The Coordinate Study of Reverse Logistics and Green Supply Chain

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Abstract: As a new pattern of enterprise strategy management, green supply chain management pursues coordinate optimization of economic efficiency and social efficiency, reverse logistics is not only the foundation of circulation economy, but also has synergism with the construction of green supply chain. This article analyzed the characteristics of reverse logistics, and gives a discussion of coordinate practice between reverse logistics and green supply chain; we hope it can give some advices to the transformation of Chinese enterprises.

Key words: green supply chain management, reverse logistics, reproducing, business process reengineering.

1 Instruction

Since the 1970’s, people began to consider environmental factors in supply chain management, but the deeply study on green supply chain was in late 1990’s. Web(1994) and Handfeild&Nichols(1999) studied the definition and connotation of green supply chain, Drumwright(1994) and Min&Galle(1997) studied the motives and decision—making mechanism of green purchasing, Sarkis(1998) and Bermen(1999) studied indicators system of green supply chain. Among the above scholars, Sarkis(1998), Bermen(1999), Handfeild&Nichols(1999) studied green supply chain as a whole, they promoted maturity of green supply chain management theory. Domestically, the research of green supply chain has just began, research results are mainly focused on concept and content of green supply chain management(Jiang Hongwei&Han Wenxiu,2000; Wu Chunyou&Zhu Qinghua,2001;Ma Zujun,2002), general pattern of green supply chain management(Li Xiangdong&Yan Hong,2001) and basic principles of green supply chain management(Wang Yingluo&Wang Nengmin,2003).

Since the beginning of the 1990’s, reverse logistics research received wide attention, some scholars had done some discussion from different points of view, Stock pointed that reverse logistic is very important to economic and society, and discussed how to establish and implement reverse logistics management. Rogers and Tibben Lembke analysed business applications of reverse logistics, Guide discussed optimize design of the reproducing system. Of course, some domestic scholars began to research reverse logistics, Xiang shengbin concerned environmental factors in his research, Liu Jian analyzed it from the perspective of industrial organization theory.

The essence of reverse logistics lies in obtaining the value of abandoned or defective products, which consistent with the thought of green supply chain management. The coordinate practices of reverse logistics and green supply chain can promote the utilization of resources, reducing the pollution and destruction to ecological environment, and achieve harmonious development of economic and society.

2 Connotation of reverse logistics

According reverse logistics of products pointed by Jones, reverse logistics management focus on regeneration, reuse of materials and waste-clear, in addition, it attach importance to management activities of hazardous substances along products lifecycle. Narrow sense reverse logistics generally refers to return logistics and recycling logistics, broad sense reverse logistics includes avoiding returned goods, reducing materials of reverse system, and ensure the reuse and recycling of materials. Reverse logistics have following characteristics: Firstly, It is uncertain. The location and time of reverse logistics can not be determined, consumers don’t know when products will be in return; secondly, complex diversity. Disposal manners of reverse logistics are various, it is difficult to make one-off concentrated disposal to these products, so it can not gain scale effect of transport and warehousing, thus it is a major cause of high handing fee of reverse logistics; the third, the incremental and descending phenomenon of
value coexist. Complexity of reverse logistics operation made a high cost fee, in this point of view, value is descending, however, these products can attain new life through re-packaging and recycling of products, circumfluent items achieve maximum value consequently; The fourth, it is multi-partner collaborative. As the locations of reverse logistics are decentralized, it is difficult to achieve scale effect. In addition, the costs of reprocessing equipment is very high, which affect the economic feasibility of reverse logistics, so we can reduce operating costs effectively through cooperation between enterprises.

3 Coordinated practices of reverse logistics and green supply chain

3.1 Reproducing logistics supply chain

Driven by economic interests and the impact of environmental legislation, more and more enterprises pay attention to reproducing business, such high level selectivity recovery mostly exists in some high-value productive sectors, such as photocopiers, computers, medical equipment and other sectors, and occupy a considerable proportion in the entire reverse logistics practice\textsuperscript{13}\textsuperscript{(Rogers and Tibben-Lembke,2001)}. since reproducing supply chain process fully consider environmental factors during circumfluent process, we can look reproducing logistics as coordinated practice of reverse logistics and green supply chain. When products lose their value, reverse logistics can recover wastes for new products by recycling some key parts and components, it is not only create economic benefits, but also promoted the construction of green supply chain.

Reproducing logistics supply chain includes the following major steps: Firstly, workers should pay attention to appearances and models of key parts which can be recycled, and input data into database to facilitate future management; Secondly, after screening recycled parts, the sections which can not be reused would be discarded; some parts which can be reused would be tested, at the same time, relevant information is collected. Thirdly, key parts which can be reused enter into assembly flow and form new useable products. The fourth, for the balance of supplies and demands, workers should pay attention to the scale of reproducing products. Reproducing logistics supply chain represents two categories of logistics: positive logistics and reverse logistics, the flowchart can be expressed as follows:

![Flowchart of reproducing logistics supply chain](image)

The recovery process of reverse logistics implemented by two steps, it can be recovered by recycling personally, it also can be collected by vendors, and then transferred to manufacturers. Of course, due to the uncertainty of reverse logistics, it is difficult to design the logistics network, so reproducing process in reality is more complicated than above flowchart.

With regard to the power source of reproducing activities, some foreign scholars had discussed. Karl Inderfurth(2005) think that only when enterprises have cost advantages can they engaged in reproducing activities, in economic perspective, when recovery quantity is greater than the quantity that market demanded, this advantage will lose because of the storage cost\textsuperscript{14}. Guide(2000) also made similar points\textsuperscript{15}. Gungor and Gupta(1999) believes that economic and environmental interests can achieve at least some degree of unify if enterprises can carry out reproducing activities successfully\textsuperscript{16}. To our country's reality, we consider that there are six factors restrict reproducing activities, these six factors are recycling levels, uncertainty, reproducing cost, environmental consciousness, supply chain structure and the government's policy orientation, the compatibility of supply chain structure and reproducing business will affect the decision—making of enterprises, the quantity for customers demanded is unanticipated, the quantity and quality of recycling items is also unanticipated, and this uncertainty will
impact whether enterprises participate in reproducing activities.

In the past few years, reproducing industry has been obtained rapidly growth in some western countries, and even exceeded some of the traditional industries (Guide, 2000), China’s reproducing industry has just started, in some industries, Original Equipment Manufacturers (OEM) flourish in reproducing domain, because it is more familiar with specific product and market, in such case OEM not only plays the role of suppliers of products in positive logistics supply chain, but also plays the role who recycle and reproduce products in the reverse logistics supply chain, by reproducing products and returning them to customers, OEM establish direct links between positive logistics and reverse logistics, and form a closed supply chain loop (Karl inderfurth, 2005). As a kind of reverse logistics, reproducing logistics holds broad prospect in china, and will produce very good coordinate effects on the construction of green supply chain.

3.2 Business process reengineering based on reverse logistics

Business process reengineering (abbreviation is BPR) is pointed by processor Hammer for U.S.MIT in 1990 [17], it was introduced into china as a new management concept in the early 1990s, as a enterprise reproducing systems, it is booming in the late 1990s. BPR requires to reducing invalid activities of every step, and optimize all kinds of business activities of processes, so that it can achieve the maximum increment of business process activities, at the same time, it can improve operational efficiency and reduce operating cost. We believe that it is avail to success of business process reengineering if we introduce design thinking of reverse logistics into the early business process reengineering, it also helps to establish green supply chain, figure below can express this thought:

Successful BPR require to shortening transmission channels, which can help enterprise to improve response speed to customers and market, recycling systems of reverse logistics also need to have rapid response to customer demands, considering the application of information technology, this will receive special effectiveness, accordingly J. Peipade put forward a concept named workflow automation [18].

BPR can occur inside an enterprise, it can also occur among two or more enterprises [19], in this article, we call this kind of BPR span organizations BPR, as we know, a typical character of reverse logistics is muti-partner cooperation, if we introduce span organizations BPR into reverse logistics management, the green degree of supply chain will be enhanced effectively, at the same time, the cost of entire supply chain will be reduced. For example, the acquisition partnership between GM and SAT-URN is a typical case of span organizations BPR.

Reverse logistics require enterprise to keep recyclable in every stage, such as raw materials, product design, product manufacture, distribution and marketing. When BPR happened among many enterprises, the first task is to understand the relationship of business process structure, and consider how to establish newly business process among enterprises.

When the design of new business process completed, the following work is to simulate and evaluate it, newly designed business process should abide to the principle of reverse logistics and green supply
chain, this work is not stop until enterprises which involved BPR are satisfied.

Business process reengineering based on reverse logistics consider environmental factors well, and pay attention to waste recycling in all stages. Recycling costs would be reduced effectively as a result of cooperation between enterprises, recoverable resources can be used to create economic benefits for enterprises. The whole process conforms to the design requirements of green supply chain.

4 Development outlooks of reverse logistics in china

As Chinese economic develop rapidly in recent years, environment and resources problem has become increasingly serious, a mass of materials had not been reused, many enterprises affected by traditional view, only pay attention to economic benefits and less on social benefits, or only attach importance to immediate interests while ignoring long-term interests. Recycling equipments are simple and laggard, consequently, the development of reverse logistics would be constrained to some extent. In recent years, people start paying attention to environment and resources, reverse logistics in china would have a good development, in this process, people should change their traditional ideas, the relevant legislation also requires amended, in addition, to develop reverse logistics, we should resolve the two outstanding issues:

Firstly, enterprises should consider reverse logistics needs in all work steps, reverse logistics is a closed loop movement, once any step occurred problem, the entire supply chain would not function normally, if enterprises can manage the supply chain effectively, incremental value will be greater than descending value, thus it can establish their own competitive advantage.

Secondly, if enterprises establish reverse logistics management system by cooperation, they should trust each other, generally, enterprises may be worry that if their experience obtained by their partners, they can’t receive corresponding reward. in fact, a high sense of trust is the key factor of cooperation, if enterprises can trust each other, the partners will not excessively self—protection for fearing fraud behavior, they may share information and exchange experiences more easily, this trust is an intangible assets, which can reduce transaction cost substantially, thereby making the entire reverse supply chain economically feasible.

Enterprises is principal role of reverse logistics, only when enterprises enhance their superiority by implementing reverse logistics management, can they increase profit of entire supply chain, and attain inexhaustible drive of reverse logistics management. Of course, during the implementation of reverse logistics management, enterprises should consider environment factor in marketing, product design, procurement of raw materials and other stages. Reverse logistics management can support the construction of green supply chain, it can also help Chinese enterprises overcome the green barriers in international markets, and then achieve sustained competitive advantage.

References