help China develop its logistics industry.

The improvement of infrastructure and the development of science technologies make China's modern logistics industry developing more easily. After several years' accumulation, the infrastructures of China's logistics, including road, railway, airline, port, are not bad. According to the related researches, the development and wide application of modern science technologies give electronic appliance logistics industry a powerful support.<sup>5</sup>

### **2.3.3 The prospect of china's electronic appliance logistics**

When it was at the beginning of electronic appliance industry, it attracted a lot of investors because the entire electronic appliance market was sellers' market and the enterprise had high profit. Then, the electronic appliance companies springed up like mushrooms. However, with the saturation of electronic appliance market in the recent years, it is being changed to the buyer's market. A great number of

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<sup>5</sup> "Logistics and supply chain management" Luo Wenping, published by electric industry publishing company, 2002, P78

electronic appliance companies came to bankrupt, restructure of capitals. All the current and alive companies have the advantages of scale and brand.

Beijing Zhongjingtong Invest Consulting Co., LTD predicted the future trend of electronic appliance industry in China in <Electronic Appliance Industry seasonal report>(2004). Firstly, the status of China as a manufacturing center in the world will be further tightened. Secondly, the restructure and integration in this industry will tend to be more activity and the cooperation among enterprises will be strengthened. Thirdly, the way of sales will be changed obviously.

China's electronic appliance logistics is one of the most important parts in electronic appliance enterprises' value chain. Every company regards logistics as a strategy of reducing cost and gaining competitions. So, it is very important to searching advanced logistics operating modes for the development of electronic appliance companies. Nowadays, there are 4 main trends for electronic appliance logistics' development: firstly, logistics suppliers are asked for providing countrywide services because the consumption of electronic appliances is a countrywide issue. Secondly, the way of sales tends to be multiple. Thirdly, the technique of electronic appliance updates so fast that electronic appliance industry raise high demand for inventory management. If an electronic appliance company wants to develop itself, it must deal with the inventory well. Then, it also raises high demand for logistics supplier and it is certain that these kinds of companies will be more centralized and integrated. Fourthly, the consumers have a higher demand for electronic appliance service, such as door-to-door delivery, after sales service, etc. If a logistics company wants to gain more business, there is no doubt that they should meet different kinds of consumers.



## **3 THE CHALLENGES FOR 3PL COMPANIES WHEN DEALING WITH ELECTRONIC APPLIANCES**

### **3.1 The characteristics of electronic appliance industry**

After China's entrance into WTO at the end of 2001, China gradually opens its market to the world. As the leader of China's enterprises, electronic appliance industry is necessary to set up a competitive strategy for its self-development.

#### **3.1.1 The appearance of buyer's market makes the existing strategy hard to work**

The typical developing strategy is market expansion. This expansion represents 2 ways: in strategy, every enterprise is developing new businesses and starts multiple operations. On the operation level, the main strategy of enterprises is to sacrifice their profit, gaining the market share and income by competitions. The practice proves that price competition is effective for gaining market share, finding potentials customers and reducing cost.

The existing strategy of electronic appliance industry becomes the bottleneck, which restricts electronic appliance industry. With the maturity of industries in China,

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<sup>6</sup> Competitive strategy choice of China's electronic appliance industry

<sup>7</sup> "3PL service marketing" Song Jinchen 1<sup>st</sup> Mar 2004, Dalian Maritime University

the intensive competition is not only to reduce the profit but also to shrink the difference of profit between industries. And even the profit between businesses tends to vanish. It is hard to get large profits for a single enterprise. Under this kind of market situation, the difference of profit of TV sets, refrigerators, air conditioners and other electronic appliances among the enterprises is getting less and less.

As traditional marketing methods, price competition used to make great efforts on winning the competitive advantages. It is also helpful for further integration of all the business. With the centralized electronic appliance market, this field tends to monopolization. In the recent years, the electronic appliance industry is almost controlled by some famous brand companies, which want to gain more market share by using price war. On the other hand, with China's open policy, the foreign brand electronic appliances are introduced to our country. The domestic companies have no idea of cooperating with and learning from them but exclusion. In conclusion, the price competition can only intensify the competition in the domestic industry and reduce profit in the whole industry.

### **3.1.2 The traditional electronic appliance industry is facing a more serious challenge.**

Tracing back to the end of 1990s, the foreign brands were introduced to China's market. It seems one night that our country becomes internationalized. After China's entering into WTO, the greatest challenges are from the international competitors and the lower tariff. Nowadays, the famous electronic appliance companies are almost among the top 500 companies which have a great deal of capital. The leading companies such as GE, National have already prepared to enter the Chinese market and they have annexed many electronic appliance

companies in China with their own capital. Furthermore, this kind of companies can also finance and set up factories in China according to the WTO rules. This can give companies more opportunities of gaining market share and profit. From this point of view, if the companies in China still keep on remaining their traditional strategy, it is certain that their future won't be bright.

### **3.1.3 The choice of the electronic appliance industry in China**

It is said that the outside situation determines operational way of a company. The purpose of strategy management is to make a company continuously adapt to the changes<sup>8</sup>. The basic rule is to make use of the effects of external challenges, avoid and reduce external threats. So, I can conclude competitive strategy as follows:

Firstly, building up the international famous brand, enhancing brand effects. In recent years, as the intangible capital in the companies, its role which is acted in the economy lives becomes more and more important. After more than twenty years' development and competition, there left some great electronic appliance companies. The brand value of Haier and Changhong has exceeded RMB 10,000,000,000, which ranks in the top enterprises in China. However, the achievements they have made cannot catch up those in developed countries. The CEO of Haier Group said that there is no brand in China, based on his cognition of international situation. Nevertheless, it is not one day or one night to build up an international famous brand, unless it is accepted by international consumers. So what we should do in advance is to guarantee the quality of products. We should spend more time and energy to researching and developing the products in order to add the internal value in the brand. Furthermore, we should make more efforts

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<sup>8</sup> Competitive strategy choice of China's electronic appliance industry

on species, designs and performance which can meet the preference of consumers from different countries. Moreover, electronic appliance enterprises should also catch the opportunity of entering WTO and have more international market share. If only we put the product to the international market, it is possible to be accepted by consumers and the brand value can be added.

Secondly, establishing strategy alliance to enhance competitive advantage. The so-called strategy alliance refers to a network organization which two or more than two enterprises, in order to achieve a certain goal by ways. All the members in the strategy alliance should retain the independence of business and have the characteristics of efficiency and agility. The purpose of establishing strategy alliance is to enhance the competitive advantages of both parties, which can achieve the objectives of mutual benefit. From this point of view, I think that a effective way to improve self competition is to establish the strategy alliance. The enterprises have the same region, the same product line, linked channel and similar developing experiences, all above provide good foundation for them cooperation. What's more important is that all the electronic appliance companies have the same competitive opponent which can cooperate with electronic appliance companies in the aspect of technology, product development and channels. Of course, we can improve our competition power by all kinds of competitions during cooperation. On the other side, all the enterprises can learn from other's strongpoint and improve the shortages by strategy alliance. This type of mutual strategy alliance can enhance the company's center competition by which the competitive advantages can be improved. The capacity of innovation such as the innovation of product, development of new technology and exploration of new market etc., is the most important source of competitive advantages for a company. However, the new strategy alliance can not only raise the accommodate

capacity of a company but also create the environment more actively. In this dynamic market environment, strategy alliance can not only conquer with the competitors but improve the competition power of a company as well. There is no doubt that electronic appliance industry can be alive in the intensive competition.

Thirdly, changing the concept of marketing, exploring distribution ways. In the past, the electronic appliance industry mainly focuses on the city in China. With the saturation of city market and opening of international market, the way of marketing should be changed accordingly. As China's entrance into WTO, both the challenges and opportunities exist. If all the electronic appliance companies obey the rules of "others in, we out", and make use of the related rules of WTO, electronic appliance industry in China won't be defeated when competing with the foreign enterprises. Facing with the expansive international market as well as the interruption of all kinds of uncertain factors, the electronic appliance companies should catch this opportunity and enter the international market by its good quality products and brand advantages. However, international marketing is not for the sake of earning foreign exchanges but a strategy choice of building up famous brand and improving self-competition. Besides the international market, I think the country market in China can also be regarded as an opportunity. With the change of consumer structure in country market and the increase of peasantries' incomes, the country market must be a new focus of electronic appliance industry competition. So if we can explore the country market in China before foreign investors do, we can have more competitive advantages for the electronic appliance manufacturers. We can make barriers to avoid foreign companies getting market shares. In 21<sup>st</sup> century, the competition of electronic appliance industry will focus on the marketing channel competition. The electronic appliance products can be divided into two types: the traditional and the modern. The traditional channel is

mainly about the shopping mall; the modern channel is mainly about the all-round chain store, online service and group procurement. The sales of shopping mall are still the main way of sales, which has the characteristics of high-leveled credit stand. But whatever traditional or modern ones, there is no difference of better or worse. When we are choosing the sales channel, we should firstly consider the economy of the channel, which is also called efficiency of sales channel. The channels can be different while the city grade and types of the products are different. So the electronic appliance manufacturer should combine their characteristics of products with market segmentation to choose a sales channel which suits itself best. Thus it can make an enterprise gain the largest market scope and market share to achieve the lowest marketing cost.

### **3.2 The workflow of 3PL**

#### **3.2.1 The classification of 3PL**

3PL companies are the undertaker and provider of professional and socialized 3PL. Viewing the logistics status quo inbound and outbound, there are many kinds of logistics companies. We can classify the logistics companies into self-operation and agency, meaning with capital and without capital. In this way to classify, there are 48.69 percent is those with capital, including the logistics companies which are built by big manufacturer or wholesalers and retailers, for example, IBM Logistics; the logistics companies which are major in transportation and warehousing meanwhile expand other logistics functions, for example UPS Logistics and the integrated professional logistics companies. On the other hand, the logistics agency covers about 51.31 percent. These companies have their main body as an agent or consultant and they make use of the social public logistics resource to run

their business. Its power results in the capture and integration of the design and logistics resource of logistics information system.

We can also classify the logistics companies by its logistics scope and service function: the integrated logistics companies which have a great deal of capital and good credit standing for logistics service) and functional logistics companies (such as transportation companies, warehousing companies that can only accomplish one or a little logistics function.) in 2001, there 29 percent of the total 3PL companies in China are integrated logistics companies, while the left 71 percent belong to transportation, warehousing companies

### **3.2.2 The main business department and function of 3PL**

(1) Business receiving department. Through the order system, internet booking system etc., companies can get the required information and send it to the information center after a primary process.

(2) Information center. Its main job is to manage the information of booking, warehousing and transportation. It is in charge of the distribution of all businesses. At the same time, information center should also be responsible for the sign of contract and financial receipt.

(3) Warehousing department. Except the storage function, there are also some cure and distribution functions according to the guidance of the information center. It is required that this department should combine with the modern logistics technologies and update the warehousing information as soon as possible. After that it will send the feedback to the information center.

(4) The transportation, distribution department. they can finish the movements of the cargo in a very low cost and send the feed back to the information center.

In the main 3PL departments which I have mentioned before, the warehousing, transportation and distribution department can exit as a way of hire and make use of the social or owners' resources, however, the control and management are different.

### 3.2.3 The workflow of 3PL

The workflow can be shown in Figure 2

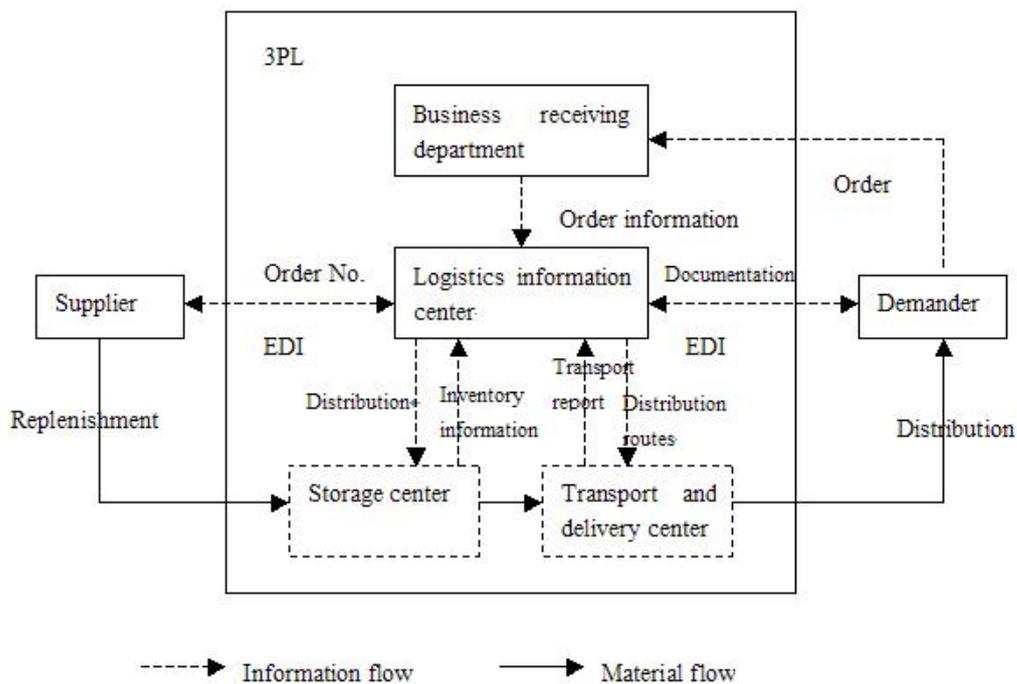


Figure 2 The workflow of 3PL

Figure 2 is the basic workflow of 3PL. What I should mention is that the provider and the demand extend widely, the workflow is not only apply for the sales logistics from the manufacturer to the ultimate customers, but also apply for the procurement from raw material supplier to producer. Of course, different functional logistics activities are different in the details of processes<sup>9</sup>.

### **3.3 SWOT analyze of China's traditional logistics companies**

In recent years, with the rapid development of China's economics, surplus of productivity appears gradually. The products are stocked in the warehouse and the products in the market are sold out. So it is very important that we should ensure the products to be transported from factory to customer without any difficulties. Some professional logistics enterprises become rising up but their service level can not reach the requirements of modern markets. We should find the suitable solution for China's logistics development.

Only when we recognized the advantages and disadvantages as well as the market environment, can we avoid the unnecessary mistakes. As our country has entered into WTO, there is more popular of the cooperation of domestic economy and international economy. Under the new market environment, it is very essential for the traditional logistics companies to have a SWOT analysis.

#### **3.3.1 Advantages**

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<sup>9</sup> "Modern logistics system and management" Yang Hairong, Published by Beijing Post University 2002

- 1) Some logistics enterprises have developed a competitive network. The most typical example is China Post. Its network has extended to every corner in China. Almost all the mails and small articles pass through this network every day.
- 2) Some logistics companies which are originated from state-owned enterprises have the infrastructure advantages, especially the tangible assets, for example, COSCO, China Shipping Logistics.
- 3) China's traditional logistics companies have several years' logistics experiences and customer resources of service. For example, Shanghai Friendship Holding has a long time experiences to store the fast consumer goods and accumulates about 50-year logistics management experience. Now it focuses on customized logistics services and gets a better market effect.

### **3.3.2 Weakness**

- 1) Most employees in the traditional logistics companies, including the medium level management operator, know little about the modern logistics theories. And they have no idea of value-added service and supply chain management.
- 2) The logistics companies in China are almost in a very small scale. Their functions are simple, which weakens the economics of scale and capabilities of fast integration and reactions.
- 3) The logistics technologies are not fully applied. The advanced logistics technology highly improves the logistics operation efficiency. For instance, Bar Code, RF, through which the information can be collected in time; GPS, GIS, by which we can track and trace the cargoes at any time. However, most logistics companies in China don't have these capabilities.
- 4) The incomplete information system. We can divide the logistics company

demand for information into three levels: first is operational information system. Its task is to provide right information for decision-making. Second is the logistics workflow based information system. Its target is to lower the cost and quicken the cash flow. Third is supply chain management based information system. Its main task is to improve the coordination of supply chain. For example, the coordination between suppliers and buyers, manufacturer and retailers.

- 5) The shortage of persons in ability. Logistics is a new industry in China. Some universities just set up the logistics department in recent years. So the person in abilities can not meet the needs of logistics industry. This will affect the development of china's logistics.

### **3.3.3 Opportunity**

- 1) There is a large potential in China's logistics market. In 2000, GDP in China is 8,900 billion. The proportion of logistics cost in GDP which is estimated by the World Bank is 18%.
- 2) The government attach important to the logistics. Many cities place the modern logistics development on the agenda. Shanghai, Tianjin and Shenzhen regard logistics as one of their support industry of regional economy development.
- 3) After China's entering into WTO, the international cooperation becomes more frequent. With the entrance of the foreign logistics companies, it is certain that the modern logistics programming technologies and management experience will be introduced. The traditional companies can catch this opportunity to learn from them by the cooperation.

### **3.3.4 Threat**

- 1) The international logistics companies have several years operational experience, advanced logistics equipments, technologies and management. For example, TNT, Maersk Logistics, DHL, etc. they have already entered into the logistics market in China. Then the traditional ones are facing with the more intensive competitions.
- 2) The big modern logistics enterprises in China, such as COSCO, China Shipping etc. are also the treats to our traditional ones. Because they can monopolize the market by their competitive capital.
- 3) The consumers have more needs of customized products and the quantity is not that much. So they have more expectations of delivery services, which brings a lot of difficulties in the logistics service.

## **3.4 The weaknesses and problems of middle-sized and small-sized logistics companies**

### **3.4.1 The weaknesses**

Since 1990s, modern logistics industry is developing quickly in the world and keeps on the rise of 20% to 30% for 10 years. And hi-tech, financial and logistics are called three sun rising industry. The tremendous market share and fast increasing market attract a lot of enterprises. China has a wide territory and the cost of basic transportation has a great impact on the logistics. However, transportation industry in our country becomes decentralized, which not only causes high cost, over

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<sup>10</sup> Yang Hairong ,“Modern logistics system and management”, Published by Beijing Post University 2002

weighted and more time but also makes transportation a very low profit industry. A true modern logistics company should have the qualifications as follows: firstly, it must have a competitive cargo transportation capability and have more than 200 thousand square meter logistics operation base, including transportation infrastructure such as warehouse, container yard, parking lot and packing workshops as well as loading and unloading. Secondly, there should be capability of disassembling and assembling customers' products. Thirdly, there should be equipped information network system covering the freight transport or logistics subsidiary business networks in whole country or a certain region. Fourthly, there should be a competitive innovation capability of freight transportation organized technology which adapt to the modern logistics operation, and an operation ideal of "win-win" which always think for the customers. This can totally meet customers' needs of logistics and can raise company's self-economic profits when reducing the logistics cost by value added services.

It is obviously that the most urgent problem which the logistics companies are facing is to promote the basic environment of logistics companies. Nowadays, most of the logistics companies in our country have the problem of "weakness, decentralize and tardiness".

Weakness means that the functions of logistics companies are too simple, the capacity of management; financing, competition and anti-risk are weak. Most enterprises are fight alone and have small operation scale, low synthetic extent. There are little companies have the turnover exceeding RMB 100 million.

Decentralize refers to the low level of organized and industry socialized, which presents in unreasonable layout, unstable supply of goods, decentralized networks,

nonstandard of operation order, disorder of competition and serious waste of resources. The main body of trade in the market economy is enterprise. From the view of logistics service trade process, we can find that the main body of trade in our country at this time is not mature enough. Both parties of trade are facing with the situation of developing, criterion and improving.

Tardiness refers to the low content of logistics technology, weakness of getting information and dealing capability, lacking of big distribution technology and advanced technical establishments and shortage of experts who are specialized in modern logistics operation and logistics management. Most logistics companies have laggard technical equipments and managing approaches, bad service networks and information system. They can only undertake the simple functioned transportation and warehousing, which seriously affects the veracity and timely of logistics service. It is in the period of development, so there haven't united the service standard and the service brand hasn't been built. The improvement of information has a great effect on the control and management of the whole producing process. Lacking of macro approach to manage and the legal restrictions<sup>11</sup>.

### **3.4.2 The problems**

#### **3.4.2.1 The scale of 3PL is not big enough**

Logistics is an integration of different transportation mode. In logistics category, the transportation of cargo changed from the traditional mode to optimum combination. However, the logistics companies in China today can only help electronic appliance company transport the cargoes in the market. Although this kind of logistics

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<sup>11</sup> "Economist" Wu Quansheng 2005, No.1

companies are called “logistics”, they are still what they were, freight forwarder. Nowadays, people’s living standard has leveled up since the fast development in our country. People from everywhere in our country have demand for electronic appliance, thus the distribution problems appear. Because most 3PL companies in our country haven’t set up their branches in other cities or there is only one or two branches in other cities, the electronic appliance can not be delivered in time and even the cost is high. As we all know, the electronic appliances are high valued products as well as high-tech, not a fast consuming products, so they need some extent of inventory.

The logistics companies nowadays haven’t such inventory management systems or something like that. They just put a lot of products in the warehouse, which will cost them a lot of money. They don’t consider the facts of weather, season and holidays. We can find that when it is summer the air conditioners are very welcomed by the consumers but the sale of heater comes to the bottom. On the other hand, when it is in winter, the radiators sells well but the fans are little demanded. In the golden weeks, many stores give some discounts on the products, which can attract consumers and stimulate them to buy their goods<sup>12</sup>. There must be enough storage products to meet the demand of customers.

In some cases, some companies want to ship their electronic appliances to the foreign countries in order to make more profit especially the foreign exchanges. They would like to export their cargoes. However, some 3PL companies can only help them transport their cargoes. The electronic appliance company must do custom, pack, label by themselves. All these really waste their time and cost.

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<sup>12</sup> “The research on the international freight forwarder being a 3PL operator”

### **3.4.2.2 The behindhand infrastructure**

After the products are finished in the factory, these finished products should be transported to the distribution centers. The distribution centers are separately located in many places of the city. The logistics company which I used to work in has little equipments for logistics, such as trucks, warehouses and loading machines. The condition of the warehouse is not so satisfied because the cargoes are stacked in disorder and the clean cargo such as foods and the dirty cargo such as the steal are put just next to each other. Considering stocking our cargo--air conditioner, my company rent an area from the warehouse owner. But it is fortunate that the air conditioners are so safe that there aren't any dirty cargoes and dangerous cargoes put next to them. What I saw in their warehouse is that they put the air condition in disorder. The staffs in the warehouse treat the products in bad manners when loading and unloading. When it was raining, the air-conditioners are wet for there is no ceiling to prevent rain during loading and unloading. Furthermore, the truck condition is not good enough. Most of them are already 5-7years old. It can not ensure that the cargoes can be transported to the destination safely and in time. However, the road transportation systems such as railways are in bad condition which makes it a big limitation for the logistics development.

### **3.4.2.3 The staffs are not well skilled**

If we want to develop the modern logistics service, a well skilled group should be needed. The logistics system of the logistics supplier is a process over industry, department and region even over the country. It is also a system which is connected by many aspects. The modern service department can also be looked as a warehousing department of a factory. For the sake of providing the accurate

arrangement of in and out, they need a group of experts to manage it. However the advanced logistics methods, there also need human beings to operate it. The more familiar and versed in this business, the better he can manage properly and thus the management level can be raised. Whether the 3PL companies can succeed in electronic appliance logistics depends on the quality of the staffs. When I was working in a logistics company which contracts the General Fujitsu logistics, the staffs in this company haven't well skill in the logistics. Some of them just do the logistics issue by their experience. They don't have system knowledge of logistics. So when they meet some problems that they haven't met before, they have no idea of what should do first. They always can not deliver the air-conditions on time and the warehousing management is bad. You can see the products here and there in disorder. When they want to move some air-conditions out, it is really too hard to move because some air-conditions are stacked at the bottom. When the customers complain our service, my colleagues cannot solve their problems properly and even makes them unsatisfied.

Those who work in the warehouse, loading and unloading the cargoes are little qualified. They don't know how to load the air conditioner onto the trucks. They put the light cargoes at the bottom and the heavy ones onto the light ones. It is undoubted that the air conditioners at the bottom would be damaged. Moreover, the staffs are so rude when they are loading and unloading the cargoes. The cargoes are almost thrown on to the trucks and out of the trucks. This will damage the cargoes whether they are fragile or not. The sign on the outside package of the air conditioners shows that the air conditioners should be moved carefully. However, the staffs in the warehousing didn't pay attention to this warning. They just did whatever they wanted to do. This situation maybe results from less training. The staffs in the warehouse are not well trained before they get their position. Some of

them just became working depending on their experiences. They even have no conscious of safety and security. I asked some of them whether they know how to use the fire extinguisher. It is a pity that the answers are “no”. I don’t know when there happens a fire, how will these stuffs do? Can they keep calm? What will they do before the fireman come? So I think it is very important and necessary for the logistics stuffs to be trained. A qualified 3PL company should be responsible for their training.

#### **3.4.2.4 The outdated business methods**

The modern logistics service must accompany with all means of transportation and networks. Customers have the needs of ocean transportation, air transportation, road transportation and so on. It is very important for the logistics companies to grasp the knowledge of transportation and warehousing as well as the information of cargo tracking. Meanwhile, what the customers check such as booking, checkout, and the movement of the cargo requires the logistics company to provide the accurate information services in time. This is the key factor of logistics superiority. For the cargo transportation center, warehousing center and 3PL service providers, they can not get any customers unless provide all-around logistics management services. The core of logistics is information; the Internet based logistics information system becomes the physical causes of modern logistics service. The development of modern logistics can not separated from the quick and accurate information exchanges. Building the information networks and transportation networks is the core of modern logistics services. However, most of the logistics companies haven’t built an integrated information networks as well as the EDI technologies which is popular in the fields of international transportation and trade is not popular applied in logistics in our country. When I worked in a

logistics company, I found that there aren't any Internet networks with the logistics suppliers. How they connected with the logistics suppliers, such as the truck fleet, is by telephone, which is very limited and cannot be noticed in time when something happens. There happened that a driver was asked to deliver the cargo to one destination by driving a truck. However, when he got to the destination, he was told that the person in contact was out of duty that day. No one knew the details of these cargoes. That means there is no body to receive these cargoes. The driver had no idea only call back to the trucking company for their help. After the trucking company got this message, the staffs in the office turned to us for help by telephone. Our company had two choices for this problem: one is to go ahead and unloading the cargoes, the other is deliver the cargoes back to the warehouse. Both of these two situations have shortages. The first one is that our company will undertake more responsibilities; the second one is that the time is wasted and the cost is increased. If we could know this information that the person in contact is out of duty that day, we wouldn't deliver the cargo there. Or there won't be any delay. That is the problem of the lack of contact and information communication.

#### **3.4.2.5 The routes**

In recent years, the logistics companies in China rarely consider the routes problem. However, this is a very important point for 3PL companies, because the routes directly related to the transportation cost. If we don't choose an optimized route, there will be wastes of time and money. Once a time, our truck which has pick up cargoes from the distribution and on its way to customers, the driver chose the customers randomly and cost I lot of time and gasoline. I think if he has an optimized route before departure, there won't be so much time and cost. Then, I will show the module of routes in the next chapter.

### **3.4.2.6 The market is separated**

Nowadays, the logistics companies can be divided into two kinds by different markets, according to the service area: the international market and the domestic market. These two markets are not repellent with each other. On the contrary, they are related with each other. Some logistics companies with great capabilities should explore these two markets at the same time. This will form the economics of scale, lower the transportation cost, raise the efficiency of usage. However, in our country the situation I mentioned above is in the opposite side of that is in the developed countries. Some logistics companies, which are actually the international freight forwarder, don't take part in the business in bound China. And furthermore, most of the domestic freight forwarders haven't the authority of running international business. So these two kinds of businesses which can be combined are separated obviously. This leads to the reinstall of the organization, wastes of resources. It not only brings the cargo owner some extent inconvenience, but also limits the development of 3PL. The logistics company that I worked before was an international freight forwarder before it changed its name by adding "logistics". Their business was just as an agent for the shipper until it deals with the truck transportation and the warehousing. In order to be focus on their own business, one electronic appliance company (will be presented as A company) wants to outsource their whole logistics issues to my former company. However, the logistics company is not so qualified for contracting this project. Although it signed the contract and made promise with the A company, there are many problems appeared during the logistics.

#### **3.4.2.7 Short of marketing layouts**

As the status and effect of the traditional logistics industry are short of theory research and experience conclusion in the whole transportation system and transportation market, they are not considered as a main body when emend the transportation development outlets. So it is very hard for the logistics companies in china to get profit, quality and scale. It is not helpful for the development of modern logistics.

#### **3.4.2.8 Lack the legal protection and risk apportion**

Nowadays, our country hasn't such regulations as logistics law. There aren't any definite concept of business scale, cargo insurance, liability and lien of logistics in our country. This makes the department such as cargo owner, insurance, port etc. have wrong opinion on the 3PL, for example, the character, basic business scale, right, liability, limitation of liability and exceptions. When dealing with the problem of economy, they can not rely on any law or regulations. This also is not helpful for the development of logistics in China.

## **4 SOLUTIONS TO SUCCEED IN ELECTRONIC APPLIANCE LOGISTICS FOR 3PL COMPANIES**

### **4.1 The way of changing from traditional logistics company to 3PL company**

There are three transform ways for logistics companies: internal transform, exterior transform and integrated transform.

Internal transform is a way to become 3PL through the internal resources integration and overcome the internal obstacles under a certain strategy goal. Firstly, according to the basic requirements of 3PL, the relative strategy should be made and put in practice under the strategy instruction. Secondly, the internal training should be enhanced and we should improve the form of modern logistics conception which provides a stable base of idea. Thirdly, intensify the investment of infrastructure, especially the build of information system, and create the qualification of value-added service.

Exterior transform refers to a way to become a 3PL by using exterior resources and power to conquer the difficulties. The key of this approach is how to choose an exterior target enterprise and alliance. In fact, this kind of way is also a strategy alliance. The traditional logistics company can make use of qualification of

engaging in logistics function service and to find the experienced and powerful 3PL companies. Through alliance even imbalanced alliance, it will develop the logistics service under the unified lead of logistics service and give up the current initiative. Then it can accomplish transforming to 3PL by the unequal alliance to finish self-experience, accumulation of business and eliminate the internal obstacles.

The integrated transform is a way to become 3PL by choosing an approach for the different phases and aims in order to overcome the internal obstacles. This approach has more agility and can finish the change in a faster and more effective way according to different exterior environment and possible opportunities.

The traditional logistics companies are the basic of logistics activities in China as well as the fundamental of 3PL development. Although there are many ways to transform to 3PL for a traditional one, as long as logistics companies choose a way which suits itself, the change must be successful.

## **4.2 Enhance information system management**

As a 3PL company which serves for the electronic appliance industries, it must be equipped with a powerful and practical information system. As a matter of fact, information is one of the core contents of 3PL. To be a 3PL company, it should have the information of the location and conditions of the cargoes. When it is necessary, 3PL company as the supporter and service supplier of the electronic appliance company, it should help the electronic appliance companies to manage their inventory properly. We can assume that when a branch of electronic appliance company is out of stock, it will absolutely need to replenish products. If the 3PL

company can not provide the all-round products information at that time, it is possible that the electronic appliance company will make a wrong decision based on the wrong information. For instance, if we transport the products which are nearby on the way to the farther warehouse, and again transport them from the warehouse, or the products can just move from the nearby warehouse, all these lead to the increase of logistics cost and waste of time. Because of the incomplete information system, the electronic appliance company will lose a lot not only the cost but its business chances as well.

As a 3PL company, it must build an information system which is suitable for electronic appliance industry depending on the status quo and characteristics of this industry. It is not necessary for 3PL to use some unpractical information systems. For the electronic appliance company, GPS is an important part of information system. Considering the electronic appliances are in relatively high value and the cost of inventory is very high, if they can get the inventory information accurately and in time, it will reduce the inventory, adjust the cash flow and redeploy the inventory quickly and effectively. So I think GPS system should be equipped in all trucks. As for the enterprises the best solution is to achieve "just in time", 3PL should make its effort to achieve this target.

A qualified information system should be as follows:

- 1) To achieve real-time inventory management: when an electronic appliance is sold, the related inventory will be reduced. The enterprises can know the inventory information at the same time. According to the inventory, they can avoid to sell the out of stock products and pull to produce them. The marketing department can also follow this information to develop their business.

2) To achieve the statistic automatics: the system should create different kinds of statistic report automatically. And it can analyze the trend of sales, sales region, sales differences and profit.

3) To achieve the inventory management automatics: after everyday sales, the system can send order to the manufacture department automatically according to the products which needs to be replenished. The manufacture department can also check the information of their products to prepare producing them.

4) To achieve low cost logistics: the electronic appliance enterprises have to build their branches and warehouse all over the country. However, 3PL companies can provide such service for them and they don't need to invest a lot of capital. And 3PL companies just rent truck and warehouse for their customers, which leads to the lowest cost.

### **4.3 The module and application of logistics delivery routes**

The vehicle routing problem is a key problem in the logistics delivery as well as the hot topic of combined optimized field. In the below, I will be on behalf of a 3PL company to build a VRP module for one electronic appliance company (F company), according to the characteristics of its distribution center. And I use the saving calculation method to optimize the delivery networks and at last I find a most satisfied scenario. <sup>13</sup>

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<sup>13</sup> Bo Xinyi& Yu Tao <the module and application of logistics delivery routes> "journal of hangzhou dianzi university" Feb. 2005 Vol. 25, No.1

### **4.3.1 Introduction**

People always call the transportation that facing the demanders in the cities and regions, delivery. One characteristics of the delivery is that the cargo transportation destinations are customers. Secondly, it is necessary to distribute the cargoes before delivering them. During the distribution, there is a vehicle routing problem (VRP), which is a very attractive optimizing problem. It attracts a lot of scientists, engineers and managers to study. Considering the characteristics of vehicle routing problem, I think that there is very important meaning for not only the delivery system but the optimization of vehicle routing problem as well.

### **4.3.2 The assumption of the VRP module and the build of VRP module**

Dantzig and Ramser raised the VRP module earliest and this module becomes the front and hotspot problems of the operational research and combined optimization field. The purpose of studying this problem is to achieve a certain optimized goal by designing some proper route according to the customers' requirements. It also should fulfill some restrictions (e.g. quantity of cargo requirements, quantity of sending, time of sending, restrictions of truck volume, restrictions of distance and the restrictions of time) to achieve the optimized goal.

#### **4.3.2.1 The assumption of the module and some factors**

(1) The assumption of the module

When considering the VRP module, we should assume the follows: there are X

customers in the city and we know the location the cargo requirements of them. The capacity of the truck is a certain figure but its amount is not. VRP module is to rank the customers where the trucks will arrive and meet every customer's needs as well as minimize the cost of transportation. (Every truck has one route and both start and end are the original point.)

(2) The factors that should be considered

Before setting up the VRP module, we should firstly study the practical issues. So the followed problems should be considered.

a) Warehouse. The technologies of the warehouse, the amount places and scale of every warehouse should be considered.

b) Vehicles. The type and amount of the vehicle, the capacity cost of each vehicle, the departure and arrival time, the rest time for the drivers, the maximum distant and time restrictions would be taken into considerations.

c) Time coordination. As for the difference of the working hours, there should be some coordination among every spot.

d) Customer. The demand of the customers, loading and unloading, the location, separating needs and priority classes will be considered.

e) The information of road. The density of traffic, charges of road transportation, attribution of distance and time need to be considered.

f) The information of the cargoes. We should consider the amount of cargo categories, fresh keep and compatibility.

g) The rules of transportation. The working hours for the employees every day and the periodic maintenance of the vehicles.

#### 4.3.2.2 The background of F Company and the setting up of VRP module

(1) F company is a very famous electronic appliance company in China, which is run by Japanese. The headquarter of this company is in Japan. The shanghai branch is located in Jiading industrial park, which is one of its four manufacturing bases in the world. The shanghai branch is set up in 1994 and its products, the air conditioners, are well sold. It covers a certain share market and its target customers are those who have a relatively high income and would like to enjoy a certain high living standard. With the high demand of its air conditioners, F company wants to set up a distribution center in shanghai. The task of the distribution center is to receive the order from shanghai and the nearby cities. And it will send this information back to the factory in Shanghai. Meanwhile it will also receive the command from there. After that the distribution center will arrange the vehicle and send the cargoes to the destination in time. In order to build the module easily, I will ignore the time differences, road information and the transportation rules.

(3) Build the VRP module of F Company

I will introduce the symbol below in order to express easily

- a) the customer muster,  $P = \{i\}$ ,  $i = 0, 1, \dots, n$ , and  $i = 0$  is the original spot;
- b) the vehicle muster,  $M = \{k\}$ ,  $k = 1, \dots, m$ ,  $m$  is decision variable which is to be decided;
- c) The demand quantity of customer  $i$  is  $q_i$ ,  $i \in V$  (when  $i = 0$ ,  $q_i = 0$ );
- d) The distant from customer  $i$  to customer  $j$  is  $C_{ij}$ ,  $C_{i0} = 0$ ,  $C_{0j} = 0$ ,  $i \in P \setminus \{0\}$ ,  $C_{ij} = \infty$ ,  $i \in P$ ;

e) The capacity of every vehicle (the maximum carry capacity of every vehicle are the same),  $Q \geq \max \{q, i \in P\}$ .

Then we can build the VRP module with the assumptions before.

Min m

$$\min \sum_i^P C_{ij} \sum_k^P x_{ijk}$$

Restrictions

$$\left. \begin{aligned} \sum_{k=1}^m y_{jk} &= \begin{cases} 1, & i = 1, 2, \Lambda, n \\ m, & i = 0 \end{cases} \\ \sum_{i=1}^n q_i y_{ik} &\leq Q \quad \forall k \quad k = 1, \Lambda, m \\ \sum_{j=1}^n x_{ijk} &= \sum_{j=1}^n x_{jik} = y_{jk} \\ &(i = 1, \Lambda, n) \quad (k = 1, \Lambda, m) \\ \{0, 1\} &\exists y_{ik}, \{0, 1\} \exists x_{ijk} \\ \{i, j = 0, \Lambda, n\}; &(k = 1, \Lambda, m) \end{aligned} \right|$$

$x_{ijk}$  and  $y_{ki}$  are variables and they refer to:

$\left\{ \begin{array}{l} y_{ik}=1, \text{ the tasks of customer } i \text{ are finished by vehicle } K \\ y_{ik}=0, \text{ others} \end{array} \right.$

$\left\{ \begin{array}{l} x_{ijk}=1, \text{ after visit customer } i, \text{ the vehicle } K \text{ moves to the customer } j \text{ directly} \\ x_{ijk}=0, \text{ others} \end{array} \right.$

### 4.3.3 The way to calculate by using VRP module and data gather

#### 4.3.3.1 Saving calculation

In order to make the optimized scenario of the delivery in the VRP module, I will

use the saving method of calculate (can also be called distance saving method).  
 With the prompt of the module, the scenario should not only achieve the minimum of the total distance but also meet the requirements as follows:

- (1) Meet the requirements of all the users
- (2) Don't allow any vehicle to be overloading
- (3) The distant that every vehicle covers for every day should not be more than the upper limited
- (4) The scenario can meet all the requirements of the arrival time.

#### 4.3.3.2 The conclusion and classify of the data

After I analyze the sales of the F company in Shanghai in 2005, I rank its customers and choose ten of them. Now I make the tables as bellows. Table 1 is the distant between distribution center and the 10 customers  $P_j$  ( $j=1, \dots, 10$ ) and the customers' requirements for the cargoes Q. table 2 is the distance between the customers:

**Table 1 Distance between distribution center and customers (km)**

Customer Distribution	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
C	3.5	19	5	4	25	12	7.5	25	17	11.5
Q	133	310	358	125	306	332	334	300	179	273

**Table 2 Distance between the customers**

Customer Point	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1		18.5	3	3	27	13	9	24	17	18.5
P2	18.5		19	18	14.5	16	11	12.5	16.5	7
P3	3	19		1.5	28.5	17	11	23	22	23
P4	3	18	1.5		26.5	16	11.3	22	21	18.5
P5	27	14.5	28.5	26.5		15	17	12	10	2.5
P6	13	16	17	16	15		14.5	14	5	6.5
P7	9	11	11	11.5	17	14.5		17	10	8.5
P8	24	12.5	23	22	12	14	17		15.5	9
P9	17	16.5	22	21	10	5	10	15.5		4
P10	18.5	7	23	18.5	2.5	6.5	8.5	9	4	

**4.3.3.3 The confirmation of the initial scenario, revised scenario and the ultimate scenario**

**1) The confirmation of the scenario**

We can use the data from Table 1 and Table 2 by using the saving method, and we can achieve the scenario bellow.

(1) The initial scenario: we send the vehicle to the customers separately and there are 10 routes.

The distance:  $S_0 = 2 \sum_{i=1}^{10} d_{0j} = 129.5 \times 2 = 259 \text{ (km)}$  | the vehicle: 1t×10

(2) The revised scenario1: according to the rank of  $\Delta C_{ij}$  from big to small and link P5 and P8, P5 and P10. Then I can get 8 routes and the distance is  $S_1 = S_0 - S_5 - 10 - S_5$ ,  $8 = 259 - 34 - 38 = 187 \text{ (km)}$

The quantity of the cargo that are loaded on the trucks:

$q_A=q_5+q_8+q_{10}=360+300+273=879(\text{kg})=1.879(\text{t})$ ; the number of the trucks:  $1\times 8$ .

(3) revised scenario 2: rank  $S_{ij}$  from big to small, and we can get  $S_{2,8}$ 、 $S_{2,5}$ 、 $S_{2,10}$ 、 $S_{6,10}$ 、 $S_{8,10}$ 、 $S_{8,9}$ 、 $S_{9,10}$  , the biggest of them is  $S_{2,8}=32.5(\text{km})$ , at the same time P8 is belong to route A. If we put P2 into route A, the vehicle would be overloaded. And the customers of other routes will also join the route A, which can lead to be overloaded, so it wont be considered. In the left  $S_{ij}$ , the maximum is  $S_{6,9}=24(\text{km})$ . We can get a revised scenario, when link P6 and P9. The number of route is seven; the distance:  $S_2=S_1-S_{6,9}=187-24=163(\text{km})$ ; the quantity of the cargo that are loaded on the vehicle:  $q_B=q_6+19=332+179=511(\text{kg})=0.511(\text{T})$ ; the number of vehicles:  $1\times 7$ .

In the same reason, we can also get the revised scenario 3、scenario 4 and scenario 5.

(4) the ultimate scenario: in the left  $S_{ij}$ ,  $S_{2,3}$ 、 $S_{2,4}$ 、 $S_{3,10}$ 、 $S_{6,7}$ 、 $S_{1,4}$ 、 $S_{1,8}$ 、 $S_{1,2}$ 、 $S_{1,9}$ 、 $S_{4,5}$ 、 $S_{1,6}$ . as the related customers have already belong to the finished routes, we don't consider them. After putting P7 into route C, we can get  $q_C''=q_C'+q_7=616+334=950(\text{kg})=0.95(\text{t})$ ,  $S_6=S_5-S_{1,7}=130.5-2=128.5(\text{km})$ . So we get the ultimate scenario at last.

Three routes are shown as follows:

Route A  $P_0--P_8--P_5--P_{10}--P_0$  using one 1ton truck

Route B  $P_0--P_2--P_9--P_6--P_0$  using one 1ton truck

Route C  $P_0--P_7--P_1--P_3--P_4--P_0$  using one 1ton truck

#### **4.3.3.4 Conclusion**

In this chapter I optimize the delivery network by using saving calculation. Although there are only 10 customers in the module and the scales are small, it can also solve the demand of customers by information technologies. Of course, the

efficiency is very high. In this module, the cost of distance is the highest cost in all factor costs. So we can reduce the distance to lower the cost; secondly, with the reduce of the distance, the consumption of the gasoline, number of drivers and working time will accordingly be reduced.

#### **4.4 Improving the customer service**

It is very hard for enterprises, employees and customers to improve the customer service. Customer service should not only stay on the level of company strategy. We should look it as an operational assignment and regard the customers as our core business. There are a lot of kinds of electronic appliances, from big to small, heavy to light. So when 3PL companies meet different electronic appliances and different customers, they should provide different customer services.

Nowadays, CRM is very popular in the world. We can apply CRM idea to the electronic appliance logistics. In order to satisfy the customers, 3PL companies should provide good service for them. 3PL companies can firstly segment the target market. According to the different electronic appliance companies, 3PL companies should customize a workflow for them and appoint a certain person to deal with their shipments.

#### **4.5 The standard of operation workflow**

As I have mentioned before, 3PL companies should make different workflows for the different customers, because different customers have different requirements. As for the electronic appliances, I suggest that the 3PL companies should make a workflow as below:

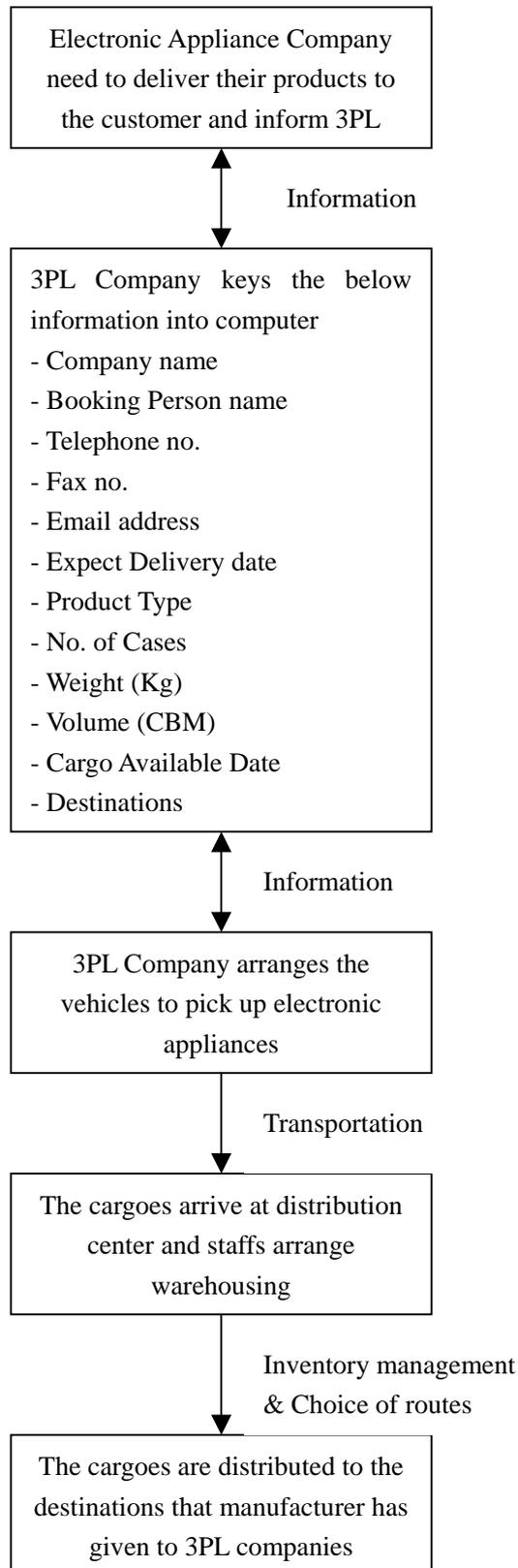


Figure 3 The standard workflow of 3PL for electronic appliance companies

#### **4.6 Gain various customers**

However, 3PL companies can not make great profit by only dealing with electronic appliances. Considering that most of the electronic appliances are in big size, the containers or trucks cannot be fully loaded. This must increase the total cost of logistics. So it is very necessary for 3PL companies to get different customers. Nevertheless, not all kinds of cargoes can be loaded together with the electronic appliances. As the electronic appliances are clean and with high value, some dirty cargoes or liquid, bulk cargoes are not permitted to put together. Furthermore, it is better to get other cargoes along the routes. Because after we have picked up the electronic appliances and on the way to the distribution center, it will save cost to get the cargoes just on its way. Let's assume that if we go to another destination which is far from distribution, the cost will be raised without any doubt.

## 5 Conclusion

As 3PL companies become more and more popular in China and the concept of 3PL is also gradually understood by people in China, the 3PL companies should learn the advanced management from the foreign enterprises in order to improve its own development.

The electronic appliance industry meets with the problems of cost in the recent years and gradually finds that it is very necessary for them to cooperate with 3PL companies. They begin to outsource their logistics part to the logistics companies and let them manage this part. By this means of outsourcing, it can not only save the total cost but also can make them focus on their own core business: research and produce electronic appliances. Thus, there appear some problems. Most of 3PL companies in China can not meet the electronic appliance industry's needs and can't provide a satisfied service for them. This results from the logistics companies which exist in china now. For example, incomplete information system, lack of persons with skills, short of the standard workflow special for the electronic appliance industry and lack of modern management method. These shortcomings should be improved soon. At last, I build a VRP module which can reduce the total cost and time for the 3PL companies. Meanwhile, according to my working experience in a logistics company, I made a standard workflow for 3PL. I hope that these can be the good suggestions for 3PL companies and can ensure them succeed in electronic appliance logistics.

In a word, I think, for the 3PL companies concerned electronic appliance industry, they should enhance system management and educate their staffs to be the experts in the logistics industry. Of course, it's necessary to set up a standard workflow for handling the business of logistics. Once the standard workflow is established, it should be the rules for operating this business and it's easy for everyone to operate the logistics procedure. It's certain that it will avoid a lot of defaults.

I sincerely wish that the 3PL logistics company in China would play an important role in the market, especially in the market of electronic appliance industry.

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