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Research on the Product Logistics Cost Control Strategy Based on the Multi-Source Supply Chain Theory

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ABSTRACT

In response to the rapidly changing market environment and adapting to many impacts such as political, economic and technological conditions, supply chain managers are increasingly demanding a high-speed and efficient way to adjust the design to optimize the supply chain structure. In order to facilitate the participating companies in the supply chain to quickly and effectively implement the supply chain design optimization strategy, improve the competitiveness of enterprises and the ability of the entire supply chain to resist risks. Enterprises have gradually reduced the space for enhancing the competitive advantage by reducing raw material consumption, labor costs and increasing production efficiency in production. The high logistics cost is a heavy burden for enterprises. In the face of fierce competition in the industry, how to highlight the core competitiveness of enterprises and expand market share has become an urgent problem for almost all enterprises. Therefore, this paper takes the logistics cost of an electrical appliance as the research object, and systematically studies the logistics cost control problem of the electrical enterprise based on the multi-source supply chain theory. As far as electrical companies are concerned, they quickly find out the problems of the logistics cost control and adopt corresponding cost control optimization methods to bring about good logistics cost reduction effects. At the same time, obtaining corresponding guidance in improving distribution efficiency and a logistics service level, in hopes to improve the attention of the electrical appliance enterprises on logistics cost control, and guide enterprises to establish correct logistics cost management concepts.

KEYWORDS: Control strategy, logistics cost, multi-source supply chain.

1 INTRODUCTION

WITH the rapid development of the economy and society, market competition has become increasingly intensified. In order to gain a superior position in the whole competition, enterprises have adopted targeted improvement measures for the control of logistics costs and adopted models. For most enterprises, as the scale of enterprise development continues to expand, the market share continues to increase, and the scale of the company's logistics distribution continues to expand. However, in terms of the actual logistics distribution work, the past logistics cost accounting and distribution mechanisms still occupy the main position, so there are still many deficiencies in the enterprise logistics cost control. From the perspective of the entire supply chain, scientific analysis of each node is required (Stevens GC et al 2016). At the same time, in this process, it is necessary to refer to the various functional departments within the enterprise and take into account all of the logistics links and scientific accounting of various logistics costs of enterprises, and control of logistics costs in the expected target cost of the entire supply chain (Liu W et al, 2015).

At present, in many enterprises, logistics costs account for a considerable proportion. The level of logistics costs is directly related to the level of corporate profits and the strength of competitiveness. Therefore, logistics cost management has become the core of enterprise logistics management (Bichou K et al 2015). Controlling each cost factor in the enterprise

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logistics supply chain is an effective way to reduce the logistics cost of the enterprise (Morgan TR et al 2018). The research on the model and method of the enterprise logistics cost in the supply chain environment has become a research hotspot. The multi-source supply chain is a complex global decision-making process for the overall operation of the supply chain (Chen L et al 2018). It forms a supply network by selecting the most suitable supplier for each supply chain node, and sets the constraint relationship, interaction strategy, control method and operational parameters between the network nodes to make one or several characteristics of the supply chain perform, (such as time, cost, and quality) to achieve optimum (Santos TFD et al 2016). In the single source procurement strategy, the relationship between manufacturers and suppliers is stable and long-term, and the transaction volume of enterprises in the downstream stage is enhanced, and the procurement risks caused by the single source procurement strategy are avoided (Zhou Z et al 2018).

Therefore, this paper takes the logistics cost of the electrical appliance as the research object, and systematically studies the logistics cost control problem of the electrical enterprise based on the multi-source supply chain theory (Yu Y et al, 2016). As far as electrical companies are concerned, they quickly find out the problems of logistics cost control and adopt corresponding cost control optimization methods to bring about good logistics cost reduction effects. At the same time, it has obtained corresponding guidance in improving distribution efficiency and a logistics service level, and hopes to improve the attention of electrical appliances to logistics cost control, and guide enterprises to establish correct logistics cost management concepts (Gunase karan A et al 2001).

Specific contributions of this paper include: Literature surveys on various existing power supply cost control algorithms based on the supply chain theory and analyze their advantages and disadvantages. This paper proposes a method based on electrical logistics cost, systematically researched based on the multiple Source supply chain theory of the power enterprise logistics cost control model (Wang G et al 2016); performance analysis of the model and algorithm evaluation relative to other existing algorithms, (this model allows power companies to quickly discover logistics cost control problems and take corresponding measures), while improving electrical efficiency and logistics service level guide enterprises to establish the correct logistics cost management concept (Zhang M et al 2018).

The rest of this paper is organized as follows: Section 2 discusses research content. The model establishment based on the multi-source supply chain theory is discussed in Section 3. Section 4 discusses the analysis of the supply chain logistics system of electrical enterprises. Section 5 discusses the logistics cost control strategy of electrical enterprises in the raw material procurement stage. Section 6 discusses the logistics cost control strategy of electrical enterprises in the production stage, and Section 7 discusses the electrical company's logistics cost control in the sales stage. The final section concludes the paper with summary and future research directions.

1.1 The Structure, Meaning, Complexity and Risk of Multi-source Supply Networks

A multi-source supply network is a supply network consisting of a single buyer and multiple suppliers. Figure 1 shows the structure of a multi-source supply network (Prajogo D et al 2016).

As can be seen from Figure 1, the multi-source supply chain sees all the nodes in the supply chain as an organic whole, based on the supply chain process, and is composed of all the enterprises that join the nodes. There is generally one core enterprise, and the node enterprise is a demand and supply relationship. The primary goal of the multi-source supply is to ensure high customer satisfaction and minimized business costs. Under this goal, the five major supply chain modules include production site decision, warehouse management, transportation and distribution, information processing and the payment system are planned (Dadzie KQ,2015).The direction in which the supplier points to the purchaser represents the supply of goods, products or services. The direction in which the purchaser points to the supplier represents the purchaser's request for management, coordination, control, etc. This directly leads to the complexity of the multi-source supply chain. The first is the supply network structure of a single purchaser with multiple sources of supply (Rezaee A, 2017). The connection between buyers and suppliers is the focus of the supply management. Because it is a multi-source convergent (only one buyer) the supply network, buyers are clearly in a dominant position in their relationship, including research on supplier selection and management of supplier-supplier relationships (Soysal M, 2014). The second is to examine the relationship between suppliers within the supply network. There are both competitive and cooperative relationships between suppliers: They have information communication and communication, may conceal information from competitors, or may collude in collusion to deal with buyers. The third is how the overall operational performance of the supply network is, how to create an innovative environment, how to avoid the overall risk, etc., which is subject to the constraints of the former two (Monostori L, 2017).These factors contribute to the complexity of the multi-source supply chain systems (see Table 1).

Table 1. Complex Characteristics of the Multi-source Supply Chain.

Number of suppliers	The greater the number of suppliers, the higher the complexity of the entire supply chain.
Differences between suppliers	It comes from the diversification of the buyer's own needs, it may need both steel products and plastic chemicals, and for those suppliers with completely different categories, buyers must adopt completely different management strategies.
There is a dual relationship between competition and cooperation among suppliers.	The closer the relationship between suppliers, the more contacts, the more frequent information exchange and communication, the more difficult it is for buyers to make decisions.

For risk, when the information barrier between suppliers is removed, the purchaser loses control of the supplier's information transmission. This kind of control of information is specially set by the purchaser to protect its own interests. The purchaser can reduce the possibility of collusion between suppliers by transmitting different information to different suppliers. However, if there are too many suppliers, there will be loopholes in the coordination of the buyers. Therefore, the supplier should be in a quantity that is not too small or too much, to ensure that the supply risk is at a low level. With the right number of suppliers, the differences and relationship characteristics between suppliers will further highlight the impact on supply risks (Giri BC, 2017). When the difference between suppliers is small, or when a supplier has a special situation and cannot supply normally, the purchaser can flexibly and timely adjust the object without interruption of supply; the close relationship between suppliers and information sharing is conducive to sharing risks (Heckmann I, 2015).

1.2 Logistics Cost and Logistics Cost Control

Logistics cost mainly refers to the consumption of a resource. After the producer produces the product, the merchant needs to pay a certain price in order to obtain the product. Logistics goods are the most critical component of the company's operating behavior (Wang, Q, 2009). In the business activities of the company, it is necessary to experience a series of activities such as procurement of raw materials, production and distribution of products, depreciation of fixed assets, and sales (Vidyasree, P. 2012). The related expenses required in all processes constitute the logistics cost. In terms of logistics costs, it includes staff salaries and corresponding control expenditures. The scientific management of logistics costs has a very important function in the company's cost control. Logistics costs need to be reliably measured in money. The logistics cost is summarized in the resources consumed by all the chain operations of the company. Logistics behavior pays attention to the reality of logistics behavior. For the company, if you want to continue to improve your overall strength under the cruel market conditions, you need to pay attention to the scientific management of logistics costs. According to the actual situation of the company and the loopholes in the logistics cost level, the corresponding logistics cost control measures are given, and the company's own logistics cost control is in the acceptable and reasonable scope, and the related expenses in the logistics behavior need to be quickly processed. The logistics cost control is specifically in the actual logistics cost control, detailed analysis of all the components, and the corresponding verification method. Do a proper verification and analysis of all costs and compare the actual logistics costs with the estimated logistics costs? If the actual logistics cost far exceeds the estimated cost, it is necessary to carefully analyze the reasons, formulate strict corrective measures, control the logistics cost resource consumption consumed in the logistics activities within a reasonable range, and quickly handle the estimation of all logistics costs. By using the corresponding management and control of operational logistics costs, it is possible to effectively control the company's logistics costs, and then enhance the company's overall strength.

1.3 Logistics Cost Management Characteristics based on the Multi-source Supply Chain and Logistics Cost Control Method

Logistics runs through the entire supply chain. It connects the various companies in the supply chain and is the link between companies. In the supply chain management environment, enterprises and other enterprises are no longer purely in competitive relations in the past, but through logistics, the enterprises in the entire supply chain have established a strategic partnership and complement each other. Therefore, mastering the characteristics of logistics cost management based on multi-source supply chain has a very important practical significance and economic value for the development of any enterprise. This also has certain reference value for guiding relevant enterprises to effectively control the logistics cost. Its characteristics are shown in the Table 2.

There are many common methods and theories for the formation of enterprise logistics cost control. According to the data given in the existing literature, the logistics cost control method is shown in the Table 3.

2 RESEARCH CONTENT

THIS study takes the platform-type electrical appliance enterprise as the research object, analyzes the multi-source supply chain structure of the electrical appliance industry, and proposes the logistics cost structure of the electrical appliance

enterprise. Starting from the procurement logistics cost, manufacturing logistics cost and sales logistics cost of the electrical enterprises, the composition and influencing factors of logistics cost are analyzed. Combined with the problems in the procurement, manufacturing and sales links, the corresponding logistics cost control strategy is combined with the feasibility of the cost control strategy proposed by the example. The research route of this study is shown in the Figure 2.

Table 2. Characteristics of the Logistics Cost Management under the Multi-source Supply Chain.

The minimum goal is the total cost of the supply chain	Supply chain management	Reducing the overall cost of the supply chain is also to gain more benefits.
	Enterprise product	The cost management goal is not to maximize the local benefits, but to minimize the cost of each link involved in the overall supply chain, and to achieve a reasonable proportion of input and output.
Supply chain overall logistics activities covered by management objects	Expand ideas, integrate and integrate activities in the supply chain, and conduct scientific accounting of costs from a long-term perspective. Focus on the overall interests, the ultimate goal is to get the most benefit with the least cost.	
Require full sharing of information	Realize the sharing of information, let all stakeholders share the information in the supply chain, and formulate corresponding supply chain development strategies based on accurate information.	

3 THE MODEL ESTABLISHMENT BASED ON MULTI-SOURCE SUPPLY CHAIN THEORY

IN the multi-source supply chain strategy, this paper considers the total cost of the logistics costs, including the logistics cost control in the procurement phase, production phase, and sales phase.

The cumulative cost value of the cumulative value Ci of the stage and the selection mode is Cio_i, and the relationship between the actual purchase ratio and Xio_i is as shown in Equation 1:

$$C_i = \sum_{Oi=1}^{s(i)} c_i o_i x_i o_i \tag{1}$$

Under each selection stage, the cumulative cost value of the logistics and the cumulative cost of the logistics to be transported are:

$$c_i o_i = \begin{cases} C_{ioi}, i \in R; \\ C_{ioi} + \sum_{j \in v(i)} C_j, i \in R \cup E \end{cases}$$
$$W_{ioi} = \begin{cases} C_{ioi}, i \in R; \\ C_{ioi}/2 + \sum_{j \in v(i)} C_j, i \in R \cup E \end{cases} \tag{2}$$

The minimum logistics shipping costs for each selection phase are:

$$AOH_{ioi} = \begin{cases} \alpha_i \sigma_i \sqrt{S_v(i) o_i + T_{ioi} - S_{ioi}}, i = R \cup P; \\ \lambda x_{ioi} \mu_i / 2 + \alpha_i \sigma_i \sqrt{S_v(i) o_i + T_{ioi} + \lambda}, i \in E \end{cases} \tag{3}$$

Therefore, the total production, procurement and transportation costs are:

$$PPT = \sum_{i=1}^{N} \sum_{O_i=1H}^{S(i)} C_{ioi} H x_{ioi} \mu_i \tag{4}$$

4 THE ANALYSIS OF THE SUPPLY CHAIN LOGISTICS SYSTEM OF ELECTRICAL ENTERPRISES

4.1 The Electrical Enterprise Logistics Cost Composition and Influencing Factors

IN the logistics activities, in order to provide relevant logistics services, it is necessary to occupy and consume the monetary performance of all living labor and materialized labor, which is the logistics cost. This is also the value of the raw materials, fuel, power, fixed assets and other means of production consumed in the logistics activities, the labor performance of labor compensation and management costs, and the compensation scale for enterprises to maintain simple reproduction. The characteristics of the enterprise logistics cost include measurability, concealment, logistics cost, customer service demand as the benchmark and benefit reversal. Combining domestic and foreign research on the composition of logistics costs and the actual situation of electrical appliances, the logistics costs of electrical appliances mainly include materials, labor, maintenance and general expenses (such as office expenses, travel expenses, conference fees, communication fees, electricity charges, and gas). Fees, water charges, heating and greening fees, and costs for logistics functions, which are reflected in the three types of materials, labor and maintenance, etc.), special

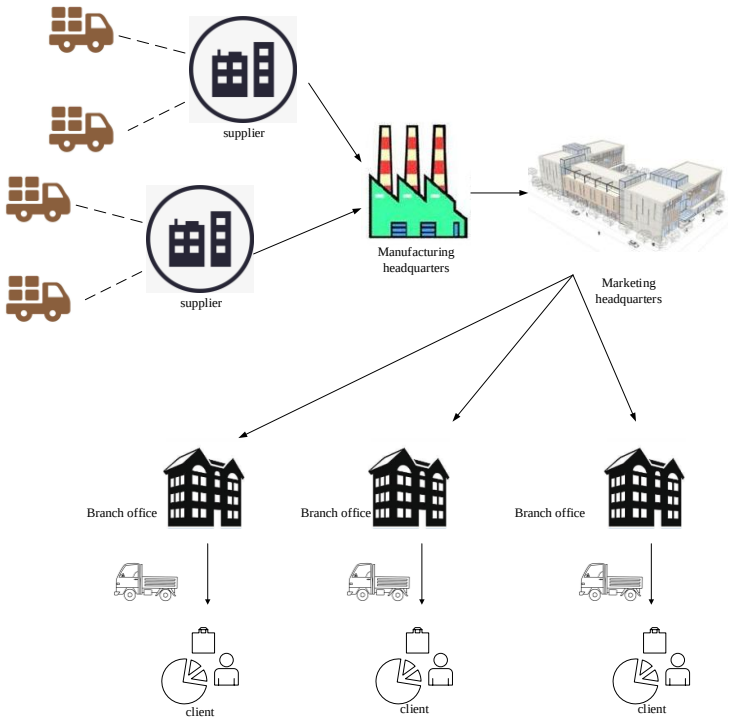

Figure 1. **The Management Model of the Multi-source Supply Chain.**

Table 3. **The Characteristics of the Logistics Cost Management under the Multi-source Supply Chain.**

Traditional cost control theory	Strictly control the production process of the company through production data and standard cost accounting calculations. Specific control methods include controlling resource consumption, controlling expenditures, and controlling production techniques and business processes.
Modern cost control theory	Pay attention to all the costs incurred in the product life cycle, and on this basis, try to control the whole process of product production from the origin of the cost.
Activity-based cost control theory	It can reflect the financial status and operating results of the company and can analyze the cost control and production in detail.
Value chain cost control theory	The adjustment compares the cost of the enterprise value activity with the contribution to the product value. The object of cost collection and distribution is the value chain. This change has finally maximized customer value—cost input to create value, and value creation must be cost.

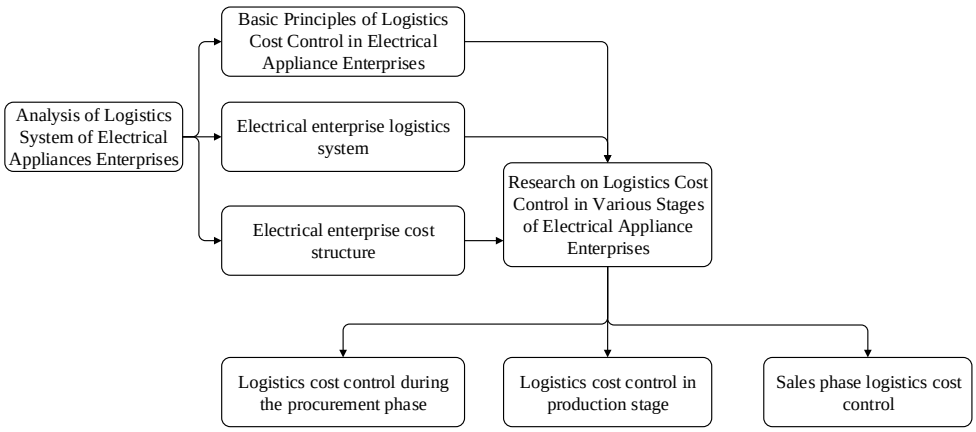

Figure 2. **Research Circuit Diagram.**

expenses (such as inventory liquidity, inventory price, loss), insurance expenses and special expenses such as logistics accident handling, and commissioned logistics costs. Figure 3 is a breakdown of the composition of the enterprise logistics costs based on the scope of logistics activities.

Based on the multi-source supply chain theory, the factors affecting the logistics cost of the electrical enterprises are mainly divided into several types as shown in Table 4.

4.2 *Basic Principles of the Logistics Cost Control in the Electrical Appliance Enterprises based on the Multi-source Supply Chain Theory*

The logistics cost control is always necessary to improve the logistics operations to reduce logistics costs, and to implement logistics cost principles in all processes of production and operation. Strengthen logistics cost management is to achieve the goal of reducing total logistics costs. Electrical appliance enterprises need to combine their own characteristics and carry out logistics cost control based on the actual characteristics of the enterprise logistics costs. At the same time of forming logistics costs, planning its prior activities, supervising and guiding activities, and evaluating and summarizing after-the-fact activities, so that the total cost of the enterprise logistics is continuously reduced to the ultimate task, and constantly seek corresponding improvement measures and implementation. The basic principles are shown in Table 5.

5 THE LOGISTICS COST CONTROL STRATEGY OF ELECTRICAL ENTERPRISES IN THE RAW MATERIAL PROCUREMENT STAGE

ELECTRICAL companies need a wide variety of raw materials, and different raw materials are not the same according to their own characteristics.

5.1 *The Situation Analysis and Cost Analysis of the Raw Materials Procurement Logistics of Electrical Enterprises*

As the primary link of electrical production enterprises, enterprises still manage procurement behavior as production logistics. One-sided emphasis on the concept of procurement as a production service, or simply a means of sourcing knowledge to save costs, these neglect the impact of procurement logistics on the overall strategy of the enterprise. At present, many electrical companies have problems in the procurement management process mainly in the following aspects, as shown in Table 6.

In the case of multiple suppliers, it is easy for suppliers to get in touch, there may be competition, there may be cooperation, and suppliers in the same region may have more contacts. This has led to the need for electrical companies to consider the logistics costs of raw materials in terms of raw material procurement. The logistics cost of the electrical enterprise procurement stage mainly consists of three parts; price cost, maintenance cost and ordering cost. The current theory of procurement logistics management pays more attention to strengthening the management of the relationship between enterprises and suppliers and establishes a mutually beneficial strategic cooperation relationship between enterprises and suppliers. This not only saves costs but also mobilizes the enthusiasm of suppliers, and is more conducive to the development of sustainable cooperation between the two sides.

5.2 *Logistics Cost Control Strategy for Electrical Appliance Companies in the Raw Material Procurement Phase*

It is generally believed that the greater the number of suppliers in the supply network, the higher the level of supplier response. The reason for this perception is

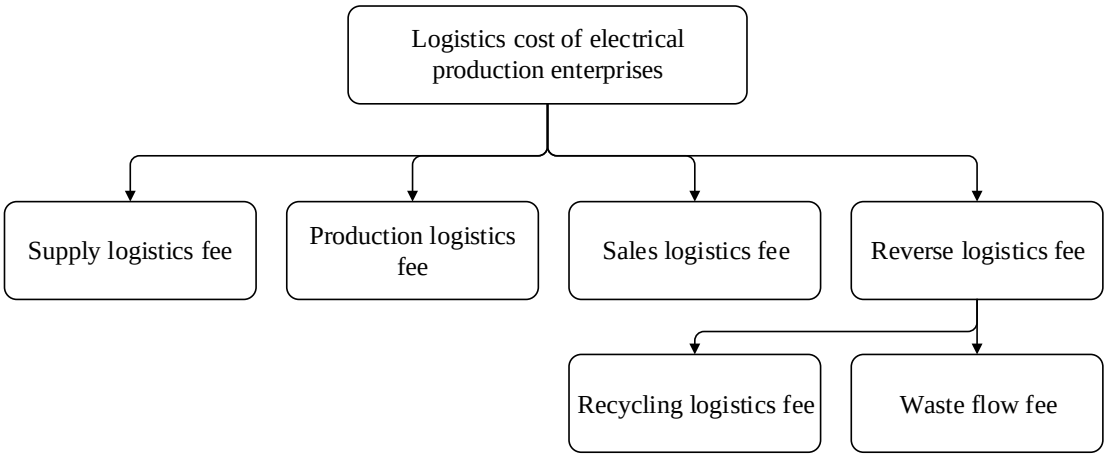

Figure 3. Calculates the Classification of Corporate Logistics Costs based on the Scope of Logistics Activities.

Table 4. The Main Factors Affecting Logistics Cost of Electrical Enterprises.

Competitive factor	Competitive factors such as quality, price and performance of the product, quality customer service (such as inventory level, order cycle, transportation, etc.).Logistics costs are constantly changing with increasing competition, and electrical companies must respond quickly to market competition in a timely manner.	
Product factor	product value	The increase in the value of the product will lead to an increase in the cost of each logistics activity, and the freight rate reflects the risk of cargo movement to a certain extent.
	Special handling	Some items need special loading tools to increase the logistics cost of the company.
	Vulnerability	The vulnerability of the article directly affects the logistics cost of the electrical appliance company. The vulnerable products have higher requirements for all aspects of transportation, packaging, warehousing and other logistics.
	Product density	Under the conditions of the same transport unit, the greater the product density, the more goods are loaded and the lower the transportation cost.
Environmental factor	Spatial distance	The distance between the enterprise's warehouse distribution center and the target market or point of supply.
	traffic condition	Traffic conditions are not ideal, and transportation costs and packaging costs are bound to increase.
Management factor	The total cost of enterprise logistics includes logistics management costs, which not only involve hydropower, travel expenses, office expenses, etc., but also the opportunity cost of funds used by enterprises in carrying out some logistics activities.	

Table 5. The Basic Principles of the Logistics Cost Control in the Electrical Appliance Enterprises.

Cost and service synchronization control	Through the simultaneous control of logistics costs and service quality, we can find the best service level and maximize the overall logistics efficiency.
Technology and economic synchronization control	Break through the improvement of logistics technology level and use efficient logistics system to achieve the goal of reducing logistics costs.
Lowest total logistics cost	From the perspective of the whole, logistics cost control should explore various logistics costs that can change the total cost of logistics, to effectively control it.
Local and integrated synchronization control	The control of logistics costs must consider a certain logistics function or link, but also consider the entire logistics system.

Table 6. The Problems in the Procurement Management Process of Electrical Companies.

Information closed information cannot be shared during the purchase process	Under normal circumstances, both the purchaser and the supplier try to conceal their own information, and the information cannot be effectively blocked, shared and communicated.
The purchaser and the supplier have not established a stable cooperative relationship	The purchaser and the supplier often need to negotiate and quotation, inquiry, counteroffer, etc., and finally choose the most suitable supplier to sign the contract, resulting in lack of effective cooperation and coordination.
Lack of procurement strategy planning	The uncertainty of market changes and consumer demand leads to the complexity of raw material procurement, which requires electrical companies to make reasonable procurement planning to ensure a smooth production process.

that many suppliers will create greater competitive pressures between suppliers, and competitive pressure will lead suppliers to actively face the immediate needs of buyers. In the process of logistics cost control during the raw material procurement phase, electrical appliance companies can manage according to the Material Requirements Planning (MRP). For electrical appliance manufacturers, if the quantity and time of the required products are determined, the number of parts of the product can be determined according to the structure of the product, and their investment time and production time can be reversed according to the production cycle of the parts. In the process of conversion, the materials involved in the quantity and time of production of various materials, through which you can determine the time and quantity of demand for these resources, organize the production resources around the process of material conversion, and achieve the best state of on-time production on demand. The closed-loop MRP in MRP combines priority planning with production capacity planning and implementation control. In this way, not only can the parts demand plan be provided, but also the production operation process can be effectively controlled based on the feedback information obtained from each link. The process is shown in Figure 4.

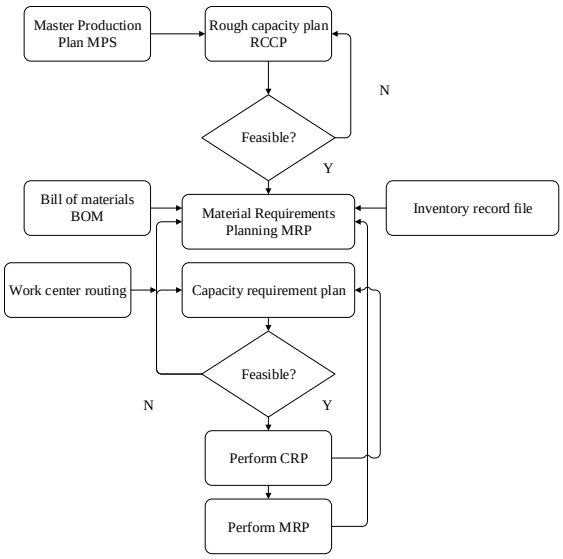

Figure 4. **The Closed Loop MRP.**

6 LOGISTICS COST CONTROL STRATEGY OF ELECTRICAL ENTERPRISES IN THE PRODUCTION STAGE

6.1 The Analysis of the Logistics Cost of Electrical Enterprises in the Production Stage

PRODUCTION logistics is a very important part of the logistics process of the whole enterprise. The production logistics cost of an electrical enterprise refers to the cost of all logistic activities in the production process. Production logistics is accompanied by the entire production process and has become part of the production process. Traditional production activities focus only on individual production processes. However, the time cost of logistics activities in the actual production process is far greater than the processing time cost of the product. Doing a good job in production logistics cost management plays a very important role in depositing production, saving material resources and improving the economic benefits of electrical appliances. The main cost consumption in the production logistics process includes the loss of materials in the process line of the production line of the workshop, the investment cost incurred in the introduction of advanced production equipment, and the depreciation expense of the old equipment; the cost of inventory during the production process and the maintenance costs of related facilities.

6.2 The Logistics Cost Control Strategy in the Raw Material Purchasing Stage of Electrical Enterprises

For most electrical companies, a product is assembled from many parts, each of which is made from a variety of parts and materials. There is a demanding relationship between products, components and materials. In the actual production process, only by coordinating the relationship between electrical appliances and various suppliers, and controlling the logistics costs in the process of production activities as a whole, can we achieve good economic benefits and promote the sustainable development of electrical appliances. If two suppliers provide products or services to the same enterprise, and there is information technology exchange between the two suppliers, and they are willing to contribute to the common activities of both parties, they can better control the logistics costs in the production stage.

For the electrical enterprise production process, there will be inflow and outflow of logistics at each stage. By recording the accumulated inflow amount Q_1 and outflow amount Q_2 and taking the time t as the abscissa and the cumulative amount Q as the ordinate as the flow number graph, is shown in Figure 5. From Figure 5, the flow velocity v and the residence time T can be obtained, and the number of products in process W can be dynamically controlled.

Therefore, the flow state graph can be used to judge the state of the logistics, and the reasons for the logistics detention can be analyzed, to take corresponding measures in time.

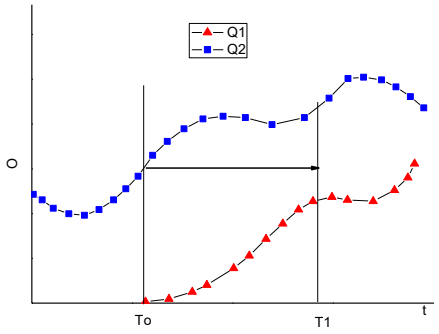

Figure 5. **The Flow chart of Electrical Companies in the Production Process.**

7 THE ELECTRICAL COMPANY'S LOGISTICS COST CONTROL IN THE SALES STAGE

7.1 The Logistics Cost Analysis of Electrical Appliances in the Product Sales Stage

SALES logistics is a logistics activity in which an electrical appliance company transfers ownership of the product to a wholesaler, retailer or consumer during the sales process. The sales logistics of an electrical appliance company is usually based on the

warehouse of the finished product of the enterprise. Through the distribution logistics to complete long-distance, trunk logistics activities, and then through the distribution method to complete regional logistics activities, and finally arrive at the business, business users or end consumers. The business process of the electrical appliance sales stage is shown in Figure 6.

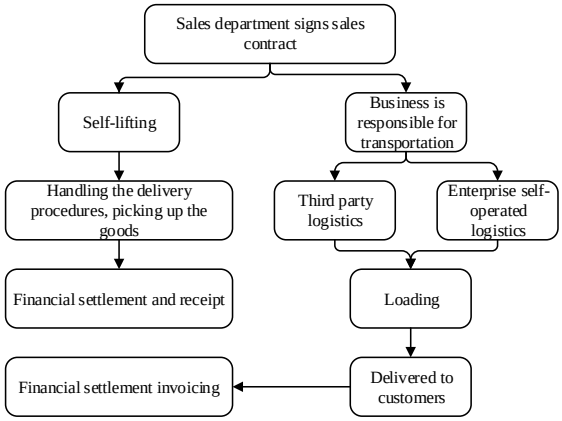

Figure 6. The Sales Business Process of Electrical Appliance Companies.

The logistics activities in the sales stage are mainly the transfer of ownership of electrical products, and the biggest difference between logistics and business flow and capital flow. This is the most frequent stage of logistics activities and the most prominent combination of organic components. This phase is centered around warehousing, transportation and distribution activities, and activities such as packaging, handling, distribution processing and information processing are carried out around these three activities. The transportation costs of electrical appliances mainly include direct labor costs, direct materials fees, operating overheads, packaging materials, loading and unloading fees, technical fees, auxiliary fees and packaging labor costs.

7.2 The Logistics Cost Control Strategy of Electrical Enterprises in the Sales Stage

(1) Choose a reasonable transportation tool

The cost of transportation is not only affected by the choice of transportation, but also the advantages and disadvantages of various transportation tools, such as transportation capacity, transportation distance and transportation speed. Electric appliance enterprises should choose reasonable transportation tools based on comprehensive measurement and consideration of the characteristics of specific transportation materials and their time schedule. While considering the economics of transportation, it should also be considered that due to the speed of transportation, the time for cargo preparation is shortened, unnecessary stocks are reduced, and the inventory level in transit is also reduced accordingly, thereby reducing storage and storage costs and saving transportation time. The opportunity cost of lost sales decreases as shipping time decreases.

(2) Develop a reasonable transportation plan

How to make the total shipping cost of the electrical products or inventory to the customer's location is the biggest problem that the electrical appliance needs to consider. Based on the balance of production and sales, the principle of near production and sales is adopted. Establish a certain sales area in a certain production area, to achieve the shortest transportation distance and the lowest transportation cost. Assume that the inventory level of the electrical appliance company, the current production capacity, the demand for the place of sale, the unit transportation distance and transportation fee from the electrical appliance enterprise or warehouse to the place of sale are all determined. We can use linear programming methods to solve specific transportation plans for electrical companies.

Suppose an electrical appliance company has X origins: $X_1, X_2, X_3, \cdots X_m$, the production or shipment volume of the origin X_i is x_i ($i = 1, 2, 3, \cdots m$), the cargo has Y sales locations: $Y_1, Y_2, Y_3, \cdots Y_n$, and the sales volume of the sales location is Y_j ($j = 1, 2, 3, \cdots n$). The freight rate is C_{ij}, the freight volume is D_{ij}, and the mileage is L_{ij}. The lowest total freight cost can be calculated according to formula 5, and the best supply method can be established to reduce the transportation cost.

$$Min(f) = \sum_{i=1}^{m} \sum_{j=1}^{n} C_{ij} D_{ij} \tag{5}$$

Or

$$Min(f) = \sum_{i=1}^{m} \sum_{j=1}^{n} L_{ij} D_{ij} \tag{6}$$

(3) Choose a reasonable transportation method

At present, electrical goods have three modes of transportation; direct transportation, centralized transportation and stowage transportation. The choice of different electrical goods to match the reasonable transportation method can reduce the transportation cost of the enterprise. However, there are some cases where using only one mode of transportation does not effectively save transportation costs. Electrical companies should fully consider the characteristics of the goods and combine several modes of transportation. At the same time, third-party logistics can also be used to reduce the logistics cost of enterprises and improve the efficiency of logistics operations. It can effectively support the distribution

of electrical enterprise products, balance logistics, greatly reduce distribution costs, and better serve enterprises, distributors and consumers.

To observe the impact of the product logistics cost control strategy of multi-source supply chain theory proposed in this paper on cost control, a series of experiments were set up to verify.

As can be seen from Figure 7, as the number of mobile terminals increases, the cost control utility value increases substantially linearly. When the number of mobile terminals gradually approaches the number of virtual machines set, the upward trend slows down. When the number of mobile terminals exceeds the number of virtual machines, the curve change slows down.

In Figure 8, the cost control rate follows the normal distribution of the sum. Analysis shows that as the average transmission rate increases, the mobile terminal transmits data consumption. The reduction in energy has led to a slight increase in the efficiency of the final company's cost control. As can be seen from Figure 9, although the average transmission rate is constant, a large variance means that there is a large delay jitter, the energy consumption of data transmitted by the mobile terminal fluctuates greatly and increases, and the efficiency of cost control is slightly lowered.

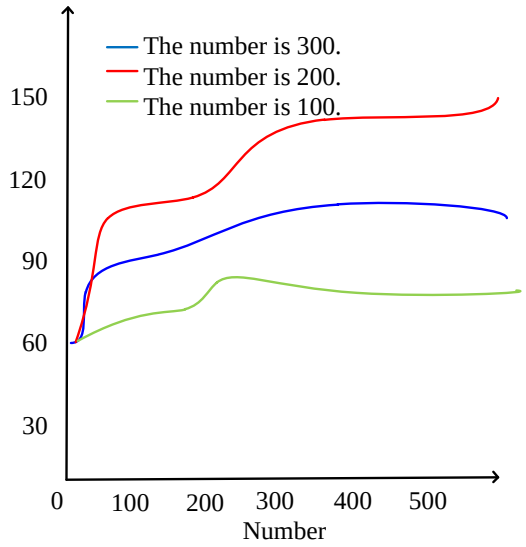

Figure 7. Efficiency Graph when the Number of Virtual Machines Change.

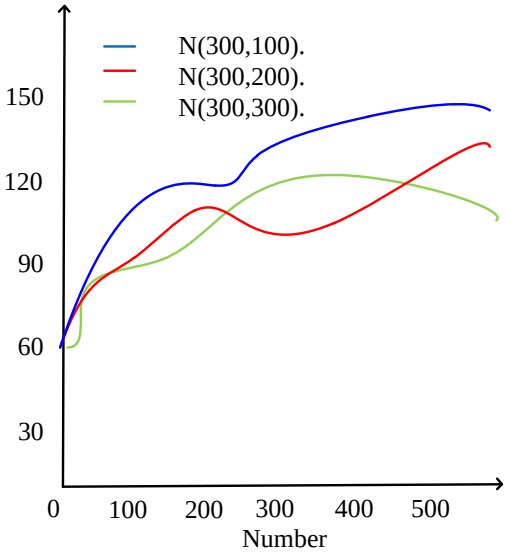

Figure 8. Efficiency Plot for the Average Change in the Transmission Rate.

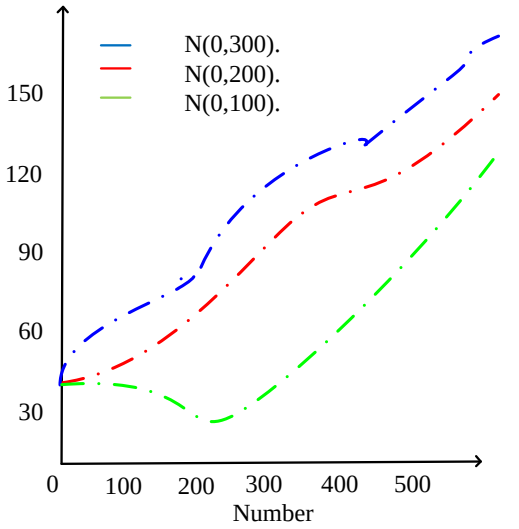

Figure 9. Efficiency Graph when the Variance of the Transmission Rate Changes.

8 CONCLUSION

FOR most enterprises, as the scale of enterprise development continues to expand and the market share continues to increase, the scale of the company's logistics distribution continues to expand, and the traditional logistics cost accounting model and distribution model are always the mainstream. Whether it is the control system or the accounting mode, there is still some room for improvement and perfection potential. The objective existence of the above problems objectively affects the overall performance and subsequent development potential of the company. Therefore, understanding the theory of

the multi-source supply chain has a very positive significance for our logistics cost control activities. Because the activities of the multi-source supply chain involve not only the relationship between the buyer and its suppliers, but also the interaction between suppliers. Therefore, the complex characteristics of the multi-source supply chain will inevitably be manifested in the buyer-supplier relationship, supplier-supplier relationship of the supply network, and have an impact on the management activities of the supply network.

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10 DISCLOSURE STATEMENT

NO potential conflict of interest was reported by the authors.

11 NOTES ON CONTRIBUTORS

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