

World Maritime University

# The Maritime Commons: Digital Repository of the World Maritime University

---

World Maritime University Dissertations

Dissertations

---

7-20-2013

## Study on how the third party logistics of warehousing system to serve the medium size C2C merchants

Shu Wang

Follow this and additional works at: [https://commons.wmu.se/all\\_dissertations](https://commons.wmu.se/all_dissertations)



Part of the [Analysis Commons](#), [Economics Commons](#), [Operations and Supply Chain Management Commons](#), and the [Transportation Commons](#)

---

### Recommended Citation

Wang, Shu, "Study on how the third party logistics of warehousing system to serve the medium size C2C merchants" (2013). *World Maritime University Dissertations*. 1648.  
[https://commons.wmu.se/all\\_dissertations/1648](https://commons.wmu.se/all_dissertations/1648)

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact [library@wmu.se](mailto:library@wmu.se).



**SHANGHAI MARITIME UNIVERSITY**



**WORLD MARITIME UNIVERSITY**

Shanghai, China

**STUDY ON THE IDEA OF NEW TPL  
WAREHOUSING SYSTEM FOR MEDIUM SIZE  
C2C MERCHANTS**

By

**Wang Shu**

**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**

**INTERNATIOANL TRANSPORT AND LOGISTICS**

**2013**

Copyright Wang Shu, 2013

## **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

(Signature): .....

(Date): .....

## **Acknowledgement**

First of all, I would like to extend my sincere gratitude to my supervisor, Gu weihong, for her instructive advice and useful suggestion on my dissertation. I am deeply grateful of her help in the completion of this dissertation.

I am also deeply indebted to all the other tutors and professors from Would Maritime University for their direct and indirect help to me.

Finally, I am indebted to my parents for their continuous support and encouragement.

## **ABSTRACT**

With the popularization of the Internet, the online shopping are widely used in the daily life. To meet the different demands of people from all walks of life, the C2C E-trade plays a more important role in the E-market. However, the logistics problem to some extent, set the block to the development of the C2C E-business, especially the medium size. The purpose of the dissertation is to set a new TPL warehousing system with the idea of Third Party Logistics and Logistics Alliance. Then analysis on how the system serve the medium size C2C merchant, which may create a new kind of TPL service in the future market and set a solve to the logistics problems of the C2C E-business.

### **KEYWORDS:**

C2C E-business, TPL, Warehousing system, Medium size merchants, C2C logistics problems

## TABLE OF CONTENTS

Declaration	II
Acknowledgement	III
Abstract	IV
Table of contents	V
List of tables	IX
List of figures	X
<b>1 Introduction</b>	
1.1 Background of this dissertation	1
1.2 Research purpose	2
1.3 Literature review	2
1.4 The framework of the dissertation	6
<b>2 C2C e-business and third party logistics of warehousing</b>	
2.1 The basic logistics problems of C2C e-business	7
2.2 How tpl and logistics alliance serves C2C	13
<b>3 The idea of new tpl warehousing system</b>	
3.1 The idea of new tpl warehousing system	15
3.2 The compare between the traditional process and new one	23
3.3 The analysis on the feasibility of the idea	25
3.3.1 RESEARCH SUPPORT	25
3.3.2 BASIC SUPPORT	25
3.3.3 THE MARKET SUPPORT	27
<b>4 Modeling</b>	
4.1 Transaction flow diagram model	29

4.1.1	THE GENERAL INTRODUCE OF TRANSACTION FLOW DIAGRAM	29
4.1.2	THE PURPOSE OF MODELING	30
4.1.3	THE PREPARE WORK OF SETTING THE FTD MODEL	30
4.1.4	MODELING	32
4.2	Analytic hierarchy process model	35
4.2.1	THE PURPOSE OF SETTING AHP MODEL	35
4.2.2	THE PREPARE WORK OF SETTING THE AHP MODEL	35
4.2.3	THE CALCULATION	42
<b>5</b>	<b>Analysis on the new system</b>	
5.1	The advantage of the new warehousing system	46
5.2	The disadvantage of the new warehousing system	48
<b>6</b>	<b>Summary and conclusion</b>	
6.1	Summary of the new-designed tpl warehousing system	51
6.2	Conclusion	52
	<b>Reference</b>	53

## **List of Tables**

Table 1	The information about the sellers in Taobao	8
Table 2	The data of several Taobao medium size C2C merchants	17
Table 3	Paired comparison	38
Table 4	The result of the weights of the factors	39
Table 5	The number of RI	42



## **List of Figures**

Figure1	The general process of traditional C2C	16
Figure2	The traditional system of the C2C warehousing and delivery process	18
Figure3	The general process of the new TPL warehousing system	20
Figure4	The FTD model made by Visio	32

# **1. Introduction**

## **1.1 Background of this dissertation**

With the development of the Internet, more and more people realize the comfort of the on-line life, which also lead to the rapid development of the E-business. Compared with the traditional shopping, people can always find it comfortable with big range of choices. When the customers ask for more personalized services and wider range of choices, only B2C<sup>1</sup> E-business can't afford more requirements, so the C2C<sup>2</sup> begins to spring up like mushrooms after rain. The remarkable examples of the C2C E-business website are: Taobao.com, Paipai.com, Eachnet.com, etc.

However, when the C2C starts to own a certain scale, the problems emerge. When the C2C suppliers reach the medium size, they can be no long the family workshop which means they need more space and men for the business. They have to rent the warehouses and hire some people to take care of the warehousing work, including picking, packing and delivery. At this time, how to reduce the cost, meanwhile keep or even improve the service level can be a serious problem for them. The logistics process is the important part for on-line shipping, not only the B2C but also the C2C suppliers should focus on the logistics and try to reduce the cost of that part but improve the service. The researches show the result that the logistics alliance and the third party logistics service is the way that can solve the basic or even the personalized logistics work.

---

<sup>1</sup> B2C: Business to Customer

<sup>2</sup> C2C: Customer to Customer

Unfortunately, the TPL nowadays is more likely cooperating with B2C supplier for its scale and certain terminals. The research of the C2C logistics solution beanarmchairstrategist but without enough practice. The real model or system, which fits to every part or the integrated logistics process of C2C, should be set and put into practice to observe whether the theory and the system is reasonable or not.

## **1.2 Research Purpose**

The main goal of this dissertation is to study and design a new set of warehousing system for C2C E-business with the thought and analysis of the weak point and the real needs of the C2C logistics service of warehousing, also to focus on analyzing the feasibility and the advantage of the new-designed system. The new system is built on the idea of logistics alliance and third party logistics.

## **1.3 Literature review**

### **1) Recent research of the TPL<sup>3</sup> service of warehousing for medium size of C2C<sup>4</sup> Business**

With the development of the C2C business, the serious competition among the practitioners make them trend to reduce the cost and improve the service level. To meet that requirement, many experts have done lots of research and raise plenty of opinions.

---

<sup>3</sup> TPL: Third Party Logistics, is a firm that provides service to its customers of outsourced (or "third party") logistics services for part, or all of their supply chain management functions.

<sup>4</sup> C2C: Customer to Customer

First, research on basic idea of logistics of warehousing for C2C is Third Party Logistics or Logistics Alliance. In Gong Fang's article (2010), we can see that limited by the scale of the business, the medium size of C2C practitioners are without the power to build up their own logistics service/business. Instead, they are better to choose professional logistics service suppliers to offer the warehousing service, which, for sure, including stowage, picking, packing and transfer. Many researches also are made to show the advantages of the third party logistics service to B2C and C2C business model. The research made by the University of Tennessee and the United States and Georgia Tech University (2008) shows that the TPL has been the best choice for the e-business as the logistics model.

Second, The Transaction Flow Diagram (TFD) is able to illustrate the exchange or the transfer of the information and the goods in the new TPL warehousing system and explain how the new TPL warehousing system benefits the users. Besides, the Analytic Hierarchy Process and the Weights is conducive to solve the problems with both qualitative analysis and quantitative analysis. The thesis made by Wang Rongpei, et al. (2005) tells us how AHP helps to select the right logistics suppliers.

Third, not only the theory research is attractive, but many businessmen also apply the studies into special cases and find the business opportunities. The Amazon chooses the TPL to support its logistics system and the good cooperation between Amazon and its TPL can be seen in the report of Lin Xiangping (2006). Not only the Amazon, in China, Alibaba is the most famous e-business company with B2C (Tmall) and C2C (common Taobao shops). The strategy report about logistics development of Alibaba (2011) clearly tells the market that the company will invest 10 billion in the storage area to establish the logistics service of Taobao to improve the service level.

However, the research and the application of the TPL of the warehousing is almost in the field of B2C business. To the contrary, the theories and the studies are not applied in the field of C2C, especially the medium size of the practitioners, that often. To be honest, there are many problems existing and the immature system of the TPL of warehousing for the medium size of C2C also stops the process of the application. The rethinking of these problems and the creation of the new system of the TPL of warehousing will surely be attractive and useful in the future.

## **2) Existing problem**

As I mentioned, problems still exist.

✧ *The initiating terminal of the C2C business can be everywhere. The dispersal of the providers will cause a big sum of waste, which will also lead to the difficulty of reducing the logistics cost.*

This is clearly explained in the article from He Juan (2007). In the C2C business, especially the medium and small size of the C2C, there is always not the big deal. Every package is small, the senders (or the place of the warehouses) and the receivers can be everywhere, all of these can be the main source of waste. The complicate routes of picking and delivering or the nonstandard packings can bring about the high level of the cost and set the obstacle to hold back the market from reducing the cost. So the high price of logistics will always be the problem to the C2C business, which is clearly showed in the paper from Sun Ruizhe, et al (2009). People always think the low price as the advantage of the on-line shopping, so if the high cost of logistics is raising the total price of the cargo, the on-line shopping will soon loss its market share.

✧ *It is not easy to select the TPL suppliers and the difficulty to control the service quality is always there. So the both sides of the C2C are worried about the real quality of the logistics service. The WAY to select the TPL suppliers and the*

*standard to judge the service should be the groundwork of the whole system.*

The article from Gong Fang (2010) explains the worry of the customers about the service quality of the TPL, which will also affect the C2C business. The research made by Ye Zhenhua (2008) tells the fact that how the TPL service quality is in connection with the choice of the customers and how to measure that effect. So we can know from these researches that the service level of the TPL is quite important in the whole system. In another word, it is not easy to select the right TPL supplier. Besides, to measure the service level scientifically can straight make it different in the final choice. Yang Huizhen, et al (2011) published a report to suggest that Data Envelopment Analysis (DEA) can offer the function to measure the service with the quantitative analysis for choosing the right TPL supplier.

- ✧ *To start a new system, the legal issues should be taken into account seriously. The legal issues involve legal nexus, contract, liabilities and obligation, safety and labor issues, etc. Some issues are with legal provisions, but some are not (because in some way the new system is a new creation).*

There are many items we should think carefully about when we talk about the legal issues of the new TPL of warehousing system, which are clearly listed in the research made by Yang Lijie (2012). Thereinto, the contract between TPL supplier and the customer involves quite a lot of things. Some articles aim to this area, such as from XieFei (2011), Liu Yansong (2012). Wang Xiangyang (2012) tells about the responsibility and the obligation in the TPL system in his research paper. So, with these articles, we are sure that everything the Codes for the whole system still need plenty of work and the items of the contract need negotiation.

- ✧ *The real application of the new system still has plenty of uncertainty, for lack of practice, lack of data to calculate and lack of the real case.*

After looking for the articles, a real problem can't be overlooked, which is the

real practice. Most of the articles are just talking about the idea of Logistics Alliance to solve the logistics problem of C2C and they also explain the theory of the advantage of the TPL to the C2C business. So it is difficult to find the example or the real date when making the simulation, which can be part of the challenge to the setting and research of the new TPL of warehousing for C2C business.

In a word, the new TPL of warehousing system to serve C2C business still has a long distance to go. Although there are more people realize that the Logistics Alliance and TPL service is the way to deal with the logistics problem of C2C, there is no deeper than a fact, not to say every single part of the system or different systems which are fit to every step of the logistics process.

#### **1.4 The framework of the dissertation**

The framework of the dissertation is based on the train of thought and the methods I suppose to use. The outline of the dissertation can be:

- First Part: Introduction, which including the background and the literature review.
- Second Part: Study on Theories
- Third Part: Discuss on the idea of the new TPL warehousing system
- Forth Part: Modeling, including the AHP<sup>5</sup> and the FTD<sup>6</sup>.
- Last Part: Analysis on the advantage and disadvantage of the idea.

---

<sup>5</sup> AHP: Analytic Hierarchy Process

<sup>6</sup> TFD: Transaction Flow Diagram

## **2. C2C E-business and Third Party Logistics of warehousing**

### **2.1 The basic logistics problems of C2C E-business**

Not like the traditional shopping, on-line shopping has its own particularity. In brief, the on-line shopping is “Trade first, and then touch the thing.”

This particularity, of course, would work with the word “Accredit”. For some reason, the Business-to-Customer, whose abbreviation is “B2C”, really has its own advantage in this aspect. Usually B2C is backed up by a business subject, which is visual or touchable in real life (sometimes the B2C traders work in a large scale of business). This will help the B2C traders win more accredit.

However, C2C E-business just goes another side. The two terminals are both untouchable to each side, so the credit problem is not only the quality and condition of the goods (which are customers believing in the C2C merchants), but also the payment (which are merchants believing in customers), that is to say, the special condition of the trade make the characteristics of the C2C E-business:

#### 1) The characteristics of Consumers

Ordinarily, the consumers of the C2C E-business are individual or family, so the quantity and the sum of the deal per time cannot be in a big number. Besides, the sex, level of income, age and types of the consumers all cover different ranges, even the location of them are all over the country (world). Moreover, the consumers are always with rational thinking. Namely, they prefer to pinch pennies and shop around for the best deal.



2) The characteristics of Sellers

The C2C E-business platform is a marker for individual businessmen, so the merchants can be in full-time or part-time job. Although the C2C E-business has created quite a lot employments for people, the scales of the E-sellers are always very small. The data provided by the Taobao Data-plate (can be seen in Table1-The information about the sellers in Taobao) shows the state:

Table1-The information about the sellers in Taobao

<b>LEVEL<sup>7</sup></b>	<b>PERCENTAGE</b>	<b>The percentage of three sizes</b>
No Record		
1 Heart		
2 Heart	19.7	
3 Heart		
4 Heart		
5 Heart		83.1
1 Diamond	6.5	
2 Diamond	7.1	
3 Diamond	17.2	
4 Diamond	20.6	
5 Diamond	12.0	
1 Crown	8.18	
2 Crown	5.78	
3 Crown	1.81	16.8
4 Crown	0.72	
5 Crown	0.31	
1 Gold Crown		
2 Gold Crown	0.1	0.1
3 Gold Crown		

Source: The analysis on the credit level of Taobao E-shops

<sup>7</sup> The standard that Chinese C2C E-trade Website Taobao use to level the C2C merchants

Besides, for the lack of the capital and great executive ability, the sorts of the goods sold in the E-shops can't be as many as in E-shops of B2C. In addition, the capability of environment controlling of them is also not enough, which means this work is not what we call in "career" and they might stop it when anything goes wrong.

### 3) The characteristics of goods

The main advantages of the goods in the C2C E-business market are the low price and the wide range of the kinds and brands. However, because of the characteristics of Sellers and Consumers, it is a trade of retailing, what is to say, every order is, usually, in little quantity and volume.

### 4) The characteristics of delivery

The delivery requirement of the C2C E-business is that the accuracy rate of the delivery should be 100%, even if both the terminals were small and dispersive. Moreover, the delivery should be in-time or on-time and guarantee the safety and completeness of the parcels. In consideration of the price advantage of the C2C trade, the price of the delivery should also be economical and practical, even, sometimes, it needs individualization service.

In short, first, the number of the participants in the C2C trade is very tremendous and with wide coverage. Not only the total of the customers is big but also they come from all walks of life (different ages, different sexes, different social classes etc.). Second, the goods in the C2C trade are in varied forms with huge amounts. Besides, the C2C trade is flexible. The communication, ways of bargain, means of exchange and transaction mode can all be provided with great flexibility.

The characteristics of the C2C trade also determine the problems of it.

#### 1) The high expense of the logistics cost

The characteristics of the Internet lead to the dispersal and uncertainty of the E-business customers, but because of the dispersal of the delivery terminals, which goes against the logistics/express companies to achieve the centralized distribution to cut down the cost of transfer, the logistics/express companies cannot offer the C2C traders with a lower price.

Besides, the each order of C2C trade can't be with high value or big quantity, which means the expense of logistics covers high proportion of the whole cost of each order and it is hard for them to come with the economics of scale. Meanwhile, the C2C merchants are at a distinct disadvantage when bargaining with the express companies.

Unfortunately, the one of the main advantages of the C2C trade is the low price of the goods, so the high expense on logistics would weaken the advantage of C2C E-business.

#### 2) The problem of TPL companies

The bottleneck of the logistics of C2C is also caused by the repetitiveness and dispersal of the layout of the Third Party Logistics companies, which is generated by the omission of the unestablished TPL information exchange platform and a supervisory organization. Without the scientific planning rational layout and the prompt information exchange, the layout of the TPL companies would cause a lot of waste of resources and many missing points which can be the shortcoming of the last-km delivery.

Other waste is not just the resource but also the time. The gaps of cargo volume in different directions between different areas stop the express companies from

immediate response. Usually, if they just collect a few parcels in one place, the next step they choose is waiting—waiting for more parcels to go together, so the time is being wasted and would do harm to both C2C merchants (trust from customers and the reputation) and customers (waiting longer). However, if the express companies respond as quickly as they can that would block the optimization of delivery.

### 3) The problems of delivery

- Accuracy

In fact, the accuracy of delivery (express service) in China just meets 80% of the standard in developed countries. The main causes of that are low intensity of logistics network and low initiative of the couriers, which bring about the miss-delivery and re-delivery.

Additionally, with the data provided by China first <The survey of the satisfaction at E-trade express service>, we can find that, in 2012, there are 137351 complains about the express service, 117.7% more than in 2011 whose number is 49465. Among these complains, there are about 95% of them is the delivery of C2C online trade.

- Security

The complete goods are the core of the E-business, if the goods were damaged on its delivery; the E-trade would end with nothing but lots of problems. The survey said that in the complaints about E-business delivery nearly 25% are about the loss and damage of the goods.

Another cause of the security problem is that some C2C merchants disguise the real nature of the goods which is sure to be the hidden danger during the delivery process.

- **Timeliness**

The complaints in E-trade delivery with the biggest number are the delay problems, which is more than 40%.

In China, the delay of C2C E-trade is chalked up to the shortcomings of logistics management and the lags between every links process. Furthermore, if faced with some special days, such as Spring Festival (lack of labor), On-sale Day (Taobao “Double 11”) etc, it would aggravate the delay problem.

- **Management**

The management problem of the delivery or the TPL companies would affect the further strategy development. The management of the delivery not only needs to focus on the management of the express workers but all so the whole express process.

The survey also pointed out that the low quality of the delivery service was due to the lack of the convention between C2C traders and express service suppliers, which is also a kind of flaw in the management part.

#### 4) The Service Problem

The service of the Third Party Logistics service of C2C E-trade is always a big problem, which can be proved by the data published by lots of surveys and news.

The problem are not only happened in the delivery service but also reflected in failing to meet the further requirements that C2C trade participators may ask for. In the future, the TPL service should take more important role in the C2C E-business, especially for the medium size merchants. Because they are faced with more logistics problem but without the ability to set their own logistics companies, what they have

to do is to relay on the TPL companies to solve the problems for them. That is to say, not only the current quality of the service but also the development of the service is the problem that TPL companies should handle with.

## **2.2 How TPL and Logistics Alliance serves C2C**

To solve such problems, many studies mention several methods:

- Self-support Logistics Service
- Third Party Logistics Service
- Logistics Alliance

### 1) The limitation of the Self-support Logistics Service

The Self-support logistics service can be in two types: one is built by the C2C merchant himself and the other one is built by the C2C E-trade platform (Website). But both of them have the limitations.

The first one asks for high level quality of the C2C merchants, because this decision of development would make them confronted with many challenges and risks. The Self-support logistics business requires the C2C merchants to get into the industry they are unfamiliar with and also need to put a big sum of initial capital. The whole logistics process involves lots of parts, so the investment may be put in renting warehouse, preparing for the warehousing, employing workers, purchasing some vehicle and other several things. What more the merchants should think about is that if the Self-support logistics business is deficit, it would not only block the logistics process of the E-shop itself, but also cut off the capital chain. Nevertheless, the Self-support logistics service is sure to with its own advantage. It can provide the service that meets your own requirement closely and be in high controlling. If the

business operated well, the C2C merchants can push it to the public market and make it to be another profitable business.

The second type is, simply put, the C2C E-trade platform, like Taobao, to set a logistics company to offer the C2C merchants with logistics service. However, although the Taobao Company really has think of this plan, the feasibility and the real gain of it is still open to question. China is a country with magnificently huge land area, so to build a logistics network that can cover all or most of the terminals of the C2C E-trade in China are a very ambitious idea, from which we can tell that it is just a plan in thinking but far away from on its way.

## 2) Third Party Logistics Service

Third Party Logistics has been widely used in current daily life in some way. The most popular one is express service. Most of the C2C merchants choose TPL companies (express companies) to deliver the goods instead of establishing an own-operated transport company. The express companies have its own transport network (of course, there can be some blind points) to connect the both terminals of the C2C E-trades. The price of the service depends on the distance, the location of the terminals, the type of the cargo, the volume and some special requirements. The famous express companies in China are: Shunfeng, Zto, Yto etc.

Besides express service, the warehouses rent by the C2C merchants, especially the merchants of medium size to super size, are owned by the TPL companies. The C2C merchants choose to rent a warehouse to support the business instead of buying or building one, which is said that TPL services, to certain extent, reduce the investment of the business and also reduce the risks of it.

For these reasons, the TPL services offer the C2C merchants with different kinds of

services and resources to let them choose the one they want. TPL is the development direction in many companies and industries. TPL helps the C2C merchants to focus on the E-trade without being bothered by other logistics problems, even the TPL companies can provide high-ends products, such as market research, inventory analysis, tracking and tracing, the whole supply chain management and so on.

### 3) Logistics Alliance

Logistics Alliance is an idea of a model of logistics problem handling. It is based on the fact that most of the C2C merchants are not strong enough to create a self-support logistics company, but they still have a lot of logistics requirement to be met. Some of them (the medium size C2C merchants) are faced with more hard problems than the small size ones, but they are not as powerful as the super traders. So the way they can choose is to get together and be as a Logistics Alliance. In this way the medium size C2C merchants, who are all in a certain area, can collectively deal with the same logistics problems they all have and act as a more powerful community, which can grant them more bargaining counters. Unity is strength. The model of Logistics Alliance is very suitable in China for many C2C traders located in the certain labor intensive industry areas. The collective handling logistics problems can not only give the opportunity to them to cut down the cost for the economies of scale, but also cut down the waste of social resources.

## **3. The idea of new TPL warehousing system**

### **3.1 The idea of new TPL warehousing system**

With the statement above, we can find the result that compared with self-support logistics service, Third Party Logistics and Logistics Alliance may be more suitable



and feasible for C2C E-traders. Usually, the small size of C2C merchants have not that many problems of logistics, at least they don't need to rent warehouses. The super size merchants are powerful enough to handle the logistics problems in their own ways and can be strong party in the negotiation with logistics service suppliers. However, the C2C merchants of medium size are not that lucky. Their businesses are not as small as can get rid of renting warehouses, still not as big as can be strong to argue a better service or a lower price. If they want to make good development (to compete with big size C2C traders) or keep the competitiveness (do better than the small size traders), they have to find some methods to solve the problems. The answer is not TPL only or Logistics Alliance only, but the good combination of the model of TPL and the idea of Logistics Alliance.

The Figure (Figure 1 - The general process of traditional C2C) shows the general

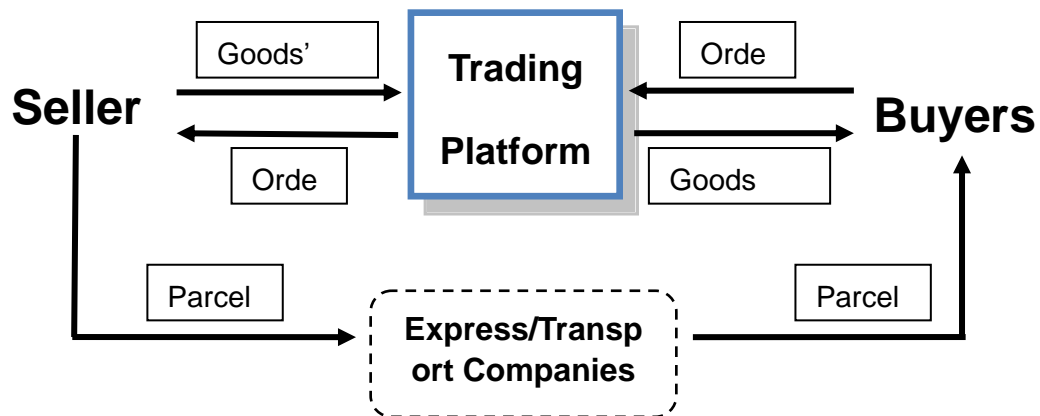


Figure1-The general process of traditional C2C

process of the traditional C2C E-trade. It can let the trade be in progress, but with a variety of unthoughtful points.

The traditional TPL warehousing of C2C E-trade is that the merchants rent the warehouse from the TPL company which can be with the workers or not. The area of the warehouse depends on the scale of the C2C E-shop and the types of goods. The

result of the questionnaire survey made in the Taobao C2C E-traders can be showed in table (Table 2-The data of several Taobao medium size C2C merchants). The data tells us that E-shop with different scales and different types of goods has different requirement on warehouse.

Table 2-The data of several Taobao medium size C2C merchants

The ID number of the E-shop	The level of the E-shop	The area of the warehouse (rent)sq.m.	The number of orders (per day)	The main type of goods
<b>Xiaolajiao***</b>	2 Crown	80	20	maquillage
<b>Xiaoxiang***</b>	4 Crown	150	80	maquillage
<b>Shiwang***</b>	2 Crown	100	50	commodity
<b>Juan***</b>	4 Crown	80	70-100	commodity
<b>Maishi***</b>	5 Crown	400	>300	sundry goods
<b>Kangshi***</b>	4 Crown	60	50	maquillage
<b>Yuanding***</b>	3 Crown	300	>200	sundry goods
<b>Qicai***</b>	4 Crown	50	80	stationery
<b>Taotao***</b>	2 Crown	50	20	maquillage
.....				

Source: By the interviews of the Taobao C2C merchants

Even the merchants can find the suitable warehouses, they still have to handle plenty of problems in the traditional TPL warehouse system.

Like what illustrated in the figure (Figure2-The traditional system of the C2C warehousing and delivery process), the traditional system can be segmentalized into three parts: 1) the interchanging between C2C merchants and C2C E-business

website; 2) the working in the warehouse; 3) give the parcels to the express companies and waiting for delivery.

In this process, the medium size C2C merchants always have to handle messy situation:

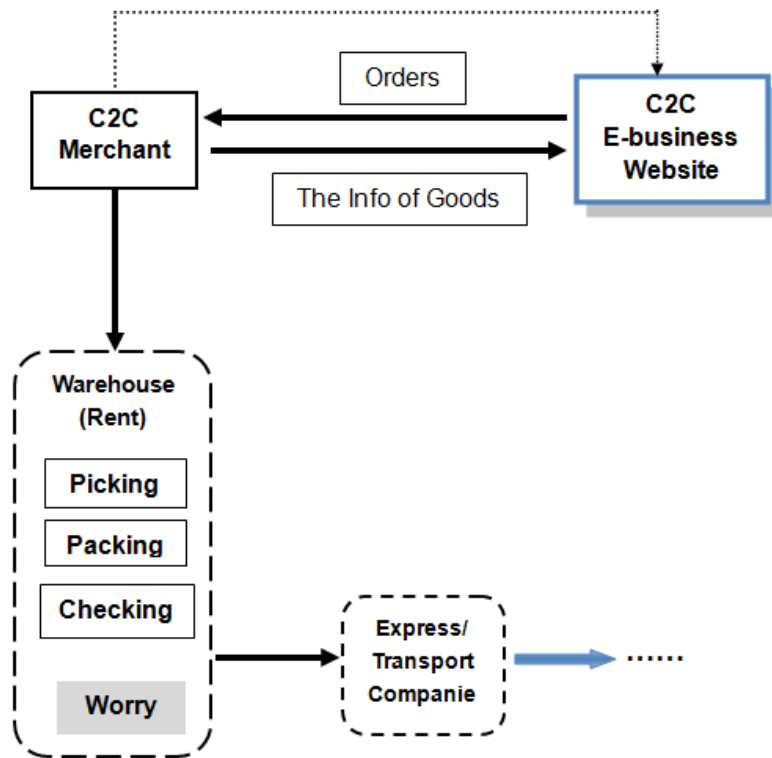


Figure2-The traditional system of the C2C warehousing and delivery process  
 (.....: stands for the rest of the delivery process)

1) Usually, the merchants can't find a warehouse that really suited. The area of the warehouse doesn't need to be as big as the one of super traders, but they are not small enough to do the business without a warehouse (the rent price is also a big part of operation cost). It is different to find a small warehouse with an attractive rent price and equipped with good peripheral resource. Generally speaking, the farther the warehouse from the city center, the cheaper it is while the poorer the peripheral resource is. If the warehouse is close to the city center, it may be equipped with good

resource, but the price cannot be low, which means it is not easy to rent a warehouse that is convenient for merchants to carry on the business while in low price.

## 2) Have to give consideration to two things—Orders & Service

Because the C2C E-trade is a kind of online shopping, the information about the goods published on the website is not enough for the consumers to make the deal. An E-shop with good service always needs the shop-keeper and customer service staff to be online during the working hours to answer the question from consumers at any time. The responding speed is considered as a scoring item of service level of the E-shop. Thus many medium size merchants and their staffs should give consideration to both order picking and online service, even the merchants may have to rush about if the warehouses are far from working place.

## 3) Just be an individual

The medium size C2C merchant works as an individual. Working alone means he can't get more resource and become a great bargainer in trading with logistics service suppliers, such as warehouse owners, express companies and packing material suppliers. Can't achieve a low price means increasing cost and that extra cost is passed on to the selling price of goods, which would also make them lose the advantage of lower price.

Besides, the medium size C2C traders usually are not able to keep pace with the market changes and set the correct management strategy, so they are always in the danger of failing and without the power to protect to themselves.

To the contrary, the new-designed TPL warehousing system is to help the medium size C2C merchants to solve these problems. The general idea of this system is to get

some medium size C2C merchants (all in a certain area) together to join the system, then a TPL warehousing company would be consigned to offer them with the warehousing service in a big warehouse. At this time, these medium size E-traders would cooperate into a big group. (The basic model can be seen in Figure3-The general process of the new TPL warehousing system.)

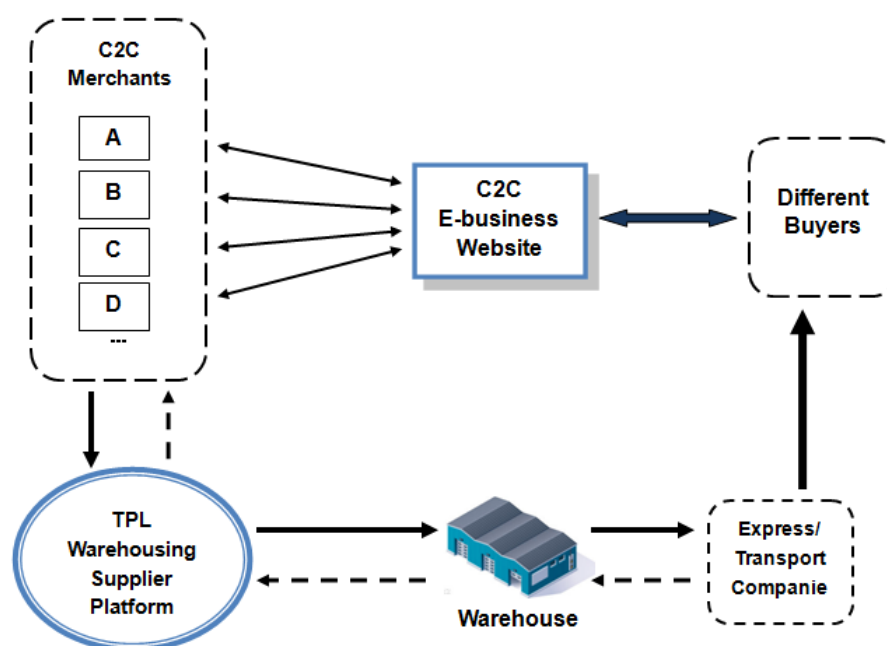


Figure3-The general process of the new TPL warehousing system

The warehousing service can include: Storage service, Warehouse management, employing trained workers, Order receiving, Picking orders, Packing parcels, Arrange for express service, Updating inventory data etc.

The warehousing service supplied by the TPL company can be more technical, more efficient and with high adaptability to be ready for particular cases. The process of picking orders can be treated more fleetly. With the experience of the trained workers, the packing process can be done in conformability to relevant specifications and the workers would ensure that the special goods is treated specially, which can avoid the situation that some C2C merchants disguising the nature of the goods and reduce the

hidden danger during delivery.

The TPL companies have the superiority to find the better warehouse. In terms of economies of scale, the bigger the warehouse service is the less average cost to every join-in C2C merchants is. Generally, the new-designed TPL warehousing system is a kind of logistics integration. The bigger scale would lead to the lower average cost

Besides, the choice of the location can be widened. The TPL company can find a really suited place and the C2C merchants don't need to worry that the warehouse is too far away from city center (or where they live). Moreover, the TPL company has more power and resource to rent or use the warehouse in a more attractive price.

Usually, in order to handle the special storage, the area of warehouse can be at least 10% more than general suitable area. It is clear that the utilization of this 10% area is very low. But if faced with the special storage situation, the spare space is necessary, even sometimes is not enough, which can be seen as an "embarrassing waste".

In the view of the number of the medium size C2C merchants, we can tell that the total area of these spare spaces is very huge. In some sense, this kind of waste cannot be avoided (because it is necessary to take the special storage into account).

However, the new-designed warehousing system will take the inventory cycle of all the goods from different participant merchants into account. Because the inventory cycle of different types of goods from different merchants are different. It is unnecessary to leave the spare space for every merchant but can combine these differences. The TPL company can use their experience and system to calculate the reasonable area of warehouse. This can not only handle the variability of the storage, but also can increase the utilization of the warehouse area. Meanwhile, if the badly

special stock<sup>8</sup> happens, the TPL company can use its resource to find a nearby temporary warehouse to do with such situation. Because the “On-sale” Day can be knew in advance, the TPL company doesn’t need to rush to the arrangement plan.

Bargain power and the connection with express service is also the advantage of this new-designed warehousing system. The bigger sum of delivery is the basic element to a VIP consumer, who can ask for a more attractive delivery price. Meanwhile, express companies are willing to make cooperation with such system. Usually, the both terminals of the delivery are dispersive. So the express companies need lots of time and labor to go everywhere at a time to collect these C2C E-trade parcels. But this new-designed system can help the companies save the collecting time from one side because they just need to go to one place instead of several places without optimal path (In fact, in the traditional collecting way, there can’t be a true optimal routing).

Furthermore, the participant medium size merchants can make links to others E-shops to take the usage of the consumption custom. Consumers can purchase things from these E-shops. Then the TPL warehousing system would help to merge the orders and make into one parcel, which would lead to some extra impetuous consumption.

All in all, the new-designed TPL warehousing system is run in the basic of tow-way selection: Both have to be standardized, faithful and cooperative.

---

8 Such as the high storage for “On-sale” Day of the E-shops

### **3.2 The compare between the traditional process and new one**

The difference between the traditional C2C warehousing/order finishing process and new TPL warehousing system can be illustrated as follow.

#### 1) The operator

In the old process, the operator of these steps is the C2C merchant himself (the labors the merchant hires for the work are also up to him as a whole), which means the C2C merchant should take everything into account instead of just focus on the E-business. He has to service on-line all the time of more than 12 hours a day. At the same time, he has to take care of the warehouse, which is sometimes not nearby, and finish the orders. So it is clear that when the scale of the E-shop achieves a certain level, the problem of the merchants is not the more cost or labor he has to put in the business but the concentration of the business is always distracted.

However, the new TPL warehousing system is right in the spot to solve such problem. The operator this time is not longer the C2C merchants but the TPL company, which makes the TPL company to make full use of its experience and skills as well as makes every participants in this system be able to focus on the main business themselves. The change of the operator is a easy movement but let the merchant free from the complicated warehousing work and order finishing work.

#### 2) Handling process

The process of the new system would be clear discussed in the Chapter4 with the FTD model. In general, the traditional handling process is also illustrated with Figure2, which is: the merchants make trade with customers online → picking the



orders in the free-time (actually during the work, they still need to handle the online service) → packing the parcels → wait for the express coming to collect the parcel (which is always once a day). If the warehouse is not nearby, it is possible that the merchants have to close the online service or leave it to other people when they have to go to the warehouse to handle the orders. To the contrary, the new system is also able to let the merchants free from these troubles and focus on the online service to improve the E-business.

### 3) Connection with the express

Usually the express company would collect the parcels from the merchants once a day for the limited number of the orders, which would decrease the high-level reaction of the E-business. Besides, because the quantity of the cargo send by the medium size C2C merchants is not in a really big number, the express company would not be willing to offer a preferential price which would cut down the profit of the merchants or reduce the competitiveness (low price) of the E-business. However, the new system would gather the goods from several merchants, which mean the quantity of the parcels, would be much bigger as a whole. The express company is certainly willing to keep a good cooperation with such a important customers, so it would arrange more collecting everyday and offer a preferential price.

### 4) Labor and cost involved

With the above discussion, the fact that the new system would help the medium size C2C merchants to reduce the labor and cost, because they can just focus on the E-shop service (need fewer labors) and the scale of economic would surely decrease the average operation cost while the express price can be lower.

### **3.3 The analysis on the feasibility of the idea**

To think of the feasibility of this idea, three aspects should be taken into account:

- Research support
- Basic support
- Market support

These three points cover the support of the feasibility of this idea in different ways, including the basic theory, the infrastructure and the demand & supply.

#### **3.3.1 Research support**

Every idea of being used in reality can't happen without the solid research on related theories. The idea of the new TPL warehousing system for medium size C2C merchants is based on the theory of Third Party Logistics and Logistics Alliance.

With the statement in the above chapter, we can find that there have been many researches focus on the current problem and development of the logistics of C2C E-business. And the results of these researches mostly concentrate on that the solution of the C2C E-business logistics problems is Third Party Logistics and Logistics Alliance. That is to say, the current research materials can be the support power to the feasibility of the idea.

#### **3.3.2 Basic support**

The basic support is, in another word, the infrastructure support. Generally, the elements of the infrastructure of the system are 1) warehouse; 2) the TPL company; 3)

operating labor.

The warehouse that meets the requirement is the main body of the infrastructure of the system. The warehouse should meet the requirement of enough space, be equipped with good condition. And the location of the warehouse can also influence the whole operation of the system. The different groups of C2C merchants have different requirement on the condition of the warehouse for their business. Fortunately, with the rapid development of the logistics service, it is easy to find the suitable warehouse with good condition and enough space in some certain areas, which can set the basic function of warehousing for this idea of new warehousing system.

The TPL company is the manager of the system, whose responsibility includes organization, planning, arrangement and management work. The TPL company should have rich experience of Third Party Warehousing service/good resource of infrastructure and understand the real demand of these C2C merchants. The organization needs the company to know deeply about the meaning of the idea and basic process of the system. The planning and arrangement needs the company to select the right participants, warehouse and other related issues. The daily management needs the company to adjust the process to handle the personal demands or special situation.

The operating labors are related to the daily operation of the TPL warehousing system. They not only have to take care of the warehouse but also have to finish the orders and arrange for the next-step express service. Because of the total number of the C2C merchants who join in the system and the different kinds of goods, the order finishing work asks for the experience of traditional third party warehousing as well

as the good fitting to the new idea. Nowadays, the improvement of the logistics service market is significant in China, which means the well-qualified TPL companies and trained labors are not as rare as a few years ago. So they all can be the support to the feasibility of the idea.

### 3.3.3 The market support

The market support focus on the D&S, potential market, the gather of the C2C merchants and the development of the TPL service.

The current C2C E-business market has already illustrated the serious demand for TPL warehousing service from medium size C2C merchants. As the statement in above chapter, the logistics problems that medium size C2C merchants are faced with set block to the business development and they really want to solve the problems, so the demand, as the main element of a market, is obviously there. The bright future of the C2C E-trade would definitely dig out more potential customers for this service, which would prove the wonderful future as well as the feasibility of the idea.

In China, somehow, many C2C merchants are gathering in some certain place, such as Zhejiang, Fujian and Shanghai etc, so it can lead to the result that it is not hard to collect the customers or the participants for the whole system, which also can be the market support element to the feasibility of the idea of new TPL warehousing system.

Besides, the TPL market is in the right middle of a cross road that is the TPL

companies can feel the bright future and the highly demand of the TPL service in the society but they are blocked by the limited kinds of service they are carrying. Therefore, the most important thing they have to do is to find or create the new market parts, which is provided by this idea—a new kind of TPL warehousing service for the medium size C2C merchants. The idea is not just bringing the benefits to the C2C merchants but also the idea that these TPL companies need indeed.

In summary, the feasibility of the idea is clearly proved in these three aspects in different level of support elements. Although the idea till now is just a spark of inspiration and without the real practice, the basic idea can surely be put into practice in current market and the feasibility of it is conclusive.

## **4. Modeling**

### **4.1 Transaction Flow Diagram Model**

#### 4.1.1 The general introduce of Transaction Flow Diagram

Transaction Flow Diagram (abbreviation is TFD) is using some of the provisions of the symbols and connections to represent a specific business process. Business flow diagrams drawn substantially in accordance with the actual processing steps and processes of the business reaction of the actual business process each item in the form of a flowchart, FTD drawn is helpful to rationalize and optimize the business process for developers. Business process diagrams with the simplest way possible to describe the method of business process. Because of its symbol is simple and clear, so it is easy to read and understand the business process.

The effort of FTD can be:

- Making the flow chart of the process is a comprehensive understanding of the business processes, which also is the basis of system analysis.
- It is a tool for systems analysis, management, operational exchange of ideas with each other.
- System Analysis can be directly drawn up the part of the computer processing which can be achieved on the operational flow chart.

Use it to analyze the rationality of the business process.

#### 4.1.2 The purpose of modeling

In this dissertation, the new-designed TPL warehousing system is to be proved to serve the medium size C2C merchants. In this system, the basic process of the warehousing system and the exchange of the information are not like the traditional ones. So with the efforts of the FTD model, it can clearly show the basic process and the function of this warehousing system.

#### 4.1.3 The Prepare work of setting the FTD Model

Usually, the medium size C2C merchants need to rent the warehouses to carry on their E-business, but they don't apply the mature warehousing system to their business for many reasons, such as lack of capital or being undervalued. However, if the medium size C2C merchants want the further development, so improvement should be taken.

The new-designed TPL warehousing system needs the merchants to pass their warehousing process to the Third Party Logistics company and let the company to take charge, which means the warehousing work would be no longer under the direct control of the merchants. So the good exchanging of the information is the basic function of the new system, which also should be showed in the TFD model.

Traditional, the information exchange of the online trade just focus on the exchange of the information about goods, because the warehousing process is in merchants' direct charge. To the contrary, in the new-designed warehousing system, the

information exchange in the warehousing process between warehouse and merchants should be put more emphasis.

In the new system, the warehousing process in the warehouse can be divided into four parts:

**Part1: PREPARE**

- 1) Receive the order
- 2) Check the inventory to confirm the order
- 3) Create the invoice

**Part2: PICKING**

- 1) Picking order, using the “barcode” technique
- 2) Checking the correctness of the picking
- 3) Finish picking

**Part3: PACKING & WAIT FOR DELIVERY**

- 1) Packing the finished order
- 2) Arrange for the delivery
- 3) Take notes of the express numbers and send them to the merchants

**Part4: UPDATE**

- 1) Update the inventory information
- 2) Remind the merchants with the shortage of goods



#### 4.1.4 Modeling

With the thought above, the general TFD model can be:(see Figure 4)

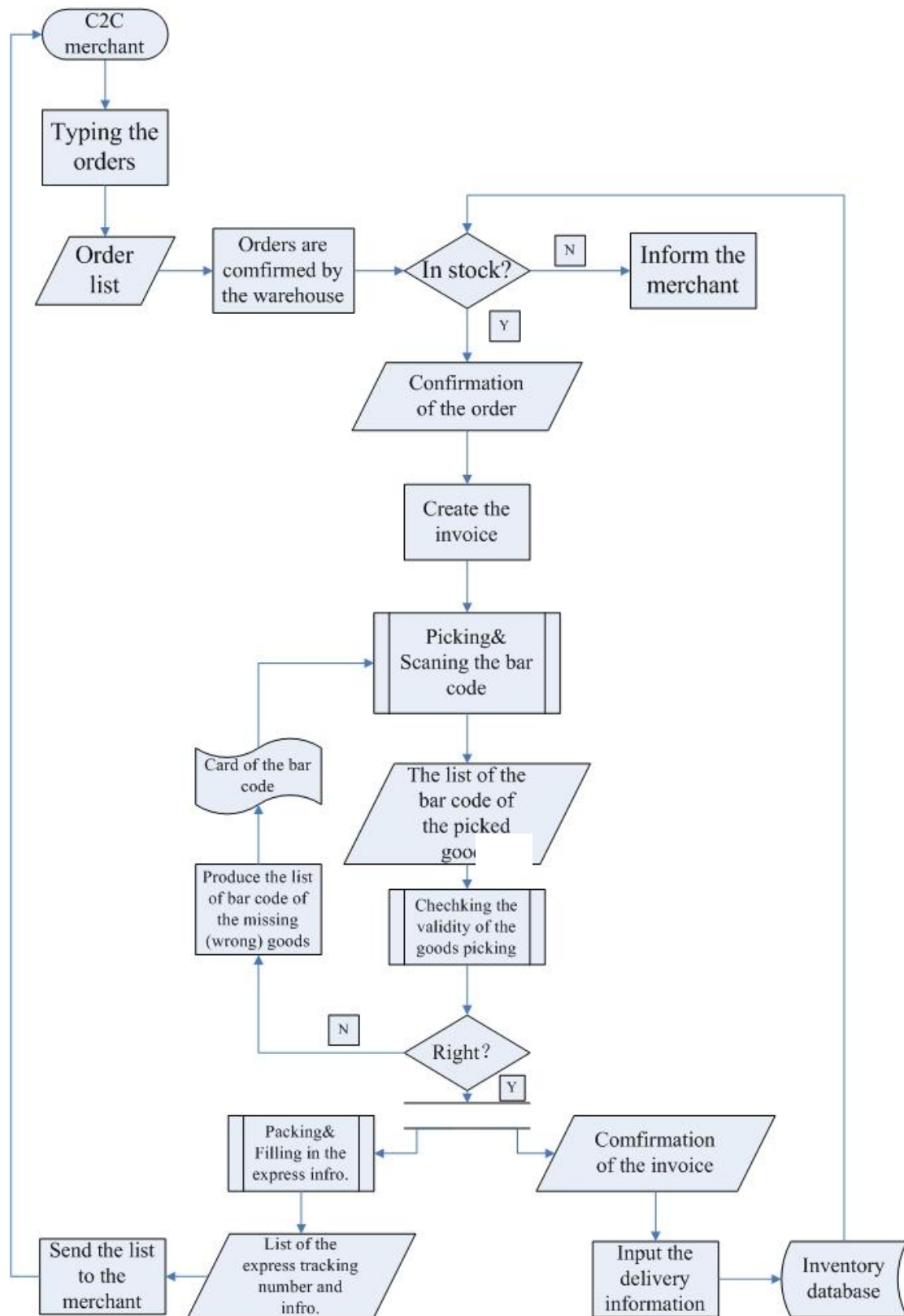
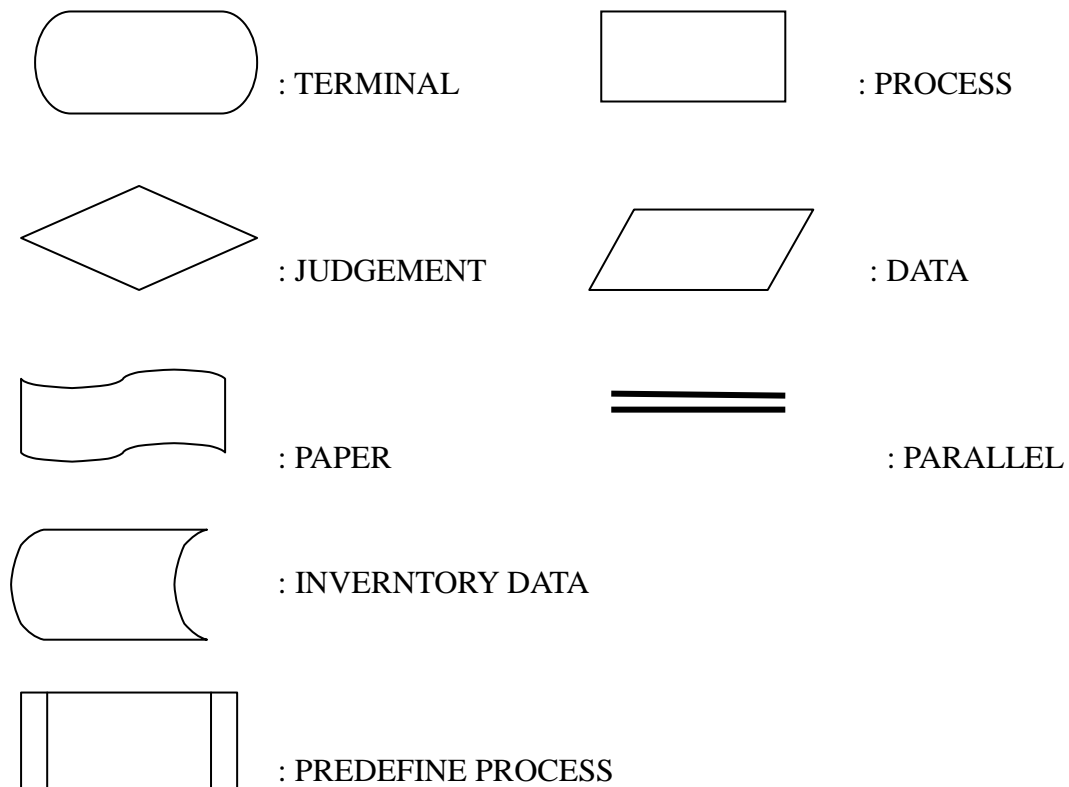


Figure 4-The FTD model made by Visio

There are several ways to create a FTD model. In this dissertation, I choose to use the “Microsoft Visio”. The Visio is equipped with the basic function to create different kinds of charts.

The different figures in the FTD model are with different means.



In the FTD model, the work in the warehouse that operated by the TPL company and the information exchange between C2C merchants and warehouse are illustrated clearly.

Traditionally, the C2C merchants would first receive the orders from the C2C E-trade platform, then finish the order picking, parcel packing and arrange for the express service by themselves. To the contrary, in the new warehousing system, we can know

from the figure, the C2C merchants just have to handle the online business, which is online service, updating the E-shop and receiving the orders. The rest of the work of the warehousing and order finishing part are now in the charge of TPL company, which would not only free the merchants from the heavy warehouse operation and let them focus on the management of the E-business, but also make full use of the advantage of the TPL warehousing company of its skillful labor and rich experience.

The FTD model shows every basic links in the warehouse part of the new TPL warehousing system, from which we can find that the general process of the new system is not complicated and keeps up with every step of the order finishing. So the system can be feasible and let the merchants know about the warehouse work from time to time but without worries.

Generally speaking, the new TPL warehousing system, which is based on the idea of TPL and Logistics Alliance, can be seen as the resource integration and rearrangement. From an overall perspective, every C2C merchants are doing the same work, which means limited by business scale and lack of related experience and operation skills, in some way, would cause the waste of time and resource, as well as do harm to the C2C business operation. To solve such problem fundamentally, the new warehousing system choose to gather the same step works from different C2C merchants together and finish them in a arranged process to avoid the rehandling and resource waste. The FTD model shows the general idea and process of the system. The order information would come from different participants (C2C merchants) to the system of warehouse, the TPL company would arrange the warehousing and order finishing work in a certain process to increase the business scale and decrease the average operation cost, which is also the main point of the whole system.

## **4.2 Analytic Hierarchy Process Model**

### 4.2.1 The purpose of setting AHP model

With the help of FTD model, it shows clearly about the general information exchange and the warehousing system order handling process. The other important element of the system is the warehouse itself.

The warehouse is the main body of the whole system and one of the advantages of the system is the better location selection of the warehouses. There several factors that would affect the selection result. But, as a matter of fact, most of the medium size C2C merchants, who need to rent warehouses for their businesses, are not with the capability to choose the optimal location. Because, since the merchants want to rent a place with low price and well-equipped, they have to give in for many objective factors, like the distance, limited by the scale of the business, etc.

So the purpose of the AHP model is not only to set a model to discuss the factors that would affect the selection of the warehouse, which is sure to be an important step in the new TPL warehousing system, but also will show the advantage of the new system in selecting the optimal location.

### 4.2.2 The Prepare work of setting the AHP Model

The analytic hierarchy process is a way of making a decision by taking into account a number of factors. These factors are weighted in terms of their importance, in an

attempt to strategically make the best decision based on all the information available. The format for the process was developed in the 1970s by educator Thomas Saaty.

The Analytic Hierarchy Process (AHP) is a structured technique for dealing with complex decisions. Rather than prescribing a "correct" decision, the AHP helps decision makers find one that best suits their goal and their understanding of the problem—it is a process of organizing decisions that people are already dealing with, but trying to do in their heads.

The analysis process includes 4 Steps.

#### Step-1: Decomposing

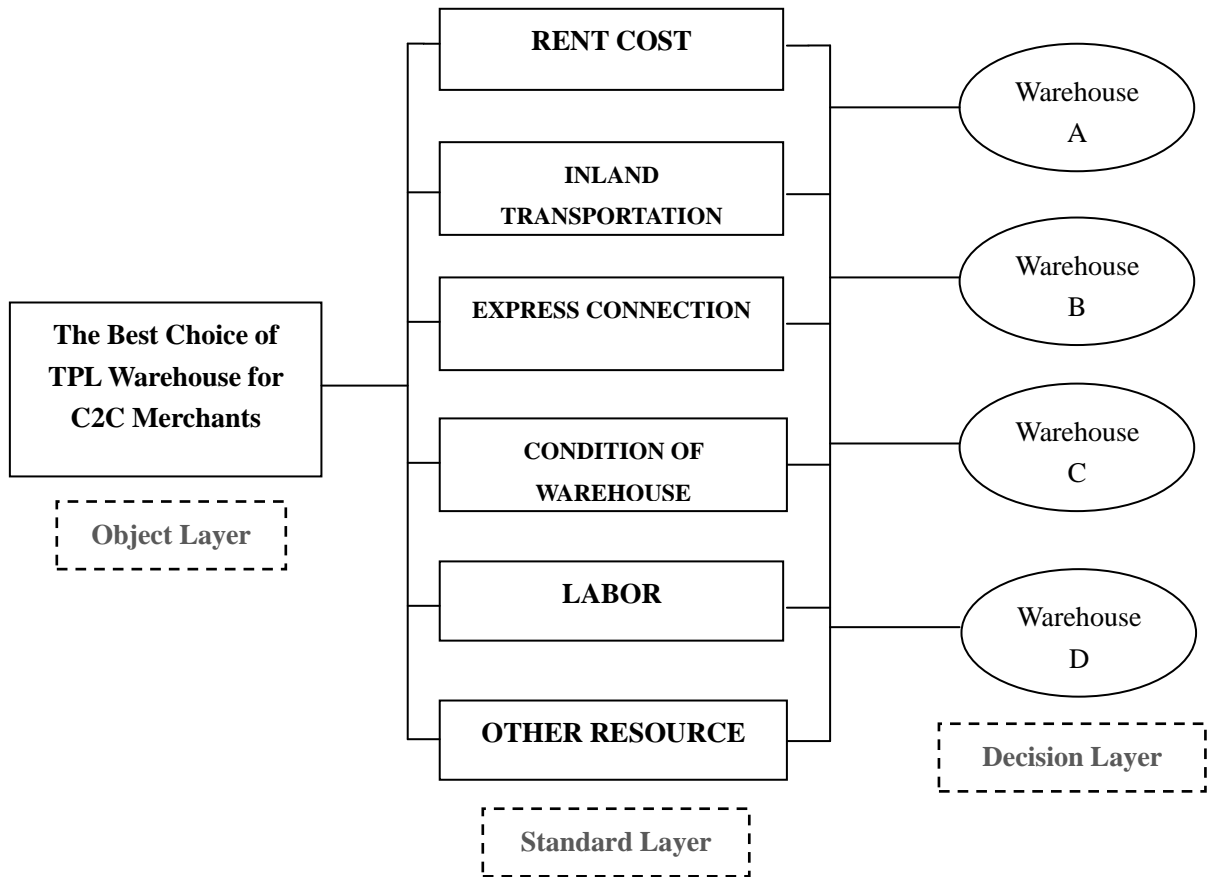
Decompose the whole Question into several small Questions.

In this dissertation, every warehouse is with 6 attributes, so we can consider the ideal warehouse should meet 6 requirements:

- Low rent price
- Mature transportation network
- Good connection with express service
- Good situation and equipment
- Easy to hire workers and low labor cost
- Completion of other resources

So 6 factors can be thought as the factors, which effect the selection of the warehousing, they are: 1) Rent cost; 2) Inland transportation; 3) Express connection; 4) Condition of warehouse; 5) Labor; 6) Other resource.

The Hierarchical Structure Chart



Step-2: Weighing

Setting different Weights to the six factors is to think about the different levels of importance of the 6 factors

The different number from 1 to 9 shows different level of the priority between factors.

The basic theory can be showed in the Table 3-Paired comparison

Table 3- Paired comparison

The scale of $a_{ij}$	Meaning
1	$B_i$ is as important as $B_j$
3	$B_i$ is a little more important than $B_j$
5	$B_i$ is more important than $B_j$
7	$B_i$ is quite more important than $B_j$
9	$B_i$ is overwhelmingly more important than $B_j$
2, 4, 6, 8	At the middle site of the above standard
Reciprocal	When $B_j$ compares to $B_i$ , the scale $a_{ji} = 1 / a_{ij}$

The TPL warehousing system of C2C E-business merchants is not like the normal warehousing system for common companies. The main cost of it is no longer the cost of storage-keeping or shortage, but is the cost of the rent of the warehouses. Usually, the C2C merchants of medium size have to pay a lot for this part. So the low rent price is the main factor should be thought about. The selection of the warehouse should be attractive to the C2C merchants, which can persuade them to give up the traditional system but to choose the new-designed TPL warehousing system. So the factor that has something deal with the rent price should be put enough emphasis.

For the C2C merchants, they have to take the inland transportation which is also the process of transfer the goods from source place to the warehouses. So the convenience of the Inland transportation is another important factor that the merchants may think about.

The next step of the warehouse-work in the whole process of the E-business is transportation, always, express service. The connection with the express companies is another important factor to the whole goods transfer process. Well connecting with the express would make the TPL warehousing system more attractive to the

customers.

Besides, the goods of the common C2C merchants usually are not with high added value, which means the expenses of the damage of goods can be a burden for them, so the bad condition of the warehouse may interfere with keeping goods safe and integrated.

We can know from the Chapter above, the merchants always gather around in the area which are located the labor intensive industry place, which means the labor issues would not influence the warehousing system a lot. (China is not like some countries, whose labor cost is much higher.)

To sum up, we can get the final relationship between these factors:

Rent cost > Inland transportation > Express connection > Condition of warehouse > Labor > Other resource

The above idea leads to the result (Table 4-The result of the weights of the factors),we can get the whole weights of the six factors.

Table 4-The result of the weights of the factors

	RENT COST	INLAND TRANSPORTATIO	EXPRESS CONNECTION	CONDITION OF WAREHOUSE	LABOR	OTHER RESOURCE
RENT COST	1	3	4	6	7	9
INLAND TRANSPORTATION	1/3	1	2	4	6	7
EXPRESS CONNECTION	1/4	1/2	1	3	5	6
CONDITION OF WAREHOUSE	1/6	1/4	1/3	1	3	5
LABOR	1/7	1/6	1/5	1/3	1	2
OTHER RESOURCE	1/9	1/7	1/6	1/5	1/2	1

### Step-3 Evaluating

#### Warehouse A—— “City place”

In the urban area, so the land price is always high. It leads to the high rent price of the warehouse. But it is good value for money, the condition of the warehouse is



good. It is easy to hire workers in the impacted area (urban area), so the labor cost can't be high and other resources are complete as well. The connection with express is good and there are quite a few choices of express company. However, although the transportation network is mature, it is probable to be blocked by city-traffic problems, such as traffic jams, time limitation etc, so we can't say it as good enough.

#### Warehouse B—— “New-developing area”

Located in the suburb area, it comes with the low rent price. This area is near the transportation network and is waiting to develop. So the transportation situation is good and should have an express station nearby, it may not have a wide range of selection of the express company. The” new-developing area” means the new-built warehouse with good condition but other resource is still on the way to be completed and it is not that easy to hire workers with low salary.

#### Warehouse C—— “Somewhere”

Located in the edge of the urban area, the whole situation is just-so-so. Because the place is just along the urban area, the rent price is not as high as Warehouse A, but still higher than Warehouse B. It is not near the main highway network and all the resources, including labor, express service and other ones, are not good enough.

#### Warehouse D—— “Mature logistics industrial park”

Is in a mature logistics industrial park which is located in suburb area, so the inland transportation network and the connection with express service is good. The labor resource and other resources are sufficient and impeccable. However, because the Park has been constructed for several years, the advantage of it is not just based on the low price which means the rent price can't be that low. The condition of the warehouse is not quite good for its being used for long time.

To sum up, we can get to the conclusion that:

(“>” means “better than”)

RENT COST:  $B > C > D > A$

INLAND TRANSPORTATION:  $D > B > C > A$

EXPRESS CONNECTION:  $D > A > B > C$

CONDITION OF WAREHOUSE:  $B > A > C > D$

LABOR:  $A > D > C > B$

OTHER RESOURCE:  $A > D > C > B$

With the determination above, the final evaluating conclusion is:

	A	B	C	D
RENT COST	1	4	3	2
INLAND TRANSPORTATION	1	3	2	4
EXPRESS CONNECTION	3	2	1	4
CONDITION OF WAREHOUSE	3	4	2	1
LABOR	4	1	2	3
OTHER RESOURCE	4	1	2	3

#### Step-4 Selecting

With the calculation of the AHP model, the best choice of the warehouse location can be made, which is the place with the highest number.

### 4.2.3 The Calculation

There are several kinds of traditional calculation methods of the AHP Model. The basic function of them can be:

First, get the Matrix A.

$$A = \begin{bmatrix} 1 & 3 & 4 & 6 & 7 & 9 \\ 1/3 & 1 & 2 & 4 & 6 & 7 \\ 1/4 & 1/2 & 1 & 3 & 5 & 6 \\ 1/6 & 1/4 & 1/3 & 1 & 3 & 5 \\ 1/7 & 1/6 & 1/5 & 1/3 & 1 & 2 \\ 1/9 & 1/7 & 1/6 & 1/5 & 1/2 & 1 \end{bmatrix}$$

Second, use the function to get and the weight vector.

$$W = \frac{1}{n} \sum_{j=1}^n \left( \frac{a_{ij}}{\sum_{k=1}^n a_{kj}} \right)$$

Third, checking for consistency

$$\lambda_{\max} = \frac{AW}{W}$$

$$CI = (\lambda_{\max} - n) / (n - 1)$$

$$CR = CI / RI$$

RI---The number of RI can be found in the Table 5-the number of RI

Table 5-the number of RI

N	1	2	3	4	5	6	7	...
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	...

Source: About AHP<http://baike.baidu.com/view/70659.htm>

If the number of CR is less than 0.1, the AHP model meets the requirement.

After finding the Weight of the factor, the W deals with the Matrix B which is determined by the evaluating of four places. Finally we can get to the verdict we want.

However, in this dissertation, I prefer to use Microsoft Excel to solve the problem.

1) Data Input and Build pairwise comparison matrices

	RENT COST	INLAND TRANSPORTATIO	EXPRESS CONNECTION	CONDITION OF WAREHOUSE	LABOR	OTHER RESOURCE
RENT COST	1	3	4	6	7	9
INLAND TRANSPORTATION	1/3	1	2	4	6	7
EXPRESS CONNECTION	1/4	1/2	1	3	5	6
CONDITION OF WAREHOUSE	1/6	1/4	1/3	1	3	5
LABOR	1/7	1/6	1/5	1/3	1	2
OTHER RESOURCE	1/9	1/7	1/6	1/5	1/2	1
SUM	2.003968254	5.05952381	7.7	14.53333333	22.5	30

2) Normalized Pairwise comparison matrices A to get the A\*

FUNCTION = A / \$ SUM \$

A* =	0.50	0.59	0.52	0.41	0.31	0.30
	0.17	0.20	0.26	0.28	0.27	0.23
	0.12	0.10	0.13	0.21	0.22	0.20
	0.08	0.05	0.04	0.07	0.13	0.17
	0.07	0.03	0.03	0.02	0.04	0.07
	0.06	0.03	0.02	0.01	0.02	0.03

3) Estimate the weight for each criterion

FUNCTION = SUM (an1:an6) / 6

W1 =	0.44
W2 =	0.23
W3 =	0.16
W4 =	0.09
W5 =	0.04
W6 =	0.03

4) Checking for consistency, compute AW

FUNCTION: =MMULT(an1:an6,\$ W1:\$W6\$) / (Wn \* 6)

AW =	1	3	4	6	7	9	0.439231
	1/3	1	2	4	6	7	0.233159
	1/4	1/2	1	3	5	6	0.163682
	1/6	1/4	1/3	1	3	5	0.09078
	1/7	1/6	1/5	1/3	1	2	0.044042
	1/9	1/7	1/6	1/5	1/2	1	0.029107
=	2.908367245	1.10358271					
	1.538050281	1.099429316					
	1.057258254	1.076538657					
	0.55449541	1.018025247					
	0.266859154	1.009876783					
	0.17867599	1.023093446					

5) Calculate  $\lambda_{\max}$

FUNCTION =SUM(E39:E44)

=	2.908367245	1.10358271
	1.538050281	1.099429316
	1.057258254	1.076538657
	0.55449541	1.018025247
	0.266859154	1.009876783
	0.17867599	1.023093446

$$\lambda_{\max} = 6.330546159$$

6) Compute the constancy index (CI)

With the Function mentioned above:

$$CI = (\lambda_{\max} - 6) / (6 - 1) = 0.0661092317041096$$

7) Compute the constancy ratio (CR)

When  $n=6$ , the number of RI can be found in the Table 5, which is 1.24.

$$CR = CI / RI = 0.0661092317041096 / 1.24 = 0.0533138965355722 < 0.1$$

So the result meets the requirement.

Since we get the weight vector, using the evaluating conclusion of four places, we can finally get the best choice of the location of the warehouse.

TRANSPOSE		=SUMPRODUCT(C3:C8,\$C\$11:\$C\$16)						
	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

	A	B	C	D
RENT COST	1	4	3	2
INLAND TRANSPORTATION EXPRESS CONNECTION	1	3	2	4
CONDITION OF WAREHOUSE	3	2	1	4
LABOR	3	4	2	1
OTHER RESOURCE	4	1	2	3

W1	0.439231
W2	0.233159
W3	0.163682
W4	0.09078
W5	0.044042
W6	0.029107

	A	B	C	D
=SUMPRODUCT(C3:C8,\$C\$11:\$C\$16)				2.78

The Final result is

A: 1.73

B: 3.22

C: 2.28

D: 2.78

Which means the Location B is the best choice in this Model.

Although it is just a model based on the supposed situation, it still can show the fact that the new TPL warehousing system can give the opportunity to these medium size C2C merchants to select a really suitable warehouse that is with the highest score evaluated by different criteria, which is obviously good for the improvement of their business with solving the logistics problems.

## **5. Analysis on the new system**

### **5.1 The advantage of the new warehousing system**

With all the studies above, the general idea of the new TPL warehousing system designed for the medium size C2C merchants is clear and apprehensible, from which the advantages of the system can be summarized as:

#### 1) Give full play to the advantages of Third Party Logistics

The Third Party Logistics is the future of the logistics model of the C2C E-trade, which means TPL has its advantage to support the C2C E-trade. In this warehousing system, the subjective initiative of TPL can be blindingly obvious. TPL company can use its experience and the way to manage the warehousing process for several C2C medium size merchants. Like what mentioned above, it is a two-way selection, which means the TPL company can also use its way to control the whole warehousing system to be operated well.

#### 2) The cooperation supports the medium size C2C merchants

As always mentioned in the dissertation, the situation of the medium size C2C merchants is kind of embarrassing. They have a lot of logistics problems, but they can just handle them in a negative ways. However, the warehousing system in this dissertation offers them another way to solve the problems instead of waiting for years to grow up as super size merchants. Using this system, many medium size merchants can get together to be an alliance, which would help them to be a powerful group. This would not only make them as a great bargainer but also would provide them with more resource and mutual supports.

### 3) Reduce cost

The new warehousing system is built on the theory of economies of scale, which is sure to help the participants to reduce the cost. The average cost of operation (warehousing process), labor cost or the delivery cost all can be reduced with the usage of the system.

### 4) Good connection with express

The one of the main problems of the delivery for the C2C E-trade is that the both terminals of the delivery are scattered around, which is blocked the optimization of the routings of the delivery. To the contrary, the system in the dissertation, in some extent, tries to solve this problem. In this warehousing system, for the express companies, they just have to collect the parcels in a certain place instead of several places, even the place of the warehouse can be selected near the express center to offer a better connection. In a word, this system not only benefits the C2C merchants but also is the system that welcomed by the express companies.

### 5) The integration of resources

Currently, there are many wastes in the logistics industry, especially in the logistics of C2C E-trade. The warehousing system integrates the resource of the warehousing process, which helps to increase the utilization of the warehouse and delivery service. The integration of resources is the advantage of the new warehousing system as well as the important point for logistics development.

For these reasons, the TPL warehousing system in the dissertation, on one hand, is suitable for the development of the medium size C2C merchants, on the other hand,



is the idea of the future development of the logistics industry. In China, the TPL service is still in a growing level and the types and the scale of the service still needs to be improved. The new warehousing system can widen the choices of the market and create a new start of the TPL service for C2C E-trade.

## **5.2 The disadvantage of the new warehousing system**

Every coin has two sides. There also has some shortcoming of the system:

### 1) The two-way selection would be affected by many factors

The new TPL warehousing system is indeed a kind of logistics service but completed with both sides of the service, so it is a two-way selection and including plenty of factors. It is not like the traditional service that the customers ask the company to offer the service that meets their requirement. In this warehousing system, the merchants give the requirement to the TPL company and, at the same time, the company also need to arrange the merchants who are entitled to be in the system, because the reputation and other issues of the merchants would be related to the regular operation of the system. Therefore, one of the disadvantage of the system is the risk that caused by the two-way selection. The unsure things in the selection process (or the preparation process of the system) would be the risk and the uncontrollable factors to the whole system, which may lead to unexpected loss to both C2C merchants and TPL company.

### 2) Lack of real case

The dissertation studies on a new-designed TPL warehousing system with the idea of TPL and Logistics Alliance and the real case of it can't be found, so how well would it act when put into practice is still a question. Lack of real case means lack of data,

experience, studies in reality and the problems can be found in it, which would make the whole system lose the support from the practical parts. Usually, a mature system needs quite a long time to test the feasibility of system and find the hidden problems of it. However, the new system hasn't the opportunity to finish this part of work, so the level of uncertainty of system would be higher than the traditional ones.

### 3) The supervising to the warehouse and TPL company

In this system, the merchants, to some extent, transfer their control of goods to the TPL system, so the problem of the complicated supervising is also one of the disadvantages of this system. The control of the good transferred to the warehouse is showed in that the warehouse operator has the power to pick the order and send the parcels. So the supervising to the warehouse should make the merchants to make sure of the security of the goods and the picking of the orders. However, there are several merchants put their goods in the same warehouse, so how to send the correct and the on-time information about the warehouse and goods to the merchants but still keep the protection of privacy of each merchant makes the supervising system even complicated.

### 4) Legal problems

Because the warehousing system has something different with the traditional ones, the legal problems also would involve some difference.

- Warehousing contract

The warehousing contract is a contract that the keeper serves the depositor with the storage service while the depositor pays for the warehousing fee. It is a labor service contract and it is a bilateral, informal contract for value.

In this warehousing system, the warehousing contract here is not just a one-to-one contract but a one-to-one contract with an annexed contract of logistics alliance. In the contract, besides the normal legal articles, the special relation between TPL company & logistics alliance and merchants & merchants should be defined clearly. The warehousing process and the service area also need to be defined clearly in the contract.

- Warehouse receipt

Another thing with difference in this system is the power of the warehouse receipt. Always the warehouse receipt is a certificate of taking delivery of goods. In tradition, the warehouse receipt is a document of title and it should be endorsed. So traditionally if someone wants to take delivery of goods from the warehouse, he has to take the warehouse receipt with him.

However, in this system, not like the traditional TPL warehouse, the man to take the goods from the warehouse is not the man with the warehouse receipt but usually the express companies. In the traditional TPL warehouse, the transfer service suppliers can directly take the goods from the warehouse with the authorization of the consigner or the consignee. To the contrary, the direct authorization in this warehousing system is actually offered by the warehouse operator, the TPL company, so the title of the warehouse receipt is quite different from the traditional one, which means the participant merchants should authorize the TPL company with the rights of disposal about the goods and the goods can be legally take off without the formal warehouse receipt but the authorization of warehouse operator.

## **6. Summary and conclusion**

### **6.1 Summary of the new-designed TPL warehousing system**

The medium size C2C merchants are faced with more serious logistics problems, because the scale of these E-shops determine that the business can't be done only at home, it need the support of logistics service. Although they are the customers of the logistics service suppliers, they are not the great bargainers. With the theory of "operation strategy", the medium size E-traders should challenge the super size ones while handle the challenges from the small size ones.

To think about the logistics problems the medium size C2C merchants have to deal with, the dissertation focuses on the warehousing process and creates the TPL warehousing system but combined with the idea of Logistics Alliance.

The business and high cost of the medium size C2C merchants are lacked by their scales. So the idea of Logistics Alliance can, in some extent, expand the scale to achieve the economies of scale. In this system, several medium size C2C merchants get together into a group to increase the utilization of every resource, which helps to cut down the average cost. Because the warehousing service is supported by the TPL companies, it would break the existing limitation. The warehousing service can include: Storage service, Warehouse management, employing trained workers, Order receiving, Picking orders, Packing parcels, Arrange for express service, Updating inventory data etc. Getting rid of the worry of the warehousing process, the C2C E-traders can be more concentrated on the online service and the management of the E-shops. Besides, the good connection with the express companies would offer the

participants with a lower delivery price and the wide-used of this system in the future would be helpful to the optimization of the whole delivery network.

## **6.2 Conclusion**

The study purpose of this dissertation is to 1) design a new warehousing system in view of Third Party Logistics and Logistics Alliance to serve the medium size C2C merchants; 2) discuss the advantages and the feasibility of this new-designed system.

Because the TPL warehousing system in this dissertation is a new-designed one with only the original idea, the feasibility of it can't be proved in the real practice. However, with the studies on the logistics problems and development of C2C E-trade, the theory of economy and practical experience of logistics service, the warehousing system still can illustrate its advantages and the value of future development.

In general, the warehousing system focuses on the real requirements of the medium size C2C merchants and rethinks the problems and the causes of the C2C E-trade logistics. By analyzing the logistics problems, we can find the research purpose and decide the main function of the warehousing system, which is the base of the dissertation and the new-designed system. The TPL warehousing system is to serve the medium size C2C merchants with warehousing service and has the true advantage in theory. Although without the determination of the real case, we still can get the conclusion that this TPL warehousing system can really help the C2C merchants to solve the logistics problem of warehousing process and may be the future development of the C2C logistics.

## **Reference**

Ba Cailin, Dong Hongyun, (2011), C2C Logistics Solution Based on Supply Chain Mangement, *LOGISTICS ENGINEERING AND MANAGEMENT*, Vol.33, No.10

Daniel S.H. MOON, (2012), Port Logistics, Chapter Simulation

Den Chunzi, Tang Zhizhong, Yuan zhen, (2007), Investigation into the Costing Method of Warehousing, *China storage & transport magazine*, No.6, 2007

Du Peiquan, Chen Senfa, (2008), Model and Algorithm of Location Optimization of Express Service Point for B2C and C2C Business, *Logistics Sci-Tech*, No.11, 2008

GengZuqun, Liu Yuewei, (2011), Study on the Pricing System of TPL Warehousing Model, *Logistics & Material Handling*, Vol.1, 2011

He He, (2009), Supply Chain Management Case Analysis in Logistics, *Presentation Solution*, No.6, 2009

He Juan, (2007), C2C Logistics Solution in China, *Logistics Technology*, Vol.26, No.5, 2007

Li Ahui, Zhang Lihua, FengFangyuan, (2011), Research on an Optimization Problem of Semi-open Inventory Routing in C2C E-Commence, *Logistics Sci-Tech*, No.6, 2011

Li Lingle, Yu Kailang, Liu Huimei, QuShipeng, (2007), The study of controlling the cost of warehouse based on the third party logistics, *Modern Manufacturing Engineering*, Vol.10, 2007

Lin Chang, Sun Guoyan, Yang Zhiyi, (2007), Analysis on the Strategy of the Capacity Allocation of TPL Warehousing in Random Environment, *RAILWAY TRANSPORT AND ECONOMY*, Vol.29, N0.1

Liu Xiaoliang, Wang Rong, PengLijuan, Wang Wenmin, (2011), Study on the Decision Making of Warehousing Based on AHP and Fuzzy Comprehensive Evaluation, *China Market*, Vol.02, 2011

Lin Xiangping, (2006), Analysis of the Logistics Model of Amazon, <http://www.docin.com/p-316420998.html>

- Liu Yansong, (2012), Legal Analysis of Third Logistics Contract, *Logistics Technology*, Vol.31, No.8 (2012)
- Ma Ning, (2010), The study on the optimization design of the TPL network with the C2C model——Taobao as the case, *CHINA BUSINESS & TRADE*, 2010
- Qin Tianbao, Wang Yanfeng, (2011), Application Oriented Simulation Modeling and Analysis with ExtendSim (Second Edition)
- QiuLinhai, (2008), The design and realization of the warehousing management system based on third party logistics, <http://www.cnki.net>
- Shi Ying, (2010), Several Thoughts about the C2C Logistics Delivery Model of Taobao, *CHINA BUSINESS & TRADE*, Vol.16, 2010
- Song Shiqiang, (2009), Study and Application on Multi-Warehouse Site Selection Model under the Multiple-center of Gravity Model Approaches, *Science Technology and Industry*, Vol.9, No.6
- Sun Chengzhi, Liu Weiqing, (2011), Study on Customers Management of TPL Company, *Market Modernization*, No.1, 2011
- Sun Ruizhe, Huang Hui, Yang Lichun, (2009), A Study of New Mode of C2C E-commerce Logistics, *Logistics Sci-Tech*, No.12, 2009
- TianZhicheng, Li Shugang, (2011), Study on the lean management of warehouse picking and delivery of third party logistics, *Windows of Enterprise*, No.11, 2011
- Wang Rongpei, Wan Qirui, (2005), An Improved Group AHP And Its Application to The Supplier Selection Model, *Computer Applications and Software*, Vol.22, No.7 (2005)
- Wang Xiangyang, (2012), Attribution of Legal Liabilities in Third Party Logistics Warehousing, *Logistics Technology*, Vol.31, No.8 (2012)
- XieFei, (2011), In view of the legal issues to talk about the contract of the storage in the TPL, *FAZHIYUJINGJI*, NO.12, 2011
- XuGenyong, Zhou Binghai, (2008), Design of 3PL Warehousing Management System with RFID, *Logistics Sci-Tech*, No.11, 2008

Yang Haizhen, Xiong Wei, Shi Chaoqin, (2011), The Way to Select and Appraise the TPL Suppliers base on DEA, *Business Age*, Vol.2, 2011

Yang Leiru, (2011), Taobao Publish its Logistics Strategy: 10 billion investment in Warehousing, *Focus Report*, No.2, 2011

Yang Lijie, (2012), Study on Legal Liabilities in Third Party Logistics Warehousing, *Logistics Technology*, Vol.31, No.8 (2012)

Ye Zhenhua, (2008), The research of the relationship between the customer's satisfaction to the third party logistics and to the seller——An empirical study under the background of C2C E-business, <http://www.cnki.net>

Zhang Binglin, (2008), Study of logistics express delivery for C2C, <http://www.cnki.net>

Zhao Taofeng, Chen Ronggang, Mo Jinkai, (2010), The Application of 2D-bar Technology in The System of Storage Management, *Computer Knowledge and Technology*, Vol.6, No.2

Zhao Wei, YueDequan, (1995), Analysis on the compare of the AHP methods, *Mathematics in Practice And Theory*, No.1, 1995

ZhengRihu, Zhang Xin, (2011), Study on the Delivery and Logistics of C2C E-business, *CHINA BUSINESS&TRADE*