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## B2C E-commerce Logistic channel structure in China

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**Abstract:** The B2C e-commerce is fast developed in China, but the logistic activities are relatively lagged behind. So many of the B2C ecommerce corporations choose to run the logistic service on their own. The advantages and disadvantages of carrying on self-built logistic service are discussed. The research is to illustrate the choice of B2C corporations to carry on logistics service in China and to show the reason why choosing tree topology logistic network could be cost saving.

**Keywords:** B2C, logistic network topology, e-commerce, channel selection

### 1. INTRODUCTION

The e-commerce is in fast development in China. The B2C is the fastest developed ecommerce mode. But the lagging behind third party logistic service brings limits on the e-commerce development. So instead of outsourcing logistic service many of the B2C corporations start to build their own logistic system. The research is going to figure out the commonly used mode. And the advantages and disadvantages of each mode are also been studied.

The research target here is the B2C corporation in China. There are ten large scale B2C corporations, including Tmall, Jingdong, Suning, Vip.com, Gome, Yhd.com, Dangdang, amazon.cn, Yixun, and Jumei.com. Some of them are web-only and some have multi-channels, known as click & brick. In developed countries, B2C web-only corporations tend to outsource the function of logistics, marketing, and customer support (Shashank Rao, Thomas J. Goldsby and Deepak Iyengar, 2009)<sup>[1]</sup>. But in China the logistics is not as good as the B2C corporations expected, many of the B2C e-commerce corporations tend to build on their own. Some research has shown that personality will not certainly increase loyalty of customers (Sriram Thirumalai, Kingshuk K. Sinha, 2013)<sup>[2]</sup>, but the advantages of time-saving and faster response are well known and documented (Blackburn,1991)<sup>[3]</sup>, so the logistic service becomes an important way for B2C corporations to win customers.

The rest of this paper is organized as follows: section 1 is the development status of B2C e-commerce in China. Section 2, the logistic modes of B2C corporations in China are presented. Section 3, we present the comparison tradeoff of self-built logistic and outsourcing third party logistic, we also give the conclusion on whether to build self-built logistics. Section 4, we use cases to show the factors that prohibit a B2C corporation to build self-built logistics. Section 5, we summarize the common logistic network topology and use Six Dot Model to show that tree topology could save cost under certain condition.

### 2. B2C E-COMMERCE DEVELOPMENT STATUS IN CHINA

According to iResearch's research data, 2014Q3 China's online shopping market in the B2C market transactions was 305.38 billion yuan, accounting for the overall online shopping market in China in transaction size reached 44.2%, as is shown in figure 1. With characteristics of body mass, variety in product category C2C market's future growth will remain stable. Compared with the C2C platform, B2C platform has advantages in the scale, product quality and service levels and other aspects, which can meet the needs of consumers in high-quality. B2C market share in the future will continue to improve, so B2C and C2C market will both

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embrace fast development in the market [4].

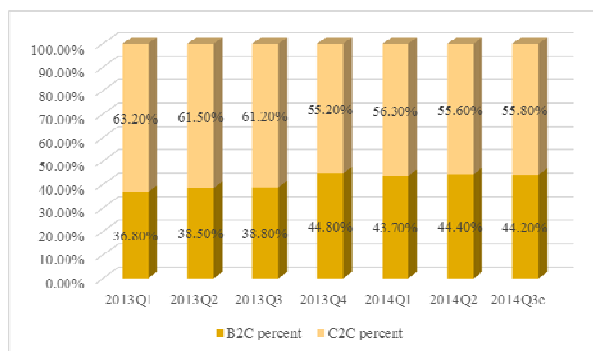
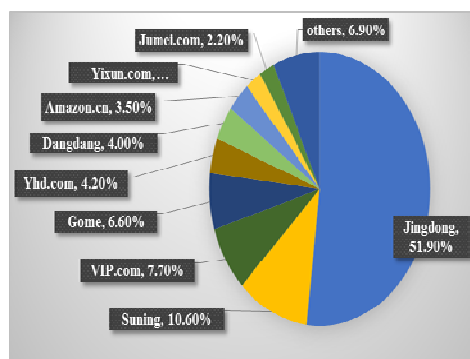
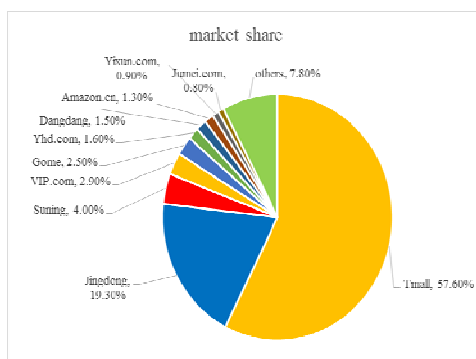


Figure 1. The B2C market share of online sale in China

Market Share: Tmall and Jingdong continue to maintain their edge, other typical B2C corporation are in intense business competition. The detail is shown in figure 2.

In 2014Q3, B2C market, Tmall still dominants market share, accounting for nearly 60%, while Jingdong accounting for 19.3%. In the rest of B2C companies, Suning, Gome, Yhd.com and Jumei.com have a higher link relative ratio than the overall industry growth. The VIP.com, Yhd.com and Gome have a higher growth rate than the overall industry growth. From the self-own sale point of view, Jingdong accounts for over half of the market, Suning accounts for 10.6%, and both the VIP.com and Jumei.com account for more than 5%, market concentration remains high<sup>[4]</sup>. The detail is shown in figure 3.



Data resource: iresearch Consultant Corporation

Figure2. Market share of B2C corporations in China

Figure 3. B2C market share of self-own B2C corporations

### 3. THE LOGISTIC MODES OF THE B2C CORPORATIONS IN CHINA

From the world wide view sight, the e-commerce has to consider to build their own logistic system, when their scale reach to a certain extent. The table1contains the logistic form information of B2C e-commerce company in China.

Tmall sets up fourth party logistics corporation and integrate the logistic activities. It sets up a corporation named cainiao with many logistics and finance corporations.

Jingdong, Amazon.com and Yhd.com build up warehouse and set up their own logistic system. Jingdong express is set up to deliver both its own goods and other companies' products. Yixun.com which is the wholly-owned subsidiary of Jingdong relies Jingdong express to deliver the goods.

Suning and Gome use their logistic system which is used for physical store for online sale delivery. These are the instances of traditional retailer joining in online sale, which is very common nowadays, just like Walmart carries on online sale.

VIP.com and Dangdang construct self-own warehouse and use third party logistics to make express delivery. Dangdang wants to realize the "just one day delivery". In order to realize that goal, it cooperates with professional third-party logistic corporations. It is reported that Dangdang has signed a strategic partnership agreements with (Sto, yto,yunda, zto) and other logistics corporations. While the smaller scale B2C corporation-Jumei.com totally uses third party logistics.

**Table 1. The sales channel and logistic modes of B2C e-commerce corporations in China**

B2C corporation	Brick & click	Online-sale	Self-built Logistic	Third Party Logistic
Tmall		√		√
Jingdong			√	
Suning	√		√	
VIP.com			Self-own warehouse+ TPL distribution	
Gome	√		√	
Yhd.com		√	√	
Dangdang			Self-own warehouse+ TPL distribution	
Amazon.cn		√	√	
Yixun.com		√	√ (by Jingdong)	
JuMei.com		√		√

Data resource: collected by the author

#### 4. COMPARISON BETWEEN SELF-BUILT LOGISTIC AND OUTSOURCING THIRD PARTY

##### 4.1 Self-built logistic

Advantages: First, self-built logistic can meet the logistic service quality that is required by B2C ecommerce corporations. Now the goods are required to reach the consumers within 24 hours. Second, the B2C ecommerce corporations can have a lower logistic cost, if the B2C corporations have reached a large sale scale. It can have the logistics information, which is very important for making corporation strategy.

Disadvantages: Logistic investment can cost a big deal of capital for B2C corporations, so it may bring financial problem to the B2C corporations. Besides, other logistic corporation may join together to prevent the B2C corporation to run the express delivery, by refusing to deliver the packages where the B2C corporations' express cannot reach or by launching price battle, etc.

##### 4.2 Outsourcing third party logistics

Advantages: It can bring down the cost of B2C corporations. This advantage is not obvious now, since the lag behind of the development of China logistic industry, but once the logistic is well developed, there can be professional and high quality and low price logistic service. It saves investment. So the B2C corporations can focus on their main business.

Disadvantages: It can lost the control of logistic activity and the logistic information. The B2C corporations may lost the bargaining right and bear a high level logistic cost. The logistic service level cannot be ensured. For instance, in November 2009, domestic Yunda, Yto and Shentong many other express delivery companies have announced that, in order to ease cost pressures, they will raise the price of every single first shipments of Taobao seller by 1-2 yuan and increase the increment weight price by 1-2 yuan per kilogram. These activities once caused great tension to the leaders of Alibaba Company.

Based on the above discussion, it can be seen that it is necessary for big B2C corporations to develop the logistic activities in the right kind of form.

#### 5. FACTORS THAT PROHIBIT B2C CORPORATION TO RUN SELF-OWN LOGISTICS

##### 5.1 Lack of ability

Alibaba which is the owner of Tmall used to join in the logistic area by investing in starexpress in 2010. Unfortunately, this corporation went bankrupt in only two years' time. Alibaba is an internet company and not

good at logistics. So they set up a corporation named Wuliubao (China568.com) that integrates the logistic information and guides the logistic activities instead, just as the model: “framework of personalized material flow services” described by Hanping Hou, Mingyao Hu, Li Chen, Jung Y. Choi, 2011 [5].

## 5.2 Cost

VIP.com and Dangdang both want to build up their own logistic system, but because logistic is an area that needs lots of investment, they choose to build their own warehouse and outsource their distribution activity to TPL. Corporations like Jumei.com is not big enough to carry on the logistic activity, so they outsource their logistic activity totally.

## 5.3 Asset-light strategy

Asset-light strategy also known as asset-light business model. Enterprise should seize their core business and outsource non-core businesses. Light asset management is a value-driven capital strategy. Asset-light can save the corporation a lot of money and have more currency to use. This is very good news for B2C corporation, since more of the B2C corporation does not earn a profit in the very beginning.

## 6. B2C E-COMMERCE SELF-BUILT LOGISTICS NETWORK TOPOLOGY STRUCTURE

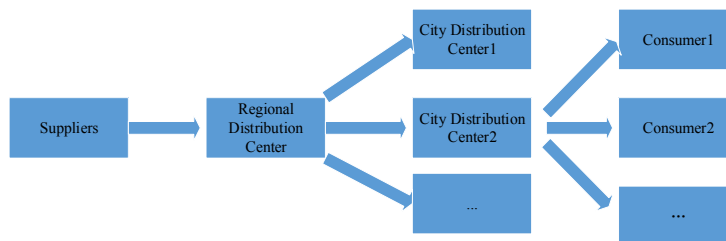
### 6.1 Tree topology logistic network

The pure Online-sale B2C company uses the tree topology logistic network, as can be shown in Figure 4. The Cainiao logistics has built up 4 warehouse locate in Beijing, Shanghai, Wuhan and Guangzhou. Jingdong has built up six logistic center in Beijing, Shanghai, Guangzhou, Chengdu, Wuhan and Shenyang. The structure is very common, just as some researcher described (Li Guanshi, 2013) [6]. This kind of structure could let the B2C corporations share the profit of collaborative distribution (Krajewska, M. A.; Kopfer, H.; Laporte, G., 2008) [7], although this activity happens within the B2C corporations. The regional distribution center location of B2C corporations in China is shown in Table 2.

**Table 2. Logistic centers of B2C corporations**

B2C	Regional Logistic center
Tmall(cainiao)	Beijing, Shanghai, Guangzhou, Wuhan, Jinan
Jingdong	Beijing, Shanghai, Guangzhou, Wuhan, Chengdu, Shenyang
VIP.com	Tianjin, Kunshan, Fuoshan, Wuhan, Jianyang, Tianjin
Gome	/
Yhd.com	Beijing, Shanghai, Guangzhou, Wuhan, Chengdu, Quanzhou
Dangdang	Beijing, Shanghai, Guangzhou, Wuhan, Chengdu, Shenzhen, Zhengzhou
Amazon.cn	Beijing, Shanghai, Kunshan, Suzhou, Guangzhou, Wuhan, Chengdu, Shenyang, Jinan, Xi'an, Harbin, Tianjin, Xiamen

Data source: Collected by the author



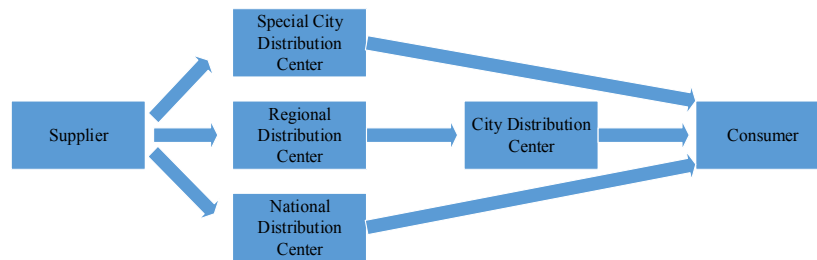
**Figure 4. The topology of online sale B2C e-commerce**

Supply chain coordination has become the key strategic area that has direct impact over the success of any enterprise in today's highly competitive business environment.

### 6.2 Hybrid topology logistic network

The brick & click corporation named Suning has a hybrid topology logistic network, as is shown in figure 5.

The Suning' logistic system could be some kind of complex, there could have some overlap in the service area among the big logistic centers.



**Figure 5. The topology of Suning's logistic network**

Suning's existing warehouse and its service coverage: Suning currently has twelve country originating warehouse, which are located in Nanjing, Beijing, Shanghai, Guangzhou, Shenyang, Chengdu, Wuhan, Xi'an, Hangzhou, Shenzhen, Chongqing, Tianjin. In which Nanjing, Beijing, Chengdu, Guangzhou four warehouses offer nationwide delivery service. Shenyang, Wuhan, Xi'an, Shanghai and four warehouses are respectively responsible for northeast China, central China, northwest China, east China (Zhejiang, Fujian, Shanghai, Jiangxi) area delivery service. Hangzhou warehouse is work for Zhejiang delivery service. Shenzhen, Chongqing, Tianjin warehouse providing city services. The details can be seen in Table 3.

**Table 3. Logistic centers of B2C corporations**

Warehouse	Coverage Area
Nanjing	All over China
Beijing	All over China
Chengdu	All over China
Guangzhou	All over China
Shenyang	Northeast China
Shanghai	East China (Zhejiang, Fujian, Shanghai, Jiangxi)
Wuhan	Central China
Xi'an	Northwest China
Hangzhou	Zhejiang
Shenzhen	Same city
Tianjin	Same city
Chongqing	Same city

Data resource: collected by the author

### 6.3 The efficiency comparison of two kinds of topology logistic network

Some researchers have developed ways to solve the distribution network design problems, for instance, two-stage stochastic mixed-integer programming approach (Y. Emre Kılıça & Umut Rıfat Tuzkaya, 2015)<sup>[8]</sup>. Many researchers have done the supply chain management performance evaluation, some of them use back propagation neural network (Ye Chunming, Ma Huimin, Li Dan, Liu Yi, 2005)<sup>[9]</sup>. Hybrid topology logistic network coordination is some kind of like dual channels supply chain coordination which also solves the conflicts between different channels, since the two channels are all under the same corporation, it will be more easily to carry on. Coordination of competitive dual supply chain channel has been researched (Wang Xiaolong, Liu liwen, 2009)<sup>[10]</sup>.

With partial information and under unclear demand distribution condition, researches about inventory management decision have been done (Ruozhen Qiu & Jennifer Shang, 2014)<sup>[11]</sup>. For the uniform-distribution demand, researches about inventory management using option dealing have been done (Ma Yong, Wang Chuanxu, 2013)<sup>[12]</sup>. For uniform demand sales channel coordination, there are researches about contract of bonus and penalty (Li Kai, Zhang Yingdong, Yan Jianyuan, 2012)<sup>[13]</sup>.

B2C corporations have the ownership of the goods, the searching for an optimal stocking position and the best distribution network is the key problem. Some researchers have developed models for price and transportation cost differences' on market selection (Ata-Ul-Waheed, Baig, A. R. 2012)<sup>[14]</sup>, but the goods on the B2C platform are same price (except very far and remote mountain area), in nearly most time the price is unique. Here a basic study case is put forward to simulate the different efficiency between the two kinds topology of logistic network.

**Suppose:**

- Ordering cost is not affected by the logistic network topology, which means that different logistic topology networks share the same ordering cost.
- Inventory level is the same, so the inventory cost is the same between different logistic topology networks.
- Same safety stocks.
- The goods are sold in equal prices in different area.

Since other costs are the same, the research is focus on the transportation cost difference among different logistic topology networks. Table-manipulation method is often used for solving the transportation problem with balanced or unbalanced supply and demand. Multi-supplier and multi-demander is the character<sup>[15]</sup>. Considering there is only one supplier, the quadratic optimization method has been used.

**6.3.1 Province and city level-Six dot model**

The Six Dot Model is to show that transfer transportation could save cost, if the transportation margin cost is zero. The demand of each dot and the distances among the dot A to F are shown in Figure 6. This mode can apply to two polar regional economy mode, like Jinan-Qingdao, Shenyang-Dalian, Fuzhou-Xiamen etc.

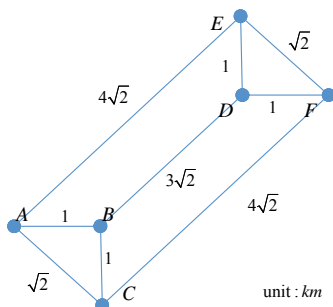


Figure 6. Six Dot Model

**Known Parameter:**

-  $\forall c_{ij} = 1$  Yuan/(ton • km).

-  $q$ ,  $q_A = 5$  ton,  $q_B = 20$  ton,  $q_C = 5$  ton,  $q_D = 20$  ton,  $q_E = 5$  ton,  $q_F = 5$  ton.

**Parameter:**

-  $c_{ij}$ : Transportation cost per unit. Unit: Yuan/(ton • km).

-  $d_{ij}$ : distance between two dots, for  $i$  vary from A to F,  $j$  is the distribution center. Unit: km.

-  $q_i$ : Total demand of dot  $i$ , for  $i$  vary from A to F. Unit: ton.

-  $TC$ : Total transportation cost. Unit: Yuan.

$$TC = \sum_{i=A}^F c_{ij} d_{ij} q_i \quad (1)$$

**Solution:**

In order to solve the Six Dot Model problem, we set up the coordination of the six dots, as can be seen in figure 7. The coordination of A is (2, 1), B is (2, 2) etc.

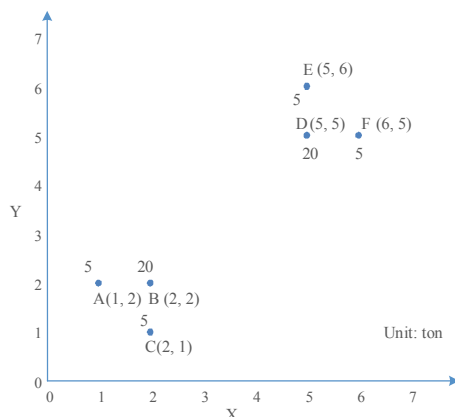


Figure 7. Build coordination of Six Dot Model

**Case 1: tree topology logistic network**

A, B, C, D, E, F are served by the distribution center, the cost function is a quadratic function, as is shown in figure 8, and the calculation result is shown in figure 9.

$$TC = 1 \times \sqrt{(x-2)^2 + (y-2)^2} \times 20 + 1 \times \sqrt{(x-5)^2 + (y-5)^2} \times 20 + 1 \times \sqrt{(x-1)^2 + (y-2)^2} \times 5 + 1 \times \sqrt{(x-2)^2 + (y-1)^2} \times 5 + 1 \times \sqrt{(x-5)^2 + (y-6)^2} \times 5 + 1 \times \sqrt{(x-6)^2 + (y-5)^2} \times 5 \quad (2)$$

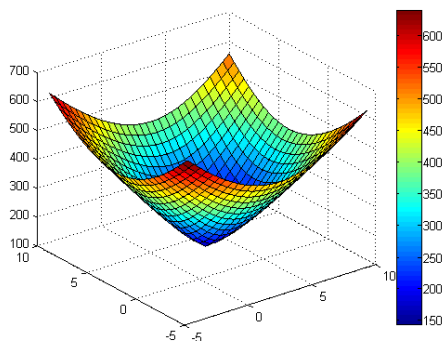


Figure 8. Case 1 function structure

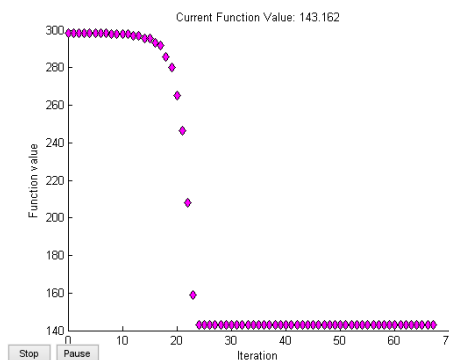


Figure 9. Case 1 calculation result

**Case 2: Hybrid topology logistic network (with transfer transportation cost)**

B, D are served by the distribution center. C, E, F are 50% served by B, D with goods transferred from the distribution center and **with no margin cost decrement** and are 50% directly served by the distribution center, the cost function is a quadratic function, as is shown in fig 10, and the calculation result is shown is figure 11. We can know that it is not beneficial compared with tree topology logistic network.

$$TC = 1 \times \sqrt{(x-2)^2 + (y-2)^2} \times 25 + 1 \times \sqrt{(x-5)^2 + (y-5)^2} \times 25 + (1 \times 1 \times 2.5) \times 4 + 1 \times \sqrt{(x-1)^2 + (y-2)^2} \times 2.5 + 1 \times \sqrt{(x-2)^2 + (y-1)^2} \times 2.5 + 1 \times \sqrt{(x-5)^2 + (y-6)^2} \times 2.5 + 1 \times \sqrt{(x-6)^2 + (y-5)^2} \times 2.5 \quad (3)$$



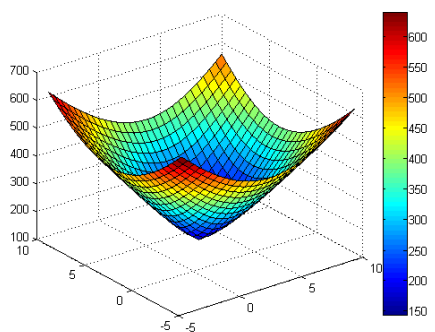


Figure 10. Case 2 function structure

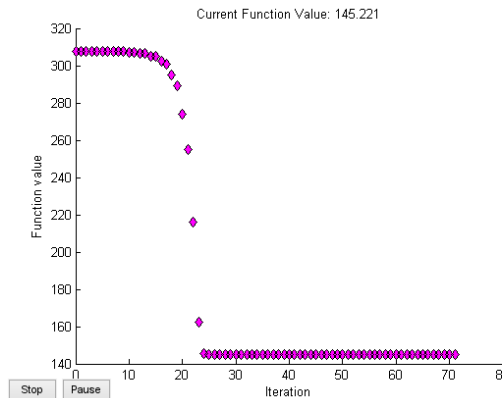


Figure 11. Case 2 calculation result

**Case 3: tree topology logistic network (transfer transportation cost is zero)**

B, D are served by the distribution center. C, E, F are 50% served by B, D with goods transferred from the distribution center and **the margin cost is zero** and are 50% directly served by the distribution center, the cost function is a quadratic function, as is shown in figure 12, and the calculation result is shown is figure 13.

$$TC = 1 \times \sqrt{(x-2)^2 + (y-2)^2} \times 20 + 1 \times \sqrt{(x-5)^2 + (y-5)^2} \times 20 + (1 \times 1 \times 2.5) \times 4 + 1 \times \sqrt{(x-1)^2 + (y-2)^2} \times 2.5 + 1 \times \sqrt{(x-2)^2 + (y-1)^2} \times 2.5 + 1 \times \sqrt{(x-5)^2 + (y-6)^2} \times 2.5 + 1 \times \sqrt{(x-6)^2 + (y-5)^2} \times 2.5 \tag{4}$$

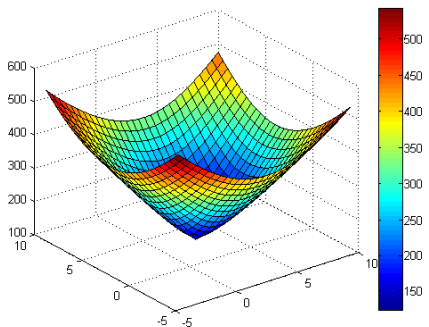


Figure 12. Case 3 function structure

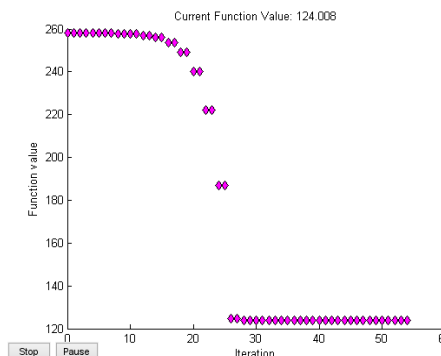


Figure 13. Case 3 calculation result

The transfer center can cut off the cost if **the margin cost of transportation is zero**, like in case 3. The express delivery is often not fully loaded. When things like this happens, it is good to set up transfer center, all goods are served from one center (see case 1) may not the best choice

**6.3.2 National level-six dot model**

Actually, it not that strict that the margin cost of transportation must zero, if the increment rate of the transportation function is decreased, as is shown in figure 14. There is a possibility of cost saving in choosing transfer transportation. The final result is determined by the multiplication of  $c_{ij}$  and  $d_{ij}$ .  $c_{ij}'d_{ij}' < c_{ij}d_{ij}$ , take the instance in the figure 15,  $c_{ij}'$  is the total cost rate of two phases in HA and AB weighted by  $d_{ij}$ .  $d_{ij}' = d_{HB} + d_{AB}$ . If  $c_{ij}'d_{ij}' < c_{ij}d_{ij}$ , then the tree topology logistic network saves the cost; If  $c_{ij}'d_{ij}' = c_{ij}d_{ij}$ , then the tree topology logistic network and hybrid logistic network have the same cost; If  $c_{ij}'d_{ij}' > c_{ij}d_{ij}$ , then the hybrid topology logistic network saves the cost.

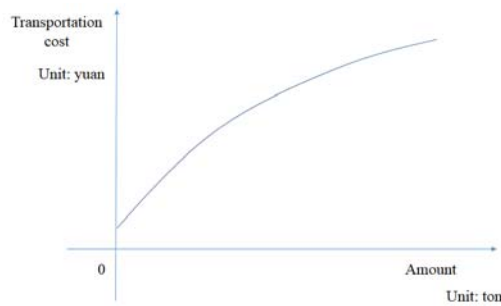


Figure 14. Case 3 calculation result

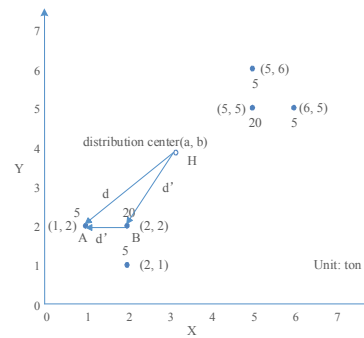


Figure 15. Tree topology logistic network transfer-transportation

The Six Dot Model can be applied to a large extent, as can be seen in figure 16. For a dot can stand a city groups, two centers can be transformed into one, location is on the line of two dots determined by the consumer number weight. So through continuous work, the final one location can be gotten.

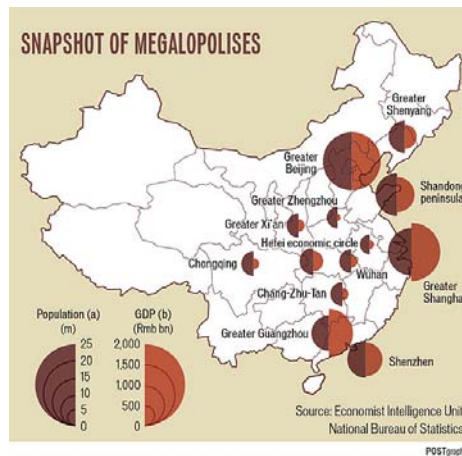


Figure 16. Megalopolises of China

## 7. CONCLUSIONS

The B2C e-commerce corporations' choice in choosing logistic mode is a strategic decision. Introduction of Chinese B2C E-commerce Logistic structure can be helpful for researchers outside of China.

In order to gain the logistic information and provide a high level of logistic service, it is better to self-built logistics if the B2C corporations have the ability and have reached big enough scale. The research shows that all the brick & click B2C corporations are using self-owned logistic system, which is hybrid topology logistic network structure. This could be less efficient and need optimized. The tree topology logistic network structure could save the cost, if there is a decreased transportation margin cost function. The Six Dot Model is to illustrate the cause. The margin cost of transportation could be decreased by amount rise, so the transfer transport could sometimes save the cost.

The limits of essay is that, the six dot model is not examined in the local case or regional model, but we here just want to show the mechanism.

## ACKNOWLEDGEMENT

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