

THE IMPORTANCE OF REVERSE LOGISTICS

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—Abstract —

How do companies differentiate themselves when operating in industries where most, if not all firms offer high quality products and customer service at the time of sale? For many products, a customer's relationship with the product's manufacturer does not end with product purchase. In fact, this relationship can be significantly influenced by the activities that occur after purchase, during the entire period of product ownership. After sales services can encompass multiple activities, including: customer support through training; product warranties; maintenance and repair; product upgrades; sales of complementary products; and product disposal. Management of these service activities can form an important part of corporate strategy. These activities management calls as Reverse Logistics. Reverse logistics operations are one of the more interesting and significant trends in supply chain management. In this paper are described that the concept of reverse logistics, the strategic importance of the reverse logistics and reverse logistics in the supply chain.

Keywords----, Material flow, Recycling, Reverse Logistics, Supply Chain Management, Remanufacturing.

JEL Classification-O31-R31-R-41

1. INTRODUCTION

The Reverse Logistics Association (RLA) defines reverse logistics as "all activity associated with a product/service after the point of sale, the ultimate goal to optimize or make more efficient aftermarket activity, thus saving money and environmental resources". According to the RLA, terms such as "aftermarket logistics," "retrologistics, and "aftermarket supply chain," are all synonymous with reverse logistics. Reverse logistics can include: Damaged merchandise, Seasonal inventory, Restock, Salvage, Recalls, Recycling, Hazardous material Obsolete equipment disposition, Asset recovery. Reverse logistics practices vary based on industry and channel position. Industries where returns are a larger portion of operational cost tend to have better reverse logistics systems and processes in place. Where great change in the industry structure has occurred in the last few years, returns are a major determinant of profitability. In the computer industry where life cycles are nearly as short as grocery life cycles, the speedy handling and disposition of returns is now recognized as a critical strategic variable. Successful retailers understand that managing reverse logistics effectively will have a positive impact on their bottom line. Industries that have not had to spend much time and energy addressing return issues are now trying to make major improvements.

1.1 What is Reverse Logistics?

Logistics is defined by The Council of Logistics Management as: The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. Reverse logistics includes all of the activities that are mentioned in the definition above. The difference is that reverse logistics encompasses all of these activities as they operate in reverse. Therefore, reverse logistics is: The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal. More precisely, reverse logistics is the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics. Reverse

logistics is more than reusing containers and recycling packaging materials. Redesigning packaging to use less material, or reducing the energy and pollution from transportation are important activities, but they might be secondary to the real importance of overall reverse logistics. (Reverse Logistics Magazine, 2006:12) Reverse logistics also includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls and hazardous material programs, obsolete equipment disposition and asset recovery. The reverse logistics process can be broken into two general areas, depending on whether the reverse flow consists primarily of products, or primarily of packaging. For product returns, a high percentage is represented by customer returns. Overall customer returns are estimated to be approximately six percent across all retailers. Return percentages for selected industries are shown in Table 1. In each case, return percentages were established by several different firms .

Table 1. Sample Return Percentages

Industry	Percent
Magazine Publishing	50%
Book Publishers	20-30%
Book Distributors	10-20%
Greeting Cards	20-30%
Catalog Retailers	18-35%
Electronic Distributors	10-12%
Computer Manufacturers	10-20%
CD-ROMs	18-25%
Printers	4-8%
Mail Order Computer Manufacturers	2-5%
Mass Merchandisers	4-15%
Auto Industry (Parts)	4-6%
Consumer Electronics	4-5%
Household Chemicals	2-3%

Clearly, return rates vary significantly by industry. For many industries, learning to manage the reverse flow is of prime importance. (Rogers and Tibben-Lembke, 1999:3)

A good reverse logistics strategy is needed to cope with this return to gain the most benefits. Although many firms already have strategies to deal with this problem, some of them are not good enough. Every strategy can be improved. These strategies need continuous improvement to help companies build more competitive advantages. Performance measurement is a tool that

helps firms better understanding advantages and disadvantages of their strategies and provides an opportunity for improvement. A performance measure is used to measure the efficiency and/or effectiveness of the system, or to compare with the benchmark. (Keebler and Durtsche,2001:7)

Reverse logistics practices vary based on industry and channel position. Industries where returns are a larger portion of operational cost tend to have better reverse logistics systems and processes in place. Some of the characteristics of the reverse logistics for the different industries are highlighted below.

Publishing Industry's reverse logistics characteristics:1) Highest rate of unsold copies (28% on average). 2) Rowth of large chain stores: More square footage requires more books. 3) To secure a prominent display in superstores, publishers must supply large quantities of books. 4) Superstores sell less than 70% of books they order. 5) Shorter shelf life.

Automotive Industry's reverse logistics characteristics have three primary areas: 1) Components in working order sold as is 2) Other components, such as engines, alternators, starters, and transmissions are refurbished before they can be sold. 3) Materials are reclaimed through crushing or shredding. Automotive recyclers handle more than 37% of the nation's ferrous scrap. Remanufactured auto parts market is estimated at \$34 billion, annually.

Retail Industry's reverse logistics characteristics:1) Profit margins are so slim that good return management is critical. 2) Returns reduce the profitability of retailers marginally more than manufacturers. 3) Returns reduce the profitability of retailers by 4.3%. The average amount that returns reduce profitability among manufacturers is 3.80%.

Computer / Electronic Industry's reverse logistics characteristics: Shorter life cycles, Approximately 325 million PC's became obsolete in the US between 1985 and 2005.2) Opportunities to reuse and create value out of a nearly omnipresent asset. How to recover and reuse materials contained within E-waste? , Lead, copper, aluminum gold, plastics and glass, E-waste includes computers, televisions, cell phones, audio equipment and batteries. Remanufacturing of toner cartridges: 12,000 remanufacturers, employing 42,000 workers, sell nearly \$1 billion annually.

1.2 Importance of Reverse Logistics

Reverse logistics (RL) is becoming an important aspect of supply chain management. Many companies that, previously, did not devote much time or energy to the management and understanding of reverse logistics have begun to pay attention. Firms have begun to benchmark return operations with best-in-class operators. Third parties specializing in returns have seen demand for their services greatly increased. (Arun and Kwan, 2003:33)

The growing environmental concern worldwide, forced companies to engage in reverse logistics, such as re-use of products and materials and recycling. Practically, most of the companies deal with returns of some nature because of issues such as marketing returns, damage or quality problems, overstocks, refurbishing or remanufacturing. Handling returns present a great challenge for companies, while in many cases becomes a necessity for keeping customers satisfaction to a certain level. Reverse logistics operations in a supply chain may be considered as an introduction to innovative services of a company's portfolio. They may have an important impact on a firm's strategic performance in terms of market effectiveness, as well as, internal cost efficiency. Through reverse logistics innovation, it may be possible to expand revenue through market growth due to account customization, service augmentation, and improved customer satisfaction. Reverse logistics is becoming an area of competitive advantage.

Kokkinaki concluded that reverse logistics is necessary for the following reasons:

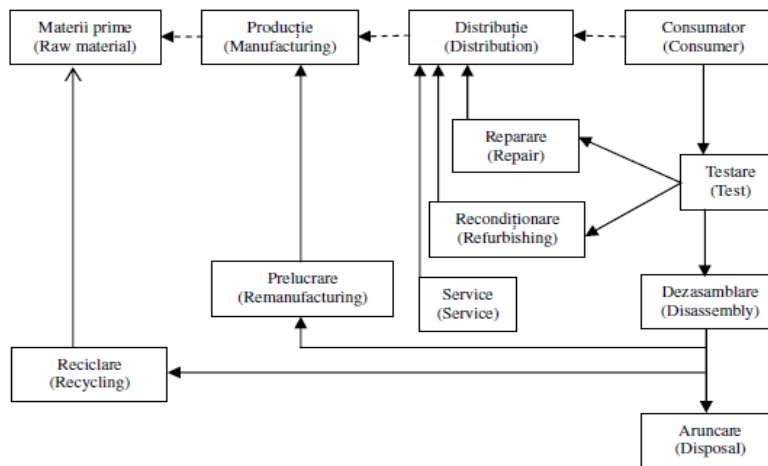
- Positive environmental impact: legislations acts, also called “producer responsibility laws,” require manufacturers to develop a policy for the collection and reuse of products at the end of their life cycle.
- Competitiveness advancement: efficient handling of returns leads to reduced costs, increased profits and improved customer service.
- Regaining value: efficient reverse logistics can capture values from reusing products or parts or recycling materials.

There are at least 70,000 remanufacturing firms in the U.S. for jet and car engines, auto parts and copiers that amount to total sales of US \$53 billion (Lund 1998).

1.3 Reverse Logistics in the Supply Chain

One of the more interesting and significant trends in supply chain management is the recognition of the strategic importance of reverse logistics operations. (Retzlaf and others, 1997:3) These reverse logistics operations support a variety of activities ranging from what is termed “green logistics,” i.e., “efforts to reduce the environmental impact of the supply chain” to activities that encompass product returns, repairs, and refurbishment. (Daugherty and others, 2001:22)

Figure 1 : Flow diagram of reverse logistics activities



Source: Samir and Rajiv 2006: 36.

Figure 1 shows the basic flow diagram of RL activities. The complexity of operations and the value recovered increase from bottom-left to top-right in the figure. Amini and Bayles have provided brief definitions of each disposal option of reverse supply chain as follows:

- Reuse – the packaging is reused or a product is sent back for resale to another customer.

- Repair/repackage – where a moderate amount of repair and/or repacking will allow the product to be reused.
- Recycling – where the product is broken down and “mined” for components that can be reused or resold.
- Reconditioning – When a product is cleaned to its basic elements, which are reused.
- Refurbishing – Similar to reconditioning, except with perhaps more work involved in repairing the product.
- Remanufacturing – Similar to reconditioning, but requiring more extensive work; often requires completely disassembling the product.

The pattern of quantity, quality and time of arrival of returns is of paramount importance in reverse logistics network design. The location of facilities relative to process inputs, customer markets or waste disposal locations has been considered both analytically and empirically. (Samir and Rajiv 2006: 36)

Strictly speaking, competition, value delivering and marketing motives, direct economic motives and concerns with the environment are some of the important of them. There are four important stages in RL.

1) *Collection* is the first and an important stage, where product types are selected and products are located, collected, and, if required, transported to facilities for rework and remanufacturing. Used products originate from multiple sources and are brought to a product recovery facility, resulting in a converging process. 2) *Inspection/ Sorting* is the next stage which may be carried out either at the point/ time of collection itself or afterwards (at collection points or at rework facilities). This may or may not be combined with pre-processing. *Pre-processing* may cover in the form of sorting, segregation, partial or complete disassembly or minor repair and refurbishing activities. It may be carried out either at collection centers or at rework facility depending upon various technological and economic factors. 3) *Location and distribution (network design)* is the most important and critical stage of reverse logistics that is assuming greater importance in

business as well as in theory. (Tibben- Lembke and Rogers; 2002:7) In many cases, recovery networks are not set up independently "from temporary" but are often combined with the existing logistics structures. In particular, this is true if products are recovered by the OEM. Location and configuration of facilities frequently affect and are affected by the external natural environment, mainly the estimated returns. Redesigning logistics networks to accommodate product returns and remanufacturing and reuse of such parts and components can often be quite profitable are remarked. (Corbett and Kleidorfer, 2001:10) 4) *Capacity decisions* in general aim at providing the right amount of capacity (i.e. how much) at the right place (i.e. facilities location) and at the right time (i.e. when). Long-range capacity is determined by the size of the physical facilities that are built. In general, facility decisions are affected by estimated returns (assuming infinite markets), costs, competitors' behavior and other strategic and operational considerations. Operations strategies that entail the installation of new capacity also become more complex as regulatory and consumer demands for returnable/recyclable products increase. There was developed the concept of "critical mass" of returns for profitable remanufacturing/recycling. In this context, the efficiency of RL could be improved by ensuring that product design takes into account the requirements of post-use/post consumption collection, sorting and recycling. (Gunasekaran and Cheng; 2008:36)

Some of the unique characteristics of the reverse logistics problem are highlighted below.

1)*Supply/Demand Balancing*: Perhaps the most difficult variable to forecast is the distribution of the returns of EOL or end-of-lease products over the planning horizon. Forecasters often face unexpected supply/demand patterns that will depend on their product's success in the market and competing products.

2)*Accumulation*: There will be accumulations of certain kinds of parts due to uneven market demands for certain components. For instance, there may be higher demands for certain models of memory chips and hard drives while other dismantled parts with no demand pile up on the operations floor.

3)*Logistical Network*: In a reverse logistics supply chain environment there will be potentially three separate entities: the assembly plant, the

disassembly plant and the recycling plant. Operations therefore have to be planned from a larger perspective that comprise those three entities. The inventory policies will alter in terms of the level and location of buffer stocks. From the supply of products, to collection, to dismantling, to reuse and/or recycling, the inventory of products and components must be properly maintained to balance the supply and demand of resources.

4)Transportation: Plant location decisions are influenced by the transportation cost of raw materials. However, when dealing with disassembly and recycling, the control for the flow of products is expected to increase several folds. Manufacturers will have to consider this problem and plan the locations of new assembly, disassembly or recycling plants appropriately

CONCLUSION

While many companies have yet to recognize the strategic potential of efficient reverse logistics, it is clear that the tide is beginning to turn. There is more interest in reverse logistics now than ever before. Firms are beginning to make serious investments in their reverse logistics systems and organizations. One clear indication of the strategic importance of a business element is the amount of money spent on managing that element. Reverse logistics will be one way to reduce costs, increase revenues and customer service levels and help to obtain market advantage. To accomplish this task, metrics that measure various aspects of the reverselogistics process must be developed and implemented. These metrics across the supply chain are equally important in forward or reverse logistics (although common metrics are much less evident in reverse logistics). This reverse distribution activity can be crucial to the survival of companies, because the permanent goodwill of the company is at stake. Businesses succeed because they respond to both external and internal changes and adjust in an effective manner to remain competitive. To achieve its business objectives, a company must respond to increasing customer demand for “green” products, comply with strict environmental regulations, and implement environmentally responsible plans as a good corporate citizen.

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