

# Investigation of the Collaborative Innovation on E-commerce Logistics

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**Keywords:** E-commerce logistics, Supply chain collaboration, Innovation, Tactics, Operation, The collaborative model

**Abstract.** Nowadays, e-commerce and distribution logistics has jointly satisfied online shopping demand for consumers, improved people living convenience and quickness, and became the cohesive ties between e-commerce platform and consumers. So for such a pair of industries which coexistence and co-prosperity, and stick together, if we can together perfect matching task of e-commerce, strengthen match and coordination between industrial chains, and optimize the collaborative innovation management mode and technology, is bound to bring more upward pushing force for their and social economic development. This paper puts forward the supply chain collaborative management such an collaborative innovation management and operation idea between e-commerce logistics industry, from two aspects of tactical coordination and operating coordination of supply chain to study, hope to solve the serious congestion problems in the e-commerce logistics supply chain, to explore new ideas for development of e-commerce logistics industry.

## Introduction

Supply chain collaboration net chain structure is comparatively complex cross network system, in which there are various horizontal competition between the enterprises, also require forming node type supply chain collaborative operation between enterprises. Due to the enterprises are independent economic entities of independent interests, whose development goals and value orientation also are not the same, so the supply chain collaborative operation is involved with common interests and interlocking and cooperative attributes enterprises, e-commerce and distribution logistics are relying industries of such two interrelated industries.

## Management connotation of supply chain collaboration

**Connotation and the development origin of management.** The concept of “collaborative” was proposed by the ancestor of enterprises strategic management Igor. Ansoff as early as in 1965, in “the security strategy”, he described “collaboration” as “implement summary of individual parts finally forms the integrated business performance of enterprise group. It can express the relationship as coexistence and co-prosperity and support each other to grow between two enterprises; it is also as the result of the resource sharing foundation.”

In the early 1990s, the U.S. economy industry experts P.Gri and D.Thoma firstly proposed the idea of “supply chain collaboration”, it emphasized the collaborative relationship between the supply chain partners. And tenet of mutual cooperation is to satisfy all the needs of clients and make the most rapid response, and thus ensure all enterprises on the chain nodes to keep competitive advantage, to gain more benefits. In recent years, with the continuous development of information science and technology progress, both enterprises of e-commerce platform and distribution logistics platform also jointly introduced the supply chain coordination mechanism, for the collaborative development of the two industries have to say it was an innovation of business tactics and operation concept. It not only improved the e-commerce logistics service quality for consumers, and also reduced their inventory supply chain cost, improved the e-commerce enterprises’ competitiveness, also improved consumer loyalty on the e-commerce logistics enterprises. Microsoft has report shows that “e-commerce logistics system management provides six key opportunities for enterprise development: collaborative product development, forecast, sales, enterprise planning, collaborative logistics and asset sharing.

**The basic ideas.** Supply chain collaboration for e-commerce logistics enterprises operation is also a kind of resource reorganization; it consolidated the past relatively decentralized supply chain nodes between the two enterprises, and made the research and development, procurement, production, sales and transportation to form a coordinated process type of joint service system. It took the real needs of the market and customers as production guidance, and took improvement of the enterprises' market share and obtain the biggest benefit as the goal, and took production factors flow as the index, realized the e-commerce logistics alliance between giants, share out the work and cooperate with each another, complementary advantages, risk-sharing, and benefit sharing principle, etc. In the basic collaborative innovation ideas, logistics and e-commerce enterprises is the main chain, they use modern information technology to control process, and then seek the direct and effective planning and control of the supply chain, two enterprises work together to create the overall effect of greater than 2. Therefore, collaborative innovation based on the supply chain is effective measures for e-commerce logistics enterprises to gain more market competitive advantage and resource.

### The core problems of e-commerce logistics developing process

The emergence of e-commerce industry promoted the development of distribution logistics industry and provided it with a huge upside potential, also had the new requirements for its business service ability. For now, the domestic e-commerce logistic has congestion problems in collaboration industrial chain operations, which influenced the joint development and progress.

**Warehouse full capacity.** Warehouse full capacity is the most common problem in e-commerce logistics operation process, it refers to the express company at a particular period appeared due to express too much and caused the phenomenon that express input speed is much higher than the output speed. It delayed the normal rhythm of distribution logistics and made all express company, the seller and the buyer suffered the loss of economic and time. In addition to the force majeure and unpredictable natural problems, the causes of warehouse full capacity also are the national legal holiday, e-commerce sales promotion (e.g., November 11, December12), etc. The first two also are the fundamental objective factors. As the warehouse full capacity caused by online sales promotion season should cause the attention of e-commerce logistics enterprises, such as in November 11, 2014, more than 3.4 billion yuan trading in the day of Taobao mall, the data was about four times that of 2013. And after November 11 if can receive express on time became to the maximum working pressure of the express company. It was reported that in November11, 2014 express orders synthetic number more than 25 million votes across the country, here intercept the order items delivery situation of seven express company in November11,2014 of, the relevant data is as follows:

Table 1. 2014 “November 11” network delivering output form of major express logistics enterprises

express company	SF-Express	YTO Express	STO Express	YUNDA Express	Best Express	ZTO Express	TTK Express
The quantity of delivery express(thousand)	3200	2700	3000	2100	2300	1800	1400

Normally speaking, each express enterprise daily express processing capacity is about 1.5 million or so. As shown in table 1, in “November 11” express input volume had reached 16.5 million of seven enterprises, indicated that the seven express enterprises had about 5 million overload capability gap, therefore warehouse full capacity phenomenon appeared. Warehouse full capacity is great pressure both for e-commerce enterprises and express enterprises, which directly caused the customer satisfaction and purchasing power declined, and caused of blockage effect of e-commerce logistics supply chain, and harm the interests in many ways.

**Complaint.** Promotion triggered warehouse full capacity, warehouse full capacity triggered complaints, and these are problems both e-commerce logistics upstream and downstream enterprises will encounter. According to e-commerce complaints and the rights safeguard public service monitoring data of our country, in 2014 e-commerce complaints submitted through online, phone,

email, instant messaging, and other means as many as 115030 pieces, in which the online shopping complaints accounted for 63.05%, online group-buying accounted for 23.22%, mobile e-commerce accounted for 8.32%, B2B net trade accounted for 2.89%, and others accounted for 2.52%. In the past data of the report, e-commerce complaints were also ranked the top complaints for three consecutive years. It also suggests that if e-commerce logistics cannot well join will blow the online shopping enthusiasm of consumers, and affect the benefit of the e-commerce platform, so according to this group of data also can see that, as consumers' demand become more and more high, the e-commerce logistics industry development should also actively innovation is likely to avoid the occurrence of the above problems, and has the ability to long-term sustainable development [1].

### E-commerce logistics tactics collaborative innovation strategy research

For e-commerce logistics enterprises, quickly finish the intermediate link from customer orders to clients receiving, so as to achieve the benefits. But e-commerce logistics daily work time is limited, and the needs of customers are different. So only reasonable coordinated service, collaborative innovation strategy, can form yield optimization of e-commerce logistics distribution model.

**Hypothesis model.** Hypothesis for the model is based on the collaborative innovation service of e-commerce logistics. Because customers are in different districts, so should provide customers with reasonable vehicle service, build supply chain between e-commerce and express company, which will focus on the benefit of e-commerce and express supply chain.

This paper established decision variables corresponding to the customer service for e-commerce logistics, should be as follows:

$$x_{ij}^r = \begin{cases} 1 & \text{Vehicles to serve a particular goal in the path } r \text{ and then} \\ & \text{enter the next service point } j \\ 0 & \text{otherwise} \end{cases}$$

So we can create collaborative mathematical model of e-commerce and express logistics distribution based on the tactical coordination of supply chain as shown below:

$$\max = \sum_{r \in R} \sum_{i \in N} \sum_{j \in N, j \neq i} w_j x_{ij}^r$$

**Model building and numerical example analysis.** It is assumed that the express company has transport vehicle with the capacity of  $Q_{\max} = 1$  tons, it from the goods supply point of start loading (e-commerce company), then being match to  $n$  service requirement points, finish delivery service. As shown in figure 1.

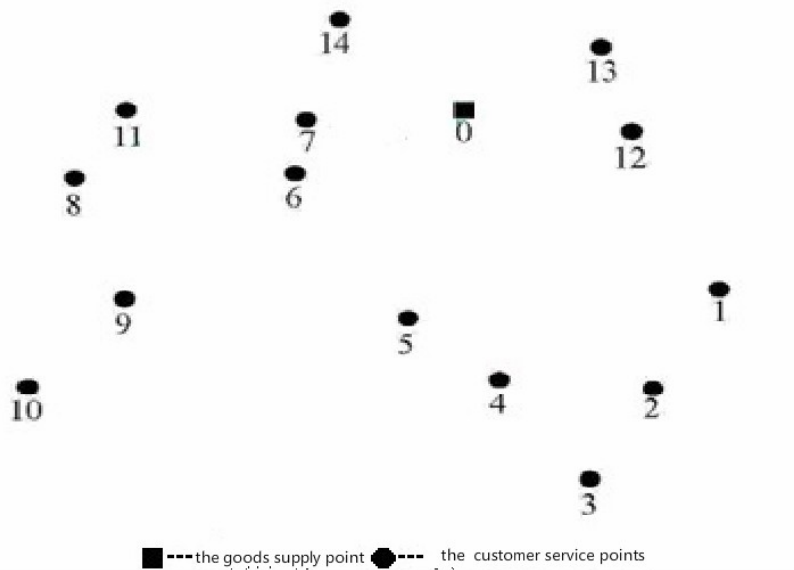


Fig. 1. Schematic geographical position between the goods supply point and the customer demand point schematic figure

Figure 1 shows the time distance based on the needs between customers and the goods supply points, indirectly suggests the income gained by the after service for the customer. Assumes that the vehicle work time limit for  $T_{\max}$ , if under the premise of no more than the load capacity of each vehicle and vehicle work time constraints, can be implemented on a single complex time distribution of the vehicle path optimization, so that we can reach profit maximization between e-commerce and express enterprises.

Based on genetic algorithm to set the parameters, assume that the size of its population is 100, the number of iterations is 500,  $P_{\text{best}}=0.2$ ,  $P_{\text{worse}}=0.3$ ,  $P_{\text{crossover}}=0.8$ ,  $n=14$ ,  $T_{\max}=12$ . According to the above data can calculate the optimal result is supposed to be 1820 by 10 times genetic algorithm, and the corresponding optimization path is:  $0 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 2 \rightarrow 14 \rightarrow 0 \rightarrow 7 \rightarrow 14 \rightarrow 9 \rightarrow 7 \rightarrow 0$ , so when  $T_{\max}=14$ , under the maximum time limit, the vehicle can provide delivery service for 7 of the 14 customers. After 7 customers' service, the rest of the customers also need to be repeated implementation according to this method. The general principle is according to the importance of customer to arrange delivery plan and work process, and feedback this table to e-commerce companies, let them deal with the shipping information, make a time table corresponding to the express enterprises, and publish on the network platform to the public. In addition, the e-commerce companies and express enterprises also should communicate with the related coordination work, to achieve maximize satisfaction for the various requirements of customers, and reduce the number of customer complaints and dissatisfaction as much as possible. So it can improve the overall profit level and service level of logistics e-commerce enterprise supply chain <sup>[2]</sup>.

### **E-commerce logistics supply chain operating collaborative innovation strategy research**

Actually, the e-commerce logistics supply chain operating collaborative strategy is a typical pyramid structure, as its operational layer is in the bottom of the pyramid structure which is the base part of supply chain operating collaborative strategy, also is the basic requirements of e-commerce logistics collaborative innovation. Based on supply chain operating collaborative innovation concept, the paper proposes the corresponding improvement countermeasures, and provide more possibility for stable operation of e-commerce logistics.

**Strengthen the e-commerce logistics supply chain collaborative information docking.** First of all, improve information sharing degree and consciousness of both e-commerce and logistics, to realize information platform docking between e-commerce logistics enterprises, make information unimpeded, and indirectly improve commodity circulation efficiency of e-commerce logistic.

Secondly, to implement the dynamic effect of information flow to achieve information sharing, only in this way can make the fastest response for the demand of customers, such as e-commerce enterprises promises to the customers covers the order of goods flow, information flow and so on information collection, and to convey the information in the first place to express enterprises, auxiliary express enterprises to speed up their service efficiency. Such efficiency measures can largely alleviate warehouse full capacity phenomenon such as November 11 for e-commerce logistics enterprise, this is mainly because it is a reasonable contingency plan, which reduce the inventory cost of the entire supply chain. And express enterprises should also give e-commerce companies real-time dynamic information about the logistics, if once appear transportation accidents, can ensure that e-commerce company immediately feedback the information to the consumers, and avoid consumers' discontent and even resistance about the service of e-commerce and logistics enterprises. In addition, when the enterprise company obtained the support and trust of the general e-commerce platform enterprises, should also be appropriately expand its market operation scope, subdivide customer resources from the e-commerce enterprises, and realize information sharing, which also may help to improve social influence and effectiveness between e-commerce and logistics enterprises, and promote both enterprises' sustainable development in the market economic environment.

**Management innovation of e-commerce logistics industry.** Due to the e-commerce logistics supply chain collaboration orders become greater and the profits will gradually reduce, and number of complaints from the customers will gradually rise, so e-commerce logistics industry management

work should be done well and actively innovation, to avoid the adverse effect.

First of all, it is necessary to draw lessons from advanced management experience of some foreign e-commerce logistics, so as to improve enterprise operating level. That mainly include for the standardization of the operation process, carefullization of the customer service, standardization of sales and clearness of account and so on. Such as American Electronic order system (EOS), Multi-Agent System (MAS) are able to build information gateway to connect the two sides, which can provide consumers with products supply dynamic information and personalized management. Anyhow, should combine enterprises' own actual situation to choose the high efficiency enterprise operating mechanism, in order to set up enterprise service system which is beneficial to develop themselves in the modern market economy [3].

## **Conclusion**

Through this paper, the current e-commerce and express service industry supply chain collaborative innovation has become the inevitable development trend. This innovation not only for the two industries spawned new services differs from the traditional services, and meet the different online shopping needs of consumers. But at the same time, they also have to face all kinds of technical problems by the supply chain collaborative construction. So, strengthen supply chain coordination mechanism from the aspects of strategy and tactics and operation, constantly achieve e-commerce logistics supply chain collaborative innovation, to improve the e-commerce logistics comprehensive competitiveness in the market, to achieve that maximize the overall interests of each other, can better meet the market demand.

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