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Logistics Optimization of E-Business Supply Chain in Chemical Raw Material Company

Li Sun*, Chengen Pan

Hangzhou Vocational & Technical College, Hangzhou 310018, China
lisun30@163.com

With the slowly developing logistics system and the diversified logistics structure, there has been no efficient, reasonable and unimpeded logistics system in China. In the chemical raw material companies, there also exist the problems such as difficult coordination and inconsistent management within the supply chain. In view of the current development status and logistics industry issues, this paper, through the analysis for the impact of e-commerce on China's logistics system, establishes the logistics optimization management of supply chain based on e-business. This optimizes the process operations for procurement, inventory, and distribution, then achieves integrated management and information integration sharing, and ensure that the companies respond to market demands in a timely manner and coordinate the production and transportation. Therefore, the use of integrated supply chain management is an essential step for chemical raw material companies to achieve logistics system informatization and rational management, and to establish the logistics distribution centre adaptive to the e-commerce environment in logistics optimization management.

1. Introduction

Compared with other common materials, chemical raw materials are hazardous, toxic, flammable, and explosive, etc. in terms of transportation and storage, which brings great potential threats and harms to logistics storage. Under the traditional business system, there also exist the problems such as management confusion, numerous channels, complex relationships, low distribution efficiency, unreasonable allocation of chemical raw material resources, and unsmooth market demand information, which seriously affects the scale, informatization, and convenience of chemical raw materials transportation (Johnson & Whang, 2003; Iii & Mccormack, 2004; Gan et al., 2004). In order to meet the needs of the new economic development and provide customers with efficient services, e-business came into being. E-business is generated on the basis of the Internet and therefore has the features of virtual reality, globality, convenience, and interactivity (Maglaras & Costis, 2003; Federgruen & Meissner, 2009; Kim, 2013). Thus, it is very important to study how to use e-business to improve the optimal management of supply chain logistics.

Compared with traditional business, e-business has not changed in nature. It still provides services such as procurement, inventory management, and logistics and distribution, but the transaction location has become virtual. Virtual trading does not cover the end of business activities, and the offline physical transfer is also required. Therefore, the supply chain logistics management of e-business is the final stage of completing the closed loop, as an important link to meet customer requirements and increase customer value (Caniato et al., 2003; Johnson & Whang, 2003). But in the current e-business, the supply chain logistics system cannot be rationalized and integrated, so it's necessary to make integration and optimization of logistics companies and e-commerce, and then form an effective logistics system with economic and scale advantages.

Therefore, in this paper, the comparative method was adopted to compare traditional business and e-business in supply chain logistics, analyse the relationship between supply chain and logistics and the relationship between supply chain management and logistics management, so as to provide theoretical basis for supply chain logistics optimization under e-business environment. Besides, the analysis was made for the feasibility and adaptability of resource allocation method in logistics companies, to provide solutions to the establishment of E-business-based informationized, socialized, and modernized logistics systems, as well as the logistics optimization for chemical raw materials and other goods.

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2. Impact of e-commerce on logistics

E-commerce can change the service quality of logistics, generate huge profits, and establish the large-scale logistics network which also means the formation of the industry threshold and the company's core competitiveness, such as JD.com logistics system. This kind of e-business has a huge impact on traditional logistics distribution, mainly in terms of logistics features, operation mode, business form, and resource allocation (Rowley, 2002; Lambert et al., 1998; Norek and Pohlen, 2001).

2.1 Logistics features

Logistics services include: transportation, warehousing, packaging, and distribution. E-business has promoted the logistics companies to focus more on the logistics technology, optimization of logistics solutions, expanding of logistics service scope, and changes of logistics management concepts. This brings about new features to the modern logistics system, including informationization, networking, intelligentization, multi-function, and globalization, as shown in Table 1.

Table 1: The characteristics of supplier logistics under Electronic Commerce

Name	Characteristic	Description
Informationization	information processing	Logistics informatization has great advantages in ordering convenience, inventory optimization and logistics network design decisions and demand forecasting.
Networking	Communication	To realize data sharing and solve the information tracking and feedback in the whole process of logistics, so as to realize "one-stop service".
Intelligentization	Operational research and decision making	Support the decision of stock level, transportation (Transportation) route selection, automatic sorting machine operation and management decision.
Multifunction	High value-added services	Provide warehousing and transportation services, carry out distribution, distribution and various value-added circulation processing services.
Globalization	Social division of labour	Make logistics enterprises more closely linked, forming a great division of labour in society.

2.2 Operation mode

The logistics of traditional business activities is carried out through different levels of channels, such as supplier-manufacturer-agent-retailer-consumer, which has the characteristics of long time, complicated hierarchies, and high cost, as shown in Figure 1. Whereas, E-business will optimize the allocation of resources through the distribution centre and directly reach consumers, as shown in Figure 2.

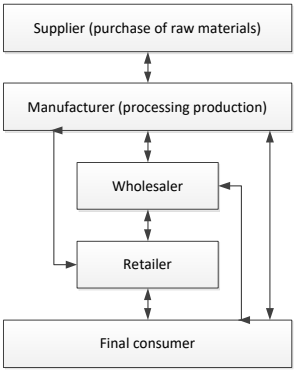

Figure 1: Logistics distribution under traditional business

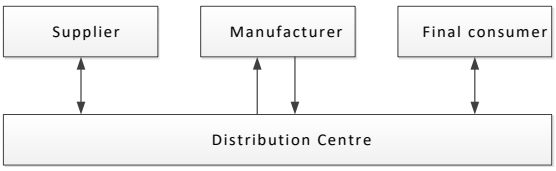

Figure 2: Supply chain logistics distribution channel under Electronic Commerce

Thanks to e-business, chemical raw material companies can access customers at different levels, simplifying tiers, saving time and economic costs, reducing intermediate links in the supply chain, and enabling customers at different levels to integrate more closely. The relationship of logistics distribution channels under different business activities is shown in Figure 3 and 4.

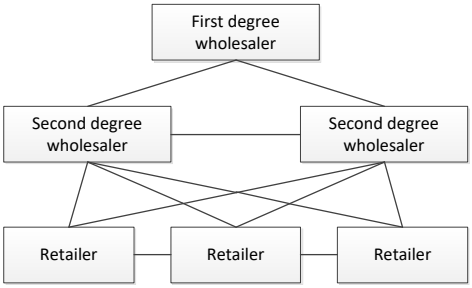

Figure 3: The relationship of logistics distribution channel under traditional business

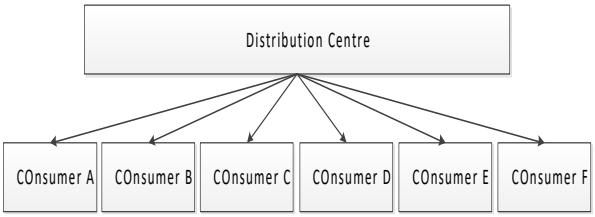

Figure 4: E-commerce supply chain logistics distribution channel relationship (centralized inventory management system)

From Figure 3 and 4, it can be seen intuitively that the logistics distribution relationship under traditional business is complex and diverse in various ways, so the delivery time is longer; the e-business supply chain distribution channel relationship is simple and clear, with no intermediate business links; despite the fewer ways of accession, delivery time can be reduced.

In addition, under e-business, logistics activity is shown in the form of services and no longer considered as one of the main factors for economic costs. Its mode of operation is made mainly through information processing systems by integrating all the warehouses together for centralized management, and making real-time monitoring of the whole logistics process

2.3 Business form

Traditional logistics company is an independent unit. There exists the fierce competitive relationship between them. They compete for customer resources by constantly improving services and reducing shipping costs. However, human management factors often fail to seamlessly link multiple business processes. E-business allows the original independent logistics to run through the entire supply chain management system, breaking the state of logistics dispersion and forming a collaborative competitive situation. Besides, with the application of the Internet, business processes are transferred online to make real-time monitoring. This change in business has also prompted the transformation of chemical raw material companies in the organizational structure of logistics management and the independence of the logistics sector, as shown in Figure 5.

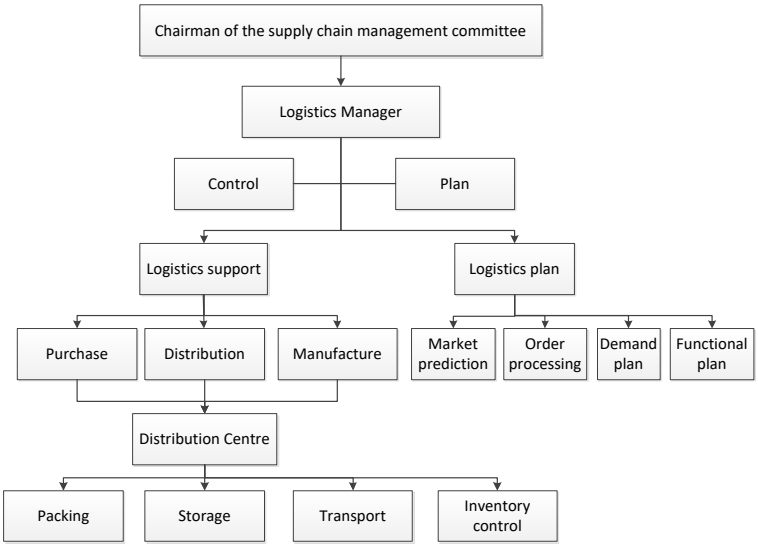

Figure 5: Structure diagram of supply chain logistics organization under Electronic Commerce

3. Integrated supply chain logistics optimization management under e-business

3.1 Supply chain logistics connection

In the traditional supply chain, the logistics management of chemical raw materials company is independently

made by itself. The corporate logistics exists in a collaborative relationship. Its relationship with suppliers, manufacturers, and sellers is complex and difficult to manage with high cost. In order to achieve the profits in the supply chain, both Japan and the United States have reconstructed the supply chain logistics system (Lee et al., 1997; Christopher, 1994; Touboulic et al., 2014), to achieved the significant reduction in logistics costs and integrated management of the supply chain.

Under the circumstances of economic development, the continuous expansion of supply chain operations and the generalization of logistics services have created a cross-contained relationship between supply chain and logistics, e.g., there may be one or more supply chains in a logistics network, and there may also be one or more logistics networks in one supply chain. In order to organically coordinate the management of chemical raw material companies in the supply chain logistics network, the supply chain management cantered on integrated logistics management was established in order to rationalize and optimize the logistics operations, and then generate comprehensive benefits.

3.2 Supply chain logistics optimization

Supply chain management is a method that combines suppliers, manufacturers, retailers, etc. together, to form a service that meets service levels, minimizes costs, and achieves accurate delivery on time. Compared to the “selling” model in traditional supply chain, the “demand-driven” supply chain model under e-business requires supply chain managers to provide a unified plan for all suppliers, manufacturers, retailers and other participants to ensure the information sharing of all parties. This optimal management approach that uses information technology to integrate all participants is taken as the integrated supply chain management which, based on e-business and logistics management, can quickly respond to the market, improve service quality, and can also effectively reduce inventory, save time, reduce costs, and increase profits.

Table 2: The benefits of integrated supply chain management

Benefits	Description
Economizing the transaction cost	Integrating the supply chain with the Internet will greatly reduce transaction costs and shorten transaction time.
Reduce inventory level	Keep inventory information, organize production and replenish in time, so there is no need for enterprises to maintain a higher inventory level.
Reducing the cost of purchasing	Acquire inventory and purchase information, and apply to purchasing management personnel for more valuable work.
Reduce cycle	Through the automation of supply chain, the accuracy of prediction is improved, time is reduced, and customer satisfaction is improved.
Increase profits	Through effective management, the boundary of the organization can be extended, and the enterprise can fulfil the contract and increase revenue.

4. Supply chain logistics optimization plan under e-business

Integrated supply chain management is a form of management that integrates the use of science and technology, including forms of composition, promotion method, and services. Its implementation process was completed through the technical support of electronic commerce and the guarantee of logistics capability.

4.1 Optimization plan of technological means

The customer demands-oriented chemical raw material companies must strengthen information integration in order to understand customer needs in a timely manner and improve customer value. That is, through the accurate analysis of the data such as orders, inventory, profits, and resources, the customer needs are forecasted. On the one hand, chemical raw material companies should establish internal financial, marketing, inventory network systems, as well as external financial settlement, orders, decision-making inquiries, training systems, etc., to achieve the integration of internal management details and external management integration. On the other hand, one logistics distribution centre with information integration should be established, including internal production distribution and external sales and distribution.

4.2 Optimization plan of logistics process

E-business-based supply chain logistics process is carried out in sequence from supplier-manufacturer-retailer or consumer, including procurement management, inventory management, and distribution management.

4.2.1 Procurement management

The procurement management of chemical raw material companies mainly refers to the ordering process of accepting orders, and the optimization operation process under e-commerce is shown in Figure 6. The

process is divided into three parts: the formulation of demand plans and submission of purchase orders, the establishment of long-term sales contract relationships, and acceptance of delivery.

4.2.2 Inventory management

In order to ensure that the total safety inventory and average total inventory of warehouses, and reduce the demand risk of decentralized inventory, the unified single-warehouse management in the sales area market should be implemented to ensure the timely receipt of order information and achieve the level of integration, although it may result in insufficient transport capacity.

4.2.3 Distribution management

Distribution management is mainly the transportation and storage of goods. The establishment of a distribution centre can timely and accurately record and arrange logistics information, so as to achieve the effective management of planning, coordination and control.

Therefore, the logistics optimization design was made from the three aspects of procurement, inventory, and distribution. The flow chart of logistics system information is shown in Figure 7.

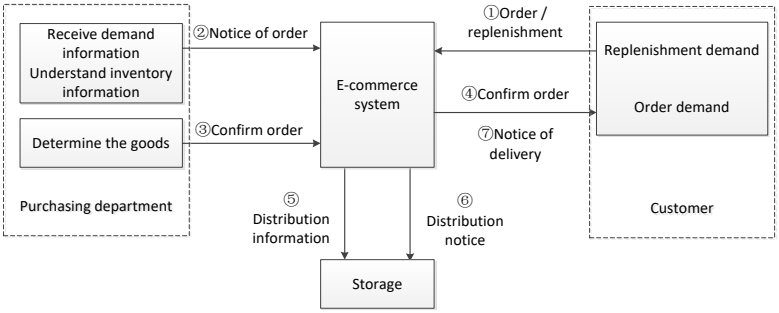

Figure 6: Sales order operation process

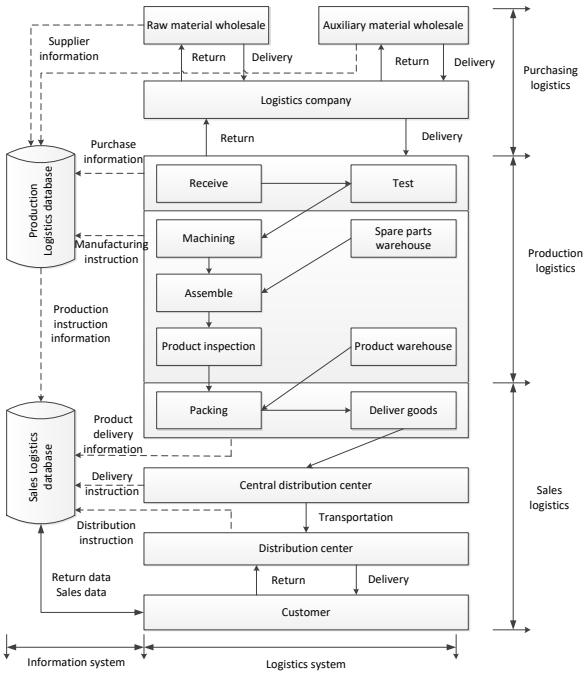

Figure 7: Information flow of logistics system

5. Conclusion

The construction of Chinese logistics system has been constantly changing from the diversified structure, but there is still no unified and effective management, and the logistics management is chaotic. Until the advent of

e-business, through this modern technological means, the logistics system has been promoted to the direction of integrated supply chain management. This paper, through the analysis of chemical raw material companies, establishes a supply chain logistics optimization plan based on e-business. It solves the problem of enterprise coordination and management in the supply chain, realizes integrated management and information integration and sharing, to ensure that the enterprises respond to market demands in a timely manner, and coordinates production and transportation. This provides a theoretical basis for optimization of supply chain logistics under e-business environment.

(1) The impact of e-business on China's logistics system was analysed, mainly in the aspects of logistics features, operation modes, business forms, and resource allocation etc. (2) Based on e-business, the supply chain management method integrating logistics, business flow, and information flow was formed, reducing the overall inventory level, reducing the cycle time, and thereby increasing profits. (3) Information sharing was achieved through e-business, to optimize the process operations for procurement, inventory, and distribution and ensure that the participants in the supply chain are all effectively integrated, and finally achieve the integrated management of supply chain logistics.

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