Research on Cost Control of Supply Chain Logistics Management in E-Commerce Enterprises Based on Internet of Things Technology

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Abstract: The current IoT technology has been applied and supply chain logistics management, which can help enterprises realize the intelligent logistics distribution service in the whole process of supply chain, greatly improve the operational efficiency of industrial enterprise warehousing and logistics distribution, reduce logistics cost and help enterprises achieve Intensive generation. Based on this background, this paper explores the new methods of supply chain logistics cost management for e-commerce enterprises under the Internet of Things technology. By sorting out the business processes of e-commerce supply chain members, the logistics cost is determined based on the activity-based costing method. The logistics cost system of the three subsystems of production and online sales combines the analytic hierarchy process and the fuzzy comprehensive evaluation method to analyze the weight of each business process, and then optimizes the key operation areas to reduce the logistics cost, thereby increasing the profit of the enterprise.

1. Introduction

The "Internet of Things concept" is a network concept that extends and extends its client-side to any item and item on the basis of the "Internet concept" for information exchange and communication. Its definition is that in 2005, the US-led International Telecommunication Union released the article "ITU Internet Report 2005: Internet of Things" at the "World Summit on the Information Society", officially proposing the concept of "Internet of Things." The Internet of Things (IoT) uses information sensing devices such as radio frequency identification, infrared sensors, global positioning systems, and laser scanners to connect items to the Internet in accordance with agreed standard protocols for information exchange and communication for intelligent identification and precise positioning. A network that tracks, monitors, and manages it in real time [1]. The technology core and implementation foundation of the Internet of Things is the Internet and sensing systems, which are extensions and extensions of the Internet.

In the context of the country's vigorous promotion of the Internet of Things, the application of the Internet of Things in supply chain logistics is bound to be a development trend. The upstream and downstream enterprises in the supply chain have achieved close cooperation through the information dissemination of the Internet, breaking the situation of their own battles, whether it is R&D or design [2]. Or the production of products of the enterprise, all of which are unified coordination and planning. Starting from the entire production chain, and based on the needs of each customer, seeking cooperation, accepting orders and co-designing, forming a seamless connection of all links, information is accessible, and through the informationization and modular operation process, new Cost control under the times.

At present, China's logistics cost management is oriented to the operational level, but this is different from the management objectives in the supply chain environment, which inevitably causes a great waste of resources. In many enterprises, the low management level and lax cost control hinder the organic combination of logistics cost management and supply chain management, which

limits the control of total cost of enterprises and indirectly affects the core competitive advantages of enterprises in the market [3]. Based on this, the thesis stands on the level of IoT technology, and explores the new means of supply chain logistics cost management for e-commerce enterprises under the Internet of Things technology. It sorts out the business processes of e-commerce supply chain members and determines on the basis of activity-based costing. Logistics cost, build a logistics cost system of supply, production, online sales three subsystems, combine the analytic hierarchy process and fuzzy comprehensive evaluation method to analyze the weight of each business process, and then optimize the key operation areas to reduce logistics costs, thereby increasing the enterprise the proceeds.

2. E-commerce enterprise supply chain logistics cost composition

In general, entrusted logistics and enterprise's own logistics costs are the main categories that constitute logistics costs. For e-commerce, third-party logistics is entrusted with logistics costs, and entrusted logistics costs refer to the costs incurred by entrusting third parties to engage in logistics operations. Analyze the causes of supply chain logistics costs and changes by determining the factors that constitute the various logistics costs.

Fig. 1 E-commerce supply chain logistics members

The general logistics cost mainly includes transportation cost TC, management fee MC and fresh-keeping cost IC. The cost driver is divided into the operation driver AD and the resource driver RD according to the role of job formation and distribution. It is the real reason for determining the cost of operation and resource consumption [4]. Combined with the cost structure and motivation of each member of the supply chain, according to the cost component and Cost drivers comprehensively analyze and rationally classify supply chain logistics costs.

2.1 Resource drivers

As far as the entire supply chain system is concerned, the resource drivers are mainly allocated resources in each operation center. The workload determines the resource consumption and is not directly related to the final output. The resource motivation is the first stage of the operation cost method to calculate the logistics cost.

2.2 Management costs

In the transportation process from the upstream to the downstream of the supply chain of e-commerce products, the cost incurred by each member for organizing and managing various activities is the management fee MC. The total logistics LC and the average management expense

ratio RLC basically constitute the logistics management cost, that is, MC=LC+RLC, where the average management expense rate is the management cost incurred in the logistics activities of the products flowing from the beginning to the terminal within a certain period of time. The combined average of the total logistics of each member.

2.3 Management fees

In the process of the product flow from the manufacturer to the end consumer, the entire cost incurred in addition to transportation and management costs is the preservative expense IC. It mainly includes storage fee SC, insurance fee ISC, information fee IFC, distribution fee DC, transportation processing fee TPC, wear and tear fee GSC, packaging processing fee PHC and interest fee INC, i.e. IC=SC+ISC+IFC+DC+TPC+GSC +PHC+INC.

2.4 Operating motivation

The standard for allocating the cost of each business activity to a product, labor, or consumer center is called an operational driver and is a bridge between communication resource consumption and output. Analyze actual operations, split and reorganize various operations, avoid redundant operations, improve processes, and reduce costs. The transportation cost refers to the total cost incurred due to the transportation of the product, mainly the freight TF and the handling and handling fee MAC, that is, TC=TF+MAC, which is calculated according to different transportation modes and their corresponding business accounting methods [5].

3. Supply Chain Logistics Cost System Design

3.1 Assigning resources to jobs

The resource costs of each member of the product supply chain are allocated to various operational activities due to resource drivers. The motivation is the standard of allocation, and the resources consumed are allocated to each operation center according to the motivation, the implementation cost, and the behavior orientation. In the calculation process, the factor allocation rate TCR_{ij}, the single resource TOC_{ij} of a job collection, and the total resource consumption TMC_i are used.

The driver allocation rate expression is as follows:

$$TCR_{ij} = \sum TMC_{ij} \Big/ \sum RD_{ij} \tag{1}$$

RD_{ij} Is the total amount of resource drivers consumed by each job center? A resource that is collected by a job:

$$TOR_{ij} = RD_{ij} \times TCR_{ij} \tag{2}$$

Total resources used by an assignment:

$$TMC_i = \sum TOR_{ij} \tag{3}$$

3.2 Define product supply chain logistics operations

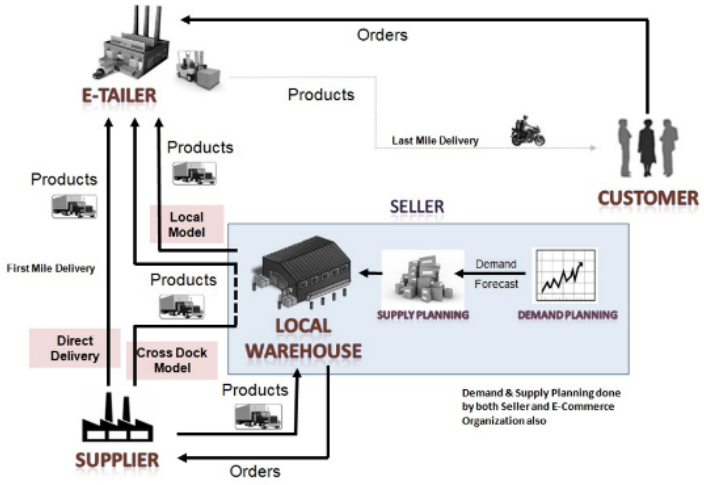

Fig. 2 E-commerce supply chain business process

According to Figure 2, the logistics operation process of each stage of the product supply chain under e-commerce is divided.

3.3 Establish a product supply chain operation motivation table under e-commerce

According to Figure 2, the product supply chain operation motivation table under e-commerce (see Table 1) is established, and when the operation cost is distributed among the work objects, the logistics operation cost of each operation is calculated by TCR_{ij}.

Tab. 1 Supply chain operation motivation table

Activity cost library	Job driver	Activity cost library	Job driver
transport	Distance, frequency	Sales	Quantity
Loading and unloading	time	Packaging processing	Quantity
Warehousing	Occupied area	Sorting	Quantity
test	frequency	Information Flow	Order quantity, product quantity

3.4 Construction of product supply chain logistics cost system under e-commerce

Under e-commerce, logistics costs are divided into explicit and implicit costs according to the payment pattern of capital flows [6]. The activity-based costing method is used to divide the business systems of the product supply chain under e-commerce into supply, production, and network sales logistics subsystems, thereby constructing a product supply chain logistics cost system under e-commerce, as shown in Figure 3.

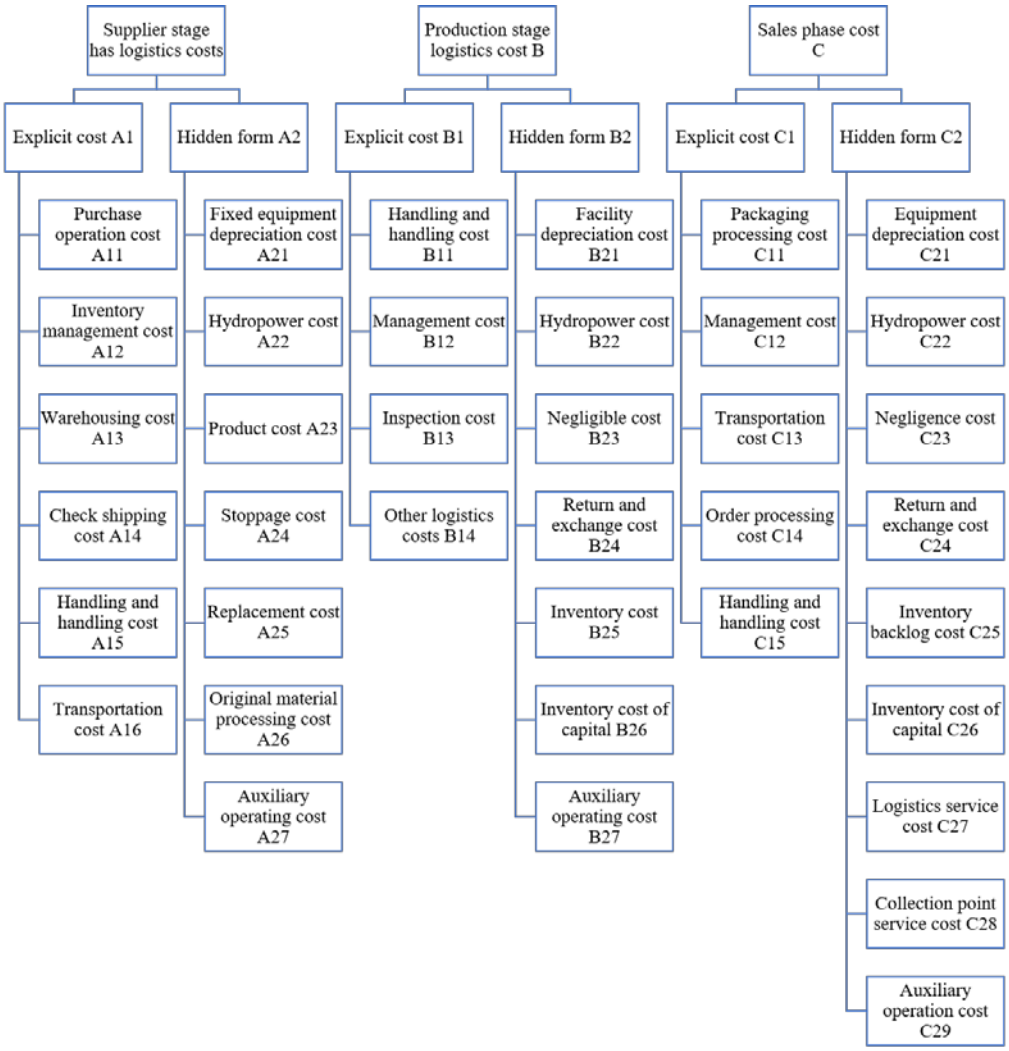

Fig. 3 Summary of supply, production and sales costs of e-commerce supply chain

4. Logistics Cost Analysis of Product Supply Chain Based on Activity-Based Costing

4.1 Logistics costs of the product manufacturer supply phase

With regard to the ratio of explicit and implicit cost allocation, fuzzy comprehensive evaluation is used. Based on the discussion with relevant experts, combined with the analytic hierarchy process, the weights of each business in the explicit and implicit costs of each stage of the product supply chain are calculated [7]. Under e-commerce, the cost of transportation operations in the supply chain of the product supply chain is 0.30, which accounts for the largest weight, and the inventory management and warehousing costs are second. According to the fuzzy comprehensive evaluation method, dominant and the hidden cost is equally important, and the transportation cost and the cost of agricultural materials are the largest in the supply phase of the e-commerce.

4.2 Logistics costs of the production phase of the product manufacturer

In the production stage, the cost of loading and unloading operations is 0.57, which is the largest; the cost of water and electricity and the cost of depreciation of facilities account for 0.42 and 0.18 of the hidden cost respectively. Due to the characteristics of the product itself, the growth environment is strict. The cost of water and electricity and the cost of depreciation of facilities are relatively high. According to the fuzzy comprehensive evaluation method, in the production stage, the ratio of dominant and hidden costs is 4:6, and the cost of hydropower accounts for 0.25 of the logistics cost of the producer's production stage.

4.3 Logistics cost of the product supply chain network sales stage

Under the e-commerce, in the network sales stage, the transportation cost accounts for 0.48 of the explicit cost, and the proportion is the largest. The inventory backlog price is 0.30 of the hidden cost. Because the product has perishable, easy to deteriorate, brittle and other characteristics, the product is stored. The life cycle is short, and the cost of price reduction is high. According to the fuzzy comprehensive evaluation method, the ratio of dominant and hidden cost is 1:1, and the transportation cost and inventory backlog cost are the two parts of the network sales stage.

5. Key node operation cost optimization

From the above analysis, it can be concluded that the transportation cost is the largest in the supply phase and the network sales phase, and the inventory backlog treatment cost is second only to the transportation cost in the network sales phase, and the hydropower cost accounts for the largest proportion in the production phase. Select the key operation areas of the logistics system (transportation cost, hydropower cost, inventory backlog and price reduction processing cost), and propose optimization solutions for each key operation field.

5.1 Inventory Backlog Price Reduction Processing Cost Optimization

The generation of inventory costs is related to the storage or holding of goods in a warehouse over a period of time, generally proportional to the average inventory held during this time. It mainly includes space, capital, and service and risk costs. Due to the characteristics of the product itself, the life cycle is short, and there is no backlog. The risk of the inventory backlog is extremely high. Generally, the manufacturer will take measures to reduce the price and increase sales. Reduce inventory.

Channel integration, collecting and analyzing demand information, predicting effective demand, and achieving supply and demand matching. In the supply phase, producers with larger scales can establish alliances of producers through channel integration, collect research on consumer demand information through surveys, questionnaires, etc., and conduct analysis and analysis to scientifically predict the effective demand of consumers. Information sharing among affiliates. Each member carries out planting and production according to the actual effective demand and their own conditions, and maximizes the matching of supply and demand.

Increase investment in science and technology, improve quality and extend life cycle. Because the products are perishable, easy to deteriorate, and vulnerable, the cold storage and cold chain logistics equipment and technology are constructed to keep the products in a low temperature state, reduce the loss in the storage process, improve the product quality, extend the product life cycle, and extend the product. The online sales cycle of the product can reduce the cost of inventory backlog and price reduction, and improve the management efficiency of inventory.

Adopt a variety of promotional methods to promote sales. In the online sales stage, product e-commerce adopts various kinds of promotion activities such as discounts and rebates, which expands the sales volume of products and reduces the inventory of products, which increases the revenue of the product supply chain.

5.2 Transportation cost optimization

The logistics transportation cost TC is all expenses related to logistics transportation activities. Reasonable choice of transportation. In the e-commerce environment, online sales lack intermediate links and are directly transported directly to end consumers by e-commerce or producers through self-built logistics or third-party logistics. Transportation costs are directly related to the choice of means of transport, in addition to transport conditions such as distance, speed and capacity. E-commerce and producers should compare and analyze according to their own characteristics, and choose the transportation method reasonably.

Reasonable choice of transportation plan. Under e-commerce, the product supply chain consisting of e-commerce (or producers), third-party logistics, and end-consumers has fewer intermediate links

and higher requirements for logistics and transportation equipment. E-commerce (self-operated logistics) or third-party logistics should classify and analyze the orders in different categories, and adopt a combination of direct transportation, stowage transportation, centralized transportation, etc. to reduce transportation distance, reduce logistics transportation costs, and make reasonable the transportation solution achieves maximum product transportation with the least cost.

Optimize the warehouse layout. From the perspective of controlling transportation costs, optimization of the layout of internal logistics and warehouses and optimization of transportation processes can minimize transportation costs. Large enterprises allocate the appropriate storage location for different producers and distributors to achieve the shortest total transportation distance and reduce transportation costs. By classifying suppliers, suppliers and purchasers, they are allocated to the waiting area and the distribution area. Their different storage locations enable the shortest total handling distance and reduce the transportation costs within the company.

6. Conclusion

In the context of the Internet of Things technology, the paper uses a combination of analytic hierarchy process, fuzzy comprehensive evaluation and quantitative analysis with activity-based costing and key factors to construct a logistics supply cost system for e-commerce, and refine it into supply. The three sub-systems of production and network sales optimize the key operation fields such as transportation and inventory backlog, and it is of great significance to the research of product supply chain logistics cost system under the e-commerce environment. However, the product supply chain logistics cost system in the e-commerce environment needs to be further refined, and the breadth and depth of the optimization schemes in key areas need to be further explored.

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