

Research on Reverse Logistics Organization Method in Express Industry

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Abstract—This paper mainly focuses on the research of the reverse logistics of recycling and the reverse logistics of packing, which is on the basis of the present situation and the development status in China. In the early stage, the development of reverse logistics mainly rely on the development of forward logistics in order to accumulate relevant development experience. In the middle and late stages, the major purpose is to establish a sound reverse logistics system and reverse logistics information system.

Index Terms—Reverse logistics, Recycling centers, Information system

I. THE PRESENT SITUATION AND DEVELOPMENT SIGNIFICANCE OF REVERSE LOGISTICS

With the remarkable development of China's express industry, some contradictions have become increasingly prominent. While brings economic benefits, China is also confronted with a huge waste of resources and environmental pollution due to courier returns and excessive packaging and other issues. At present, given that reverse logistics is in infancy in China, many companies dare not rush to try. Therefore, this paper put forward a plan that through the use of reverse logistics to integrate return delivery and packaging resources to establish the reverse logistics industry logistics model that conforms to the national conditions.

Reverse logistics is a new industry. Its development has the following meaning:

(1) Ecological Benefits

In 2015, for example, in 2015 produced about 1.12 million tons of packaging waste, equivalent to the

consumption of 64 million tons of coal, 392 million kWh, 190.4 million tons of wood pulp and rice, 88,000 tons of caustic soda. In addition to the huge consumption, but also to the huge emissions of natural pollutants, affecting the ecological balance. Therefore, the development of reverse logistics has a very important ecological benefits.

(2) Economic benefits

The cost of packaging for express parcels is 10 times the cost of packaging waste recycling. Therefore, to achieve the re-use of parcels can reduce the huge cost. The development of reverse logistics can not only re-use of packaging resources, but also return the wrong package to businesses, which really avoids the unnecessary losses.

(3) Social benefits

The study found that if Beijing developed the garbage industry, it could solve the employment problem of 100,000 people. In view of this, reverse logistics can not only drive the economic development of enterprises, but also solve the employment problem. Meanwhile, it strengthens people's awareness of environmental protection and re-use of resources, which really brings great social benefits.

II. RESEARCH ON ORGANIZATIONAL METHOD OF PROMOTING REVERSE LOGISTICS DEVELOPMENT

(1) Construction and Improvement of Reverse Logistics System

Based on the third party logistics system and the characteristics of forward logistics and reverse logistics, we have established a combination of the two logistics model as shown in "Fig. 1".

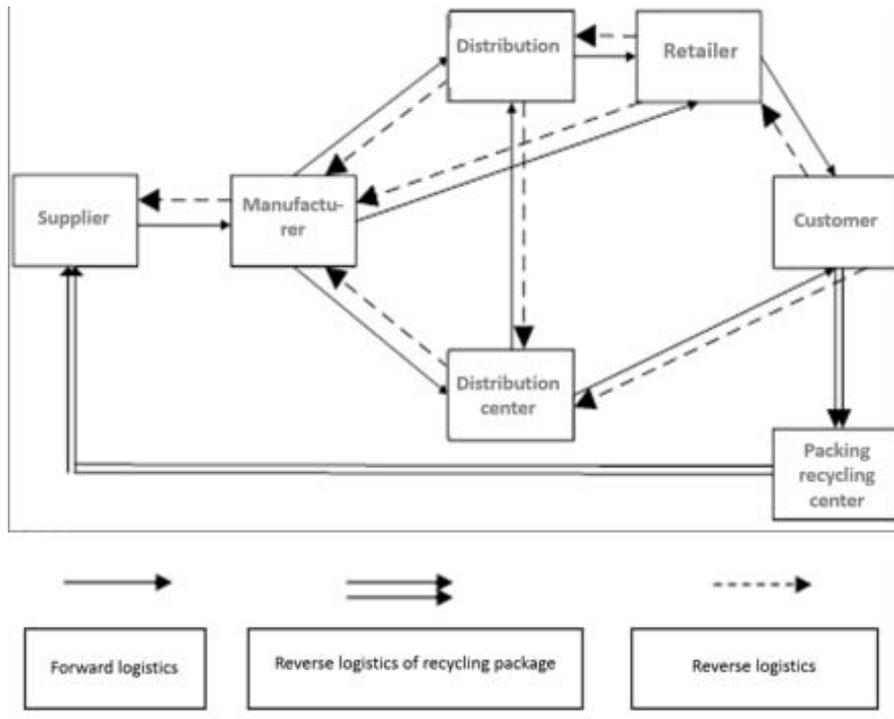


Figure 1. Simple reverse logistics system.

Simple reverse logistics system is completely dependent on the positive logistics system, and its business is carried out on the basis of the original facilities and logistics operation. Because of this, the development of reverse logistics is limited by many factors. Specific shortcomings mainly in the following areas.

- ① Because reverse logistics rely on forward logistics systems, it needs to be returned along the original route and is not optimized;
- ② Under the restriction of transport vehicles, the reverse flow rate of each class is small;
- ③ Each link needs to be classified and consumed for long periods of time;
- ④ Lack of the professionals of reverse logistics, there is

no professional technical support;

- ⑤ The time point and dispersion degree of customers seriously affect the development of reverse logistics.

So we can draw the conclusion that simple reverse logistics is suitable for small and medium-sized logistics enterprises and third-party logistics enterprises. According to the long-term strategic development goal, if we want to develop reverse logistics system, we must have professional facilities and technical level. Therefore, we must improve and optimize the simple reverse logistics system to establish a perfect reverse logistics system, and also support the rapid development of reverse logistics. The improved reverse logistics system is shown in “Fig. 2” below.

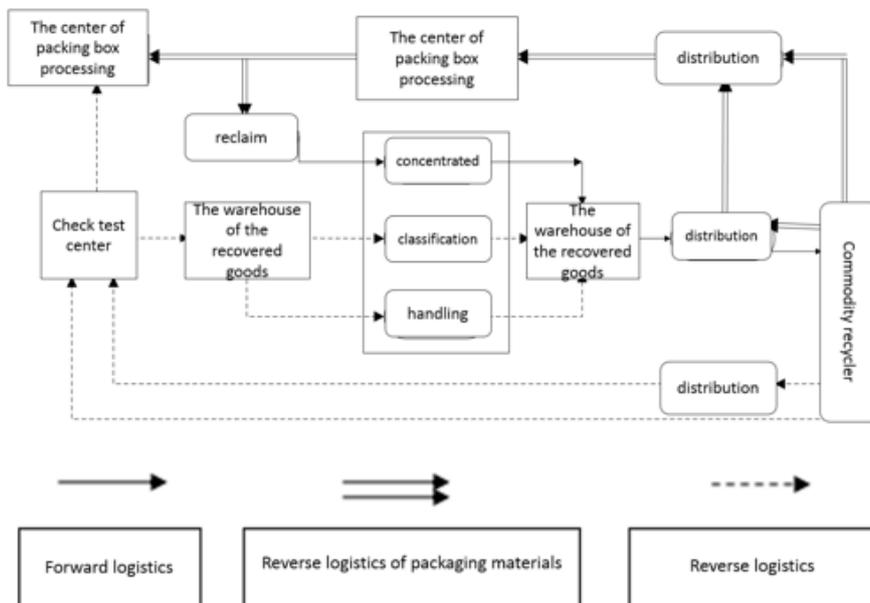


Figure 2. Perfect reverse logistics system.

Perfect reverse logistics system is not a simple use of the existing third-party logistics system, but it set up a specialized network of the reverse logistics system through the original route back to the way to achieve the function of reverse logistics. In the reverse logistics system, it establishes the commodity recycle, inspection and testing center, recycling materials warehouse, processing center and packaging materials processing center and other functional modules to provide the goods for recycling, distribution, classification, distribution and other operations.

(2) Recycling reverse logistics management system

①The establishment of the processing center of the box

The main purpose of the packaging box processing center is to centralize the recycling box and form the economies of scale. The role of the processing center of

the box is similar to the distribution center in the forward logistics. The main functions of the processing center include recycling, sorting, sorting, storage and reprocess packaging boxes. Because the time, place and quantity of the packing box is unpredictable, the packing box processing center set up a network in order to connect the surrounding user network to a point, which easily to carry out reverse logistics operations. At the same time, the government vigorously promote development of reverse logistics and increase public opinion propaganda in recycling center, the government also encourage consumers to participate in the activities of reverse logistics. Besides, it also need the relevant government subsidies and other incentives to promote the reverse logistics. The packaging processing center is shown in “Fig.3”.

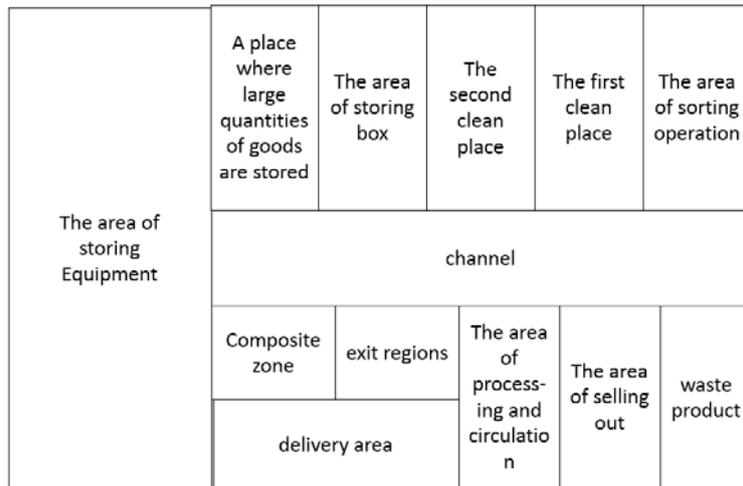


Figure 3. Package Processing Center.

②Establish recycling center

The recycling center's role is to centralize recycling of bad packages and wrong packages. Centralized management is the reverse logistics high-quality operation of the material basis and premise. At present, China is going to set up a special return center area in the distribution center of forward logistics to centralize and

classify which goods are returned or missing information and then be shipped to the next node. The recycling center will be built independently, and it mainly to add the reprocessing, detection and destruction functions in the processing center. To ensure the reverse logistics of the next part of the efficient operation. The recycling center is shown in “Fig.4”.

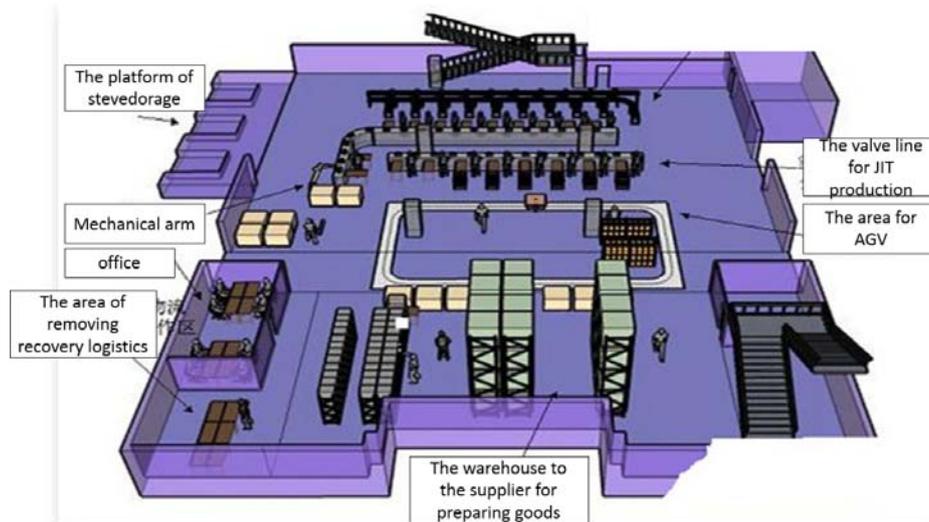


Figure 4. Recycling Center.

The process of recycling reverse logistics is shown in “Fig.5”.

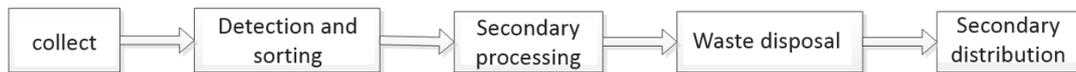


Figure 5. Recycling Reverse Logistics Function Flow.

(3) Reverse Logistics Information System

① Research on Reverse Logistics Information System

Logistics information systems include forward logistics systems and reverse logistics systems, the two can work together through combination or run independently. For the compound logistics company, the best way is to combine the reverse logistics system. And the use of existing logistics system to develop reverse logistics system can reduce the design of many modules. With the development of reverse logistics, single-type reverse logistics companies will be highly valued. Independent reverse logistics information system will also be attention and development. Third-party reverse logistics enterprises as a recycling material exchange hub, the flow of information is very large, it contains storage, transportation and other operating functions, it also provides a disassemble classification services, network services and other complex business. So if there is no efficient information processing system, reverse logistics operation can only be on paper. And now the third party reverse logistics enterprises are still in the initial stage of development, mostly from the traditional warehousing and transport companies from the transformation. so in face of complex business processes, the original information system seems powerless. Therefore, it is necessary to construct a complete and efficient reverse logistics enterprise for the third party reverse logistics enterprise.

② The service demand of reverse logistics information

system

One of the biggest difficulties in reverse logistics system is to collect and analyze the customer's demand of logistics and the perfect logistics service is also one of the key factors to develop reverse logistics. At present, the forward logistics system is more mature and reverse logistics is only a simple return and recycling process. Therefore, it is relatively feasible to develop the reverse logistics system by using the existing forward logistics system. In the logistics information system, the express delivery control system is added to the express tracking. It can ensure the accuracy of forward logistics already, it also can carry on the positioning of reverse logistics, express, convenient delivery of decentralized information collection, intensive processing, solve customer, information collection difficult problem in order to meet the logistics needs of customers. From the international and domestic market, reverse logistics outsourcing is the inevitable result. Because the reverse logistics is in its initial stage, it can learn less from experience, and the business of reverse logistics is not comprehensive. Therefore, the service of reverse logistics is not only the task of the third party reverse logistics enterprise, but also the third party is coordinating with the logistics enterprises. The timely and rapid information transmission and sharing of reverse logistics enterprises is a reliable guarantee for the decision-making of reverse logistics activities. The information system is shown in “Fig.6”.

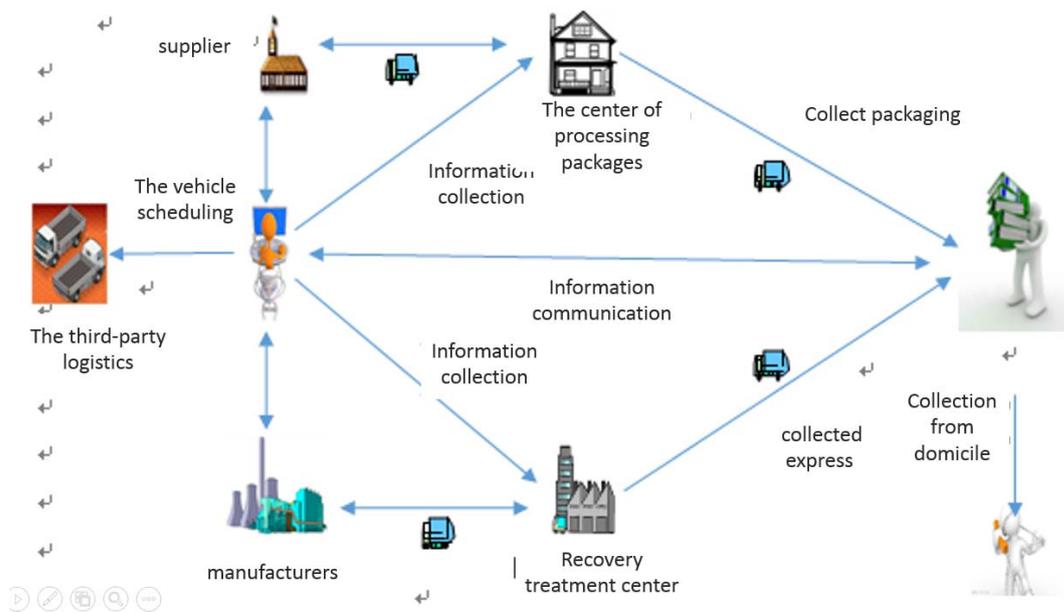


Figure 6. Reverse Logistics Information System.

③The function of reverse logistics information system

Reverse logistics information system's main function is to classify and deal with the information of express and the information about packaging materials. They play a direct role in tracking the management of the return process and the exchange of information between the various nodes of the supply chain. It is convenient to exchange information through the sharing of information among customers and manufacturers through third-party reverse logistics enterprises. Through the support of the information system, reverse logistics enterprises can not only collect and manage the products of the returned products, but also classify and process them for the manufacturing industry. It not only increases the processing speed of the returned goods and reduces the cost of reverse logistics, but also ensures the efficient process of the reverse logistics.

The most difficulty in reverse logistics is the collection. Because of the irregular dispersion of goods, it can make it harder to recycle. In this process, the main tasks are recycling, transportation and warehousing. The transport mode is mainly combined transport to avoid the high freight cost caused by the distribution.; To test the recycled materials is mainly to detect its quality, whether be in good condition and be reused value are based on test results of commodity classification, the goods sorting in recycled goods, and the serious damage to the goods and destroyed; In the process of processing, the requirements of facilities are extremely high and the efficiency and specialization of equipment directly affect the economic benefits of reverse logistics. Therefore, the processing process must be concentrated in large quantity and scale to form the scale economy of reverse logistics; Waste disposal is mainly carried out in waste treatment plants. The recycling center will waste parts and goods for landfill or incineration; The second is to ship the processed goods to the merchants for secondary sales. Secondary sales mainly include sales, transportation and warehousing. This process is the same

as the distribution in forward logistics, which can be used to promote sales by adopting corresponding sales strategies.

III. REVERSE LOGISTICS OF THE ECONOMIC CYCLE MODEL

The development of reverse logistics is conducive to the improvement of logistics economy and the sustainable development of economy.

It also requires the joint efforts and support of enterprises and governments to achieve the goal of promoting economic circulation.

(1) Advantages of reverse logistics

①Promote resource integration

Reverse logistics can realize resources integration, manufacturers, distributors and consumers in the supply chain to a whole to broke the traditional transportation mode and have reused the valuable product of resources integration of social resources.

② Accelerate product innovation and strengthen recycling

In reverse logistics, it is necessary to reprocess the product. Technical design and transformation are indispensable in this process. It can carry on the technical character and product structure innovation through the transformation of the product. In this process, enterprises can also design and manufacture equipment that meets the development of circular economy according to their own needs.

③Promote the economic cycle

Reverse logistics and circular economy depend on each other and promote each other, so that the resources can be used reasonably and efficiently in the short economic cycle and realize the goal of sustainable development. Because of the existence of reverse logistics, it further improved the one-way operation mode of traditional logistics, which largely solved the waste of resources and environmental pollution caused by incineration and

landfill.

(2) The cost and benefit analysis of reverse logistics

① Recovery cost analysis

From the point of view of the enterprise, the cost of reverse logistics is includes product collection cost, test

cost, processing cost, secondary transport cost, secondary utilization cost, destruction cost and waste emissions, as well as the cost of waste collection, classification, processing costs, transportation costs, waste disposal costs and other expenses, As shown in “Fig.7”.

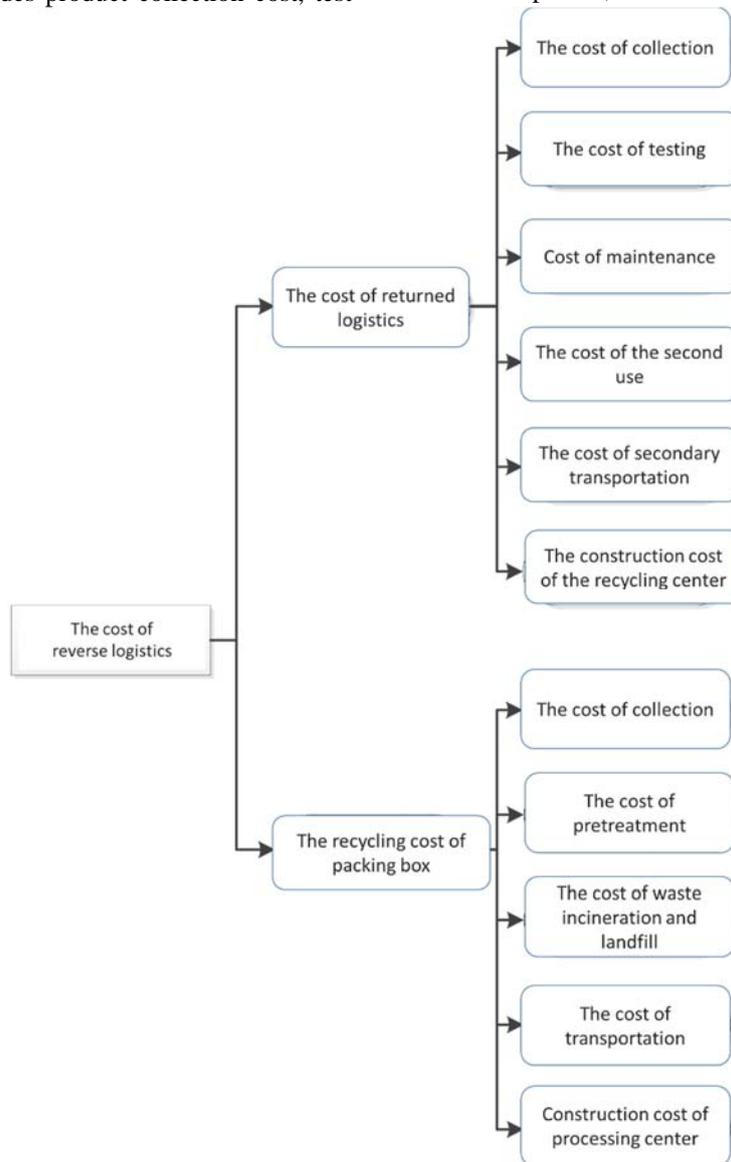


Figure 7. Recycling costs.

② Benefit Analysis

Enterprises in the development of reverse logistics at the same time, it not only reduces the enterprise resource consumption, but also reduce the cost, improve the utilization of resources and fulfill the social responsibility,

protect the ecological environment and responded to the call of the government. The benefits of reverse logistics are mainly divided into government subsidy income, resource recycling efficiency, ecological benefits, secondary utilization efficiency of products, and the regenerating efficiency of parts, etc. As shown in Table 1.

Table I. Recycling benefits table

The income classification of reverse logistics	note
The benefits of regenerating parts	The remanufacturing of components not only reduces costs for companies, but also reduces waste emissions and protects the environment.

Material reuses income	It means that some parts cannot be remanufactured to have the original value, but they can be recycled as raw materials for production. For example, waste newspapers are recycled into pulp and can be used to produce new paper
Energy recovery efficiency	There are no longer any of these two types of disused logistics, which can generate some energy when burned or buried and save the company's cost.
The resale of the product	For example, recycling of used cars.
Environmental protection income	By reverse logistics management, enterprises reduce waste emissions, thereby reducing the government fines imposed on waste emissions, thus increasing the profits of enterprises.
Government-sponsored earnings	The government will allocate a certain amount of money to support the company's environmental expenditure.

(3) Construct cost and benefit optimization model

In the process of reverse logistics, the cost of reverse logistics mainly occurs in the beginning part.

①The initial cost is indicated by C_1 , mainly including transportation expenses, the cost of paying for the recovery items and storage expenses:

$$C_1 = \sum_m (P_{1m}Q_{1m} + P_{2m}Q_{2m} + P_{3m}Q_{3m}) \quad (1)$$

Among them:

P_{1m} means the unit cost required to pay m recovered

$$R_m = \sum_m (P_{3m}Q_{3m} + P_{4m}Q_{4m}) + \sum_j (P_{1j}Q_{1j} + Q_{2j}P_{2j}) + \sum_m \sum_j (W_{mj}Q_{mj}P_{mj}) \quad (2)$$

Among them:

P_{3m} Refers to the sales revenue of regenerated product m for secondary sales;

Q_{3m} Refers to the number of reinvented product m for secondary sales;

P_{4m} Refers to the enterprise cost of product m after being remanufactured with the original practical value of the product.

Q_{4m} Refers to the quantity of remanufactured product m ;

P_{1j} Refers to the sales revenue of the regenerated parts j for secondary sales;

Q_{1j} The number of parts j for secondary sales;

Q_{2j} It refers to the cost of enterprises that the parts and components have been made after they are manufactured.

P_{2j} Refers to the number of additional components j ;

W_{mj} Refers to the unit weight of the parts j manufactured by the participating items m after re-engineering;

Q_{mj} Refers to the number of parts j manufactured by the participating items m after re-engineering;

P_{mj} Refers to the cost of environmental pollution saved by the components j manufactured by the company after re-

$$\begin{aligned} \text{Max } Z = & R_m + R_p - C_1 = \sum_m (P_{3m}Q_{3m} + P_{4m}Q_{4m}) + \sum_j (P_{1j}Q_{1j} + Q_{2j}P_{2j}) + \\ & \sum_m \sum_j (W_{mj}Q_{mj}P_{mj}) + \sum_m (P_{5m}W_{5m} + P_{6m}W_{6m}) - \\ & \sum_m (P_{1m}Q_{1m} + P_{2m}Q_{2m} + P_{3m}Q_{3m}) \end{aligned} \quad (4)$$

The model assumes that other costs can be neglected in the logistics process. At the same time the benefits of reverse logistics including reengineering income of reverse logistics and reverse logistics of material regeneration income, and starting from the three aspects to construct cost-benefit optimization model of reverse logistics.

IV. CONCLUSION

As the emerging field of domestic logistics, reverse logistics should not only face a lot of capital investment,

goods;

Q_{1m} Refers to the number of payment m products;

Q_{2m} Refers to the unit transportation cost of m products;

Q_{2m} Refers to the amount of transport cost of m products;

P_{3m} Refers to the unit storage cost of m recovery products;

Q_{3m} Refers to the number of storage of m recovery products;

②Revenue from reverse logistics

Use R_m for recycling income:

engineering;

③Reverse logistics material regeneration income

After the material is regenerated, it can be sold as the production material of the product or as the raw material of the enterprise, thus reducing the production cost of the enterprise. The income of the material is denoted by R_p , and the formula is as follows:

$$R_p = \sum_m (P_{5m}W_{5m} + P_{6m}W_{6m}) \quad (3)$$

P_{5m} Refers to the unit price used for secondary sale after the material m has been regenerated;

W_{5m} Refers to the weight of materials used for secondary sale after regeneration;

P_{6m} Refers to the enterprise cost of participating in the production and manufacturing of materials after the material m has been regenerated;

W_{6m} Refers to the total weight of product production and manufacturing after regeneration of material m ;

Based on the above analysis, the cost - benefit measurement model of reverse logistics is

but also solve the problem of the complexity of reverse logistics network. The three characteristics of logistics network determine the difficulty of developing reverse logistics. This paper presents a simple reverse logistics system based on forward logistics system in the early stage of development. This can effectively solve the capital problem and constantly find problems in the development to propose a reasonable solution and learn the experience for the improvement of the backward logistics system in the later stage. However, the simple reverse logistics system is restricted by the positive logistics because of the defects of the system, so it is difficult to get rapid

development. Aiming at these problems, this paper proposes a complete reverse logistics system in the medium term. After the early fumble, the market and specialization of reverse logistics are expanded and the reverse logistics information platform is used to guarantee the efficient development of reverse logistics.

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