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Project Advisor: Alyssa Zasada

Professor: Yunshan Lian

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By

Saika Sayeed

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Abstract

Companies are searching for better ways for future advancement in the competitive world of logistics management. Reverse logistics is one of the important parts of supply chain management. Some companies believe that delivering products to the end customer is the end of the cycle. However, it is not true in the business industry. Over \$100 billion of products or goods are being returned every year. Reverse logistics offer opportunities to reclaim value, disposal, or recycling, long-term customer relationships, and environmental benefits as well. However, it requires commitments and plenty of resources. This paper will focus on the importance of reverse logistics, factors, the process of reverse logistics, challenges, and lastly the best way to manage it. Moreover, this study will highlight the current examples of reverse logistics practices. It will also provide recommendations to adopt better reverse logistics strategies. The findings were developed based on articles, textbooks, journals, and literature reviews.

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Introduction

Reverse Logistics is the process of planning and executing the movement of returned goods, inventory, and finished products. Another aspect of RL is environmental efficiency. According to Carter and Ellram (1998), there are two aspects of reverse logistics. First, “viewed narrowly, it can be thought of as the reverse distribution of materials among channel members.” Second, viewed more broadly, RL is the “reduction of materials in the forward system in such a way that fewer materials flow back, reuse of materials is possible, and recycling is facilitated”. (p. 85). Reverse logistics plays an important role when it comes to logistics management. “Reverse Logistics is a broad term referring to the logistics management and disposing of hazardous or non-hazardous waste from packaging and products. It includes reverse distribution (...) which causes goods and information to flow in the opposite direction of normal logistics activities.” (Stock,1992). Moreover, Reverse logistics (RL) can be defined as the logistical activities of retrieving materials or products to repair, re-sale, recycle, or properly discard (Hsu, Tan & Zailani, 2016, p. 92).

RL is a small part of total logistics management and deals with all products and goods that are being returned from time to time. The RL team of any company covers all activities regarding returned goods to determine the future of these products. This report contains basic concepts of reverse logistics and the problems related to it. RL is fairly a new concept and researchers are focusing on its effects and benefits when it comes to customer satisfaction. Therefore, knowledge of logistics management is necessary for reverse logistics objectives.

The primary purpose of this study is to understand the basic concepts of reverse logistics, and its process, and to examine the challenges in the reverse logistics world. Moreover, this study will help to develop better reverse logistics strategies, identify best practices, and provide

recommendations regarding customer satisfaction and competitive advantage. Another aim of the study is to analyze the environmental aspects of RL and CSR (Corporate Social Responsibility). To maintain reverse logistics activities, at first, companies need to perform their logistics activities properly which includes planning, controlling, and implementing the flow of goods from the beginning to the end.

It is very important to study several aspects and challenges of reverse logistics. Some challenges include retailer manufacturer conflict, lack of defined process, and negligence from all parties. Therefore, both manufacturer and retailer should be on the same page regarding product values. Also, companies should be able to provide enough information to retailers for planning purposes. The lack of a defined process is another challenge that manufacturing companies face daily.

Secondary data analysis of research and statistics will be used as the primary method for this study. Further research information will be gathered from companies like- Verizon, Walmart, and United parcel services. I work as a logistics analyst at Verizon, and I will set up an interview with my manager to understand the reverse logistics process in detail. The purpose of this study will be explained to Patrick Boyle (Reverse logistics Analyst) so that he can throw some light on the whole reverse logistics process. Other companies like- Walmart, and the united postal service have published some research on their reverse logistic system. The literature and research will be attained from journals, peer-reviewed papers, scholarly articles, and published credible work. All secondary research will be analyzed and reviewed to support the reverse logistics strategies. In addition, all resources will be used to portray the current situation of reverse logistics, the background of the industry, and recommendations for future improvement.

Literature Review

The literature review provides a good set of definitions for reverse logistics. According to the European working group on reverse logistics (REVLOG), “ The process of planning, implementing and controlling backward flows of raw material, in-process inventory, packaging, and finished goods, from manufacturing, distribution, or use point, to a point of recovery or point of proper disposal”. The council of logistics management (CLM) defined reverse logistics 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 to conform to customer requirements”. The growth of reverse logistics has been tremendous and the activities of reverse logistics are developing with time by increasing the company’s profitability. (Daugherty, Myers & Richey, 2002).

Reverse logistics was not a part of the supply chain process in the early 1980s. The industry was more focused on the legislation process of defective products, product safety, and design changes. Chandran & Lancioni (1981) states that “ Logistics managers have done little to develop a systematic recall process or reverse distribution system from consumer to producer”. The reverse distribution system was not built at that time and researchers were searching for a mechanism for product location identification, and a computerized warranty system. However, reverse logistics research started to develop at the beginning of the 1990s. Stock (1992) focused on the holistic and academic view of the reverse logistics process. Drumwright (1994) focused on intraorganizational factors which is one of the most important parts of reverse logistics. The study by Drumwright highlighted the involvement of reverse logistics and how it is affected by several environmental forces. Researchers like Evans-Correia, Graham, and Drumwright put a lot of emphasis on the procurement side of purchasing for recycling, intraorganizational factors,

and the overall reverse logistics process. The following illustration shows the contribution of these authors to promoting reverse logistics.

Table 1: Summary of the Purchasing Literature

Author	Topic	Contribution	GAP
Bronstad & Evans-Correia (1992)	Role of procurement in purchasing recycled paper.	A detailed description of obstacles involved with the procurement of recycled paper, and a comprehensive approach for implementing a recycled paper procurement program.	Focuses narrowly on the purchase of recycled paper, and states that recycling should receive a higher priority than resource reduction.
Herberling & Graham (1993)	Role of Procurement in reverse logistics	Advocates the need for purchasing to follow a life-cycle approach in order to determine objectively the most appropriate reverse logistics process.	Does not provide a well-grounded, theoretical framework and empirical evidence.
Drumwright (1994)	Intra organizational factors that influence socially responsible buying	Provides an initial, grounded theory of the intra organizational factors that influence environmental purchasing, and uses interviews to develop the grounded theory.	Primarily considering the intra organizational, as opposed to the external factor that drives environmental purchasing, the exploratory results must be followed with empirical testing.

Source: Journal of Business Logistics; Hoboken Vol. 19, Iss. 1, (1998): 85-102.

During all these years, only a few organizations were trying hard to improve after-sales activities. Additional environmental challenges are also hampering the improvement. According to the Tompkins Supply Chain Consortium survey, poor practices of after-sales supply chain management are an indication of the whole reverse logistics system in the industry. Moreover,

the survey highlights several facts regarding the supply chain service. Some of them are mentioned below-

- The average rate of return 9.1%
- The holiday season return rate is 12.1% higher than the yearly rate
- Asset recovery time 55 days on average
- Return as a percentage of revenue is between 6% to 14%
- Outbound shipment is cheaper than processing returns.

According to the article “Reverse Logistics is not the Reverse of Logistics”, “The lack of visibility due to non-integrated processes with outsource service providers and the lack of aligned incentives across supply chain partners, and, surprisingly, many companies do not view the service supply chain as a differentiator”. (Tompkins, 2010). However, based on several types of research and studies, top drivers of supply chain excellence include the speed of returns, return policy, sustainability, organizational alignment, and use of the returned asset to increase profitability. (Antonyová, A. Antony, A. & Soewito, B. (2016, April).

Online shopping and E-commerce are playing an important role when it comes to profitability. Since customers are not able to experience the service or try the product, the importance of return management is very crucial during this period. A great example of E-commerce advancement would be Amazon and eBay. Online shopping experience includes return, reverses-flow, and supplier relationship. (XiaoYan, Han, Qinli & Stokes, 2012). E-commerce products can be returned due to several reasons. Some of them include unwanted material, incorrect quantity, quality issues, wrong product description, size, and so on. The retail fashion industry is focusing on reverse logistics because of e-commerce advancements.

According to XiaoYan, Han, Qinli & Stokes, a simple issue like color inaccuracy can be the

main reason for return and the companies will get a negative review or consequences if the return process is not smooth. In the early stages of e-commerce, there were only three parties involved and the organizations struggled in terms of the complex logistics processes, and higher costs.

During the last few years, companies are focusing on reverse logistics and e-waste. According to American researchers K. K.Dhandra, and A. A. Peters, “various methods to alleviate the e-waste amount from the resource reduction in the input process through reuse, computer refurbishing as a form of remanufacturing or recycling. Disposal results in toxic waste as well as groundwater contamination. Extended producer responsibility can also help to cope with the increasing e-waste in its amount”. (2010).

In the past, companies were not focused on returned or refurbished products due to lesser incentives. But corporate social responsibility and company profitability is forcing the industry to make the reverse management process smoother. (Rogers & Tibben-Lembke, 2001). Moreover, some companies used to consider reverse logistics as a liability because of landfill cost and disposal issues. However, recent research shows that factors related to reverse logistics help during the operational stage, and the returned products are handled as efficiently as possible.

Methodology

Secondary data analysis of research and statistics was used as the primary method for this study. Further research information was gathered from companies like- Verizon, Walmart, and United parcel services. The purpose of this study was explained to Patrick Boyle (Reverse logistics Analyst). Other companies like- Walmart, and the united postal service have published some research on their reverse logistic system. The literature and research were attained from journals, peer-reviewed papers, scholarly articles, and published credible work. All secondary research was analyzed and reviewed to support the reverse logistics strategies. In addition, all resources were used to portray the current situation of reverse logistics, the background of the industry, and recommendations for future improvement.

Return Reasons

Products are returned to the manufacturer for several reasons. According to, " Reverse logistics [excerpt from development & implementation of reverse logistics programs]", there are three return reasons. (Stock, J. R. (1999). They are-

Manufacturing Return:

Products and parts that need to be recovered at the production stage are considered manufacturing returns. Some examples include surplus raw materials, quality control, and leftovers.

Distribution Return:

Distribution returns are initiated during the product distribution stage. Some examples include functional return, product recall, and stock adjustment. Products can be returned due to wrong labels, damaged materials, and unsold products. Because of that stock adjustment takes place when the supply chain team decides to re-distribute the stocks.

Customer Return

Customer return is one of the most important returns. There are several reasons behind customer returns. For example, reimbursement, end-of-cycle, and warranty. If the products are not up to the mark, consumers usually return them. In that case, they get a full refund or a new product.

Reverse Logistics Process

Customers return products or services for multiple reasons. Some of them include unhappy customers, product damage during transportation, alternative purchase, poor performance, and so on. According to the reverse logistics manager of Verizon, there are four steps in the reverse logistics process. It starts with the collection, next comes inspection and selection, the third step is recovery, and lastly, redistribution takes place. Each step of the process has different objectives so that the supply chain can run smoothly. Figure 1 below gives a better idea of the reverse logistics process.

Collection means bringing the products to recovery when customers return them. After that the returned products are selected, inspected, and sorted depending on the recovery route. Inspection is one of the important parts of the reverse logistics process. According to our interview with Patrick Boyle (Verizon Logistics Manager), the quality of all returned products is inspected during this stage and the warehouse team makes decisions on recovery type based on inspection. For example, if a returned phone almost looks like new then that specific product is sent for redistribution or re-use. On the other hand, the recovery process demands more action if there is any defect or the inspection is not up to the mark. Direct recovery also includes recycling, retrieval, repair, refurbishing, and remanufacturing.

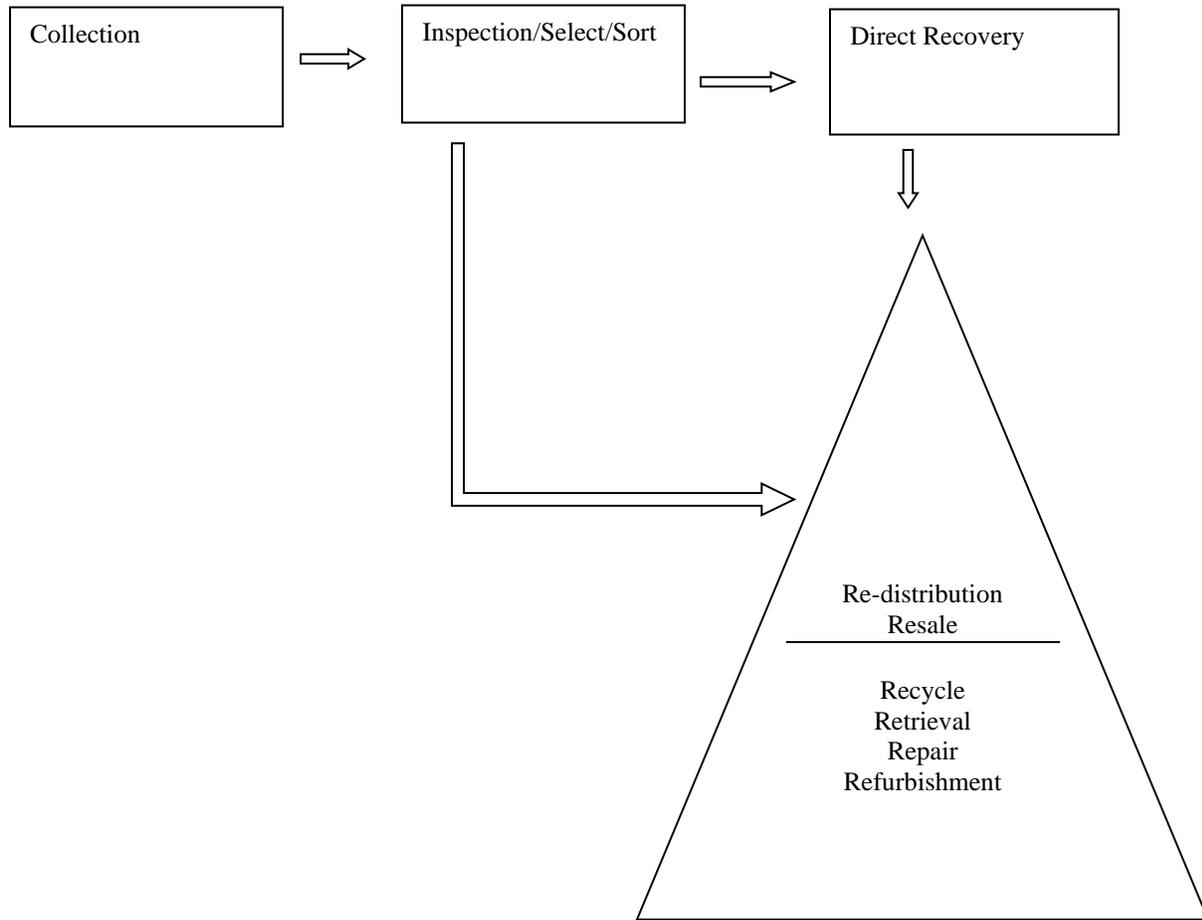


Figure 1: Reverse Logistics Process

Key Terms for Understanding Reverse Logistics

It is very important to understand the key terms of reverse logistics before we dive into the whole process of managing reverse logistics. The following terms are crucial when it comes to managing RL.

Product Cores

Product core is considered as the recoverable elements of a product that was previously used by a customer. It goes through several remanufacturing operations like reassembly, testing, inspection, reprocessing, and so on. (Ostlin et al., 2009). However, core products are usually seen in secondary markets or can be used as refurbished items.

EOL (End of Life), and EOU (End of Use)

All returned products or services are either end of their use period or at reached end of their life cycle. EOU returns are basically at a certain stage of the product. These products are not new but most of the time they are in a satisfactory state. On the other hand, end-of-life returns are at the end of the physical life cycle. According to “Product Life-Cycle Implications for Remanufacturing Strategies”, “The return of cores from end-of-use is generally lower than the potential demand for remanufactured products. Vice versa, after a point when the product has been on the market for a long time, the returns of end-of-use products are generally higher than the demand for remanufactured products”. (Ostlin et al., 2009).

RUL (Remaining Useful Life)

The residual value of a returned product is known as the remaining useful life. According to “A Review on the Lifecycle Strategies Enhancing Remanufacturing”, “The remaining useful life of a product is an estimation of how much useful life the used part or product still has and for

how long it can still be used. It can be used to determine whether or not a used part can still withstand another lifecycle". (Fofou, R. F., Jiang, Z., & Wang, Y. (2021)

PSS (Product Service System)

Instead of selling the product by itself, the product servicing system combines both service and product. This system can be very useful in terms of product monitoring and inspection. (Fofou, R. F., Jiang, Z., & Wang, Y. (2021).

EPR (Extended Producer Responsibility)

Extended producer responsibility is a policy to hold the companies responsible for the whole manufacturing process. According to the GrassRoots Recycling Network, an advocacy group, "EPR is the extension of the responsibility of producers for the environmental impacts of their products and packaging to the entire product life cycle - and especially for their take-back, recycling, and disposal." (Bridgman, G. (2004, 11). There are four basic goals of extended producer responsibility. (OECD, 2001, p. 29). It includes waste reduction, material conservation, sustainability development, and environment-friendly products.

Return Management:

Return management is all about transforming the product so that it can be re-used. Therefore, companies use multiple tools to maximize profit. Rogers and Tibben-Lembke (1998) discussed seven different channels for product disposing of. They are-

1. Return to Vendor
2. Sell as New
3. Sell via Discount
4. Sell to Secondary Market
5. Remanufacture

6. Recycle

7. Donate to Charity

Disposal decision depends on several factors like- product condition, demand, vendor obligation, and so on. Often, retailers buy bulk products or provide incentives for larger orders. This kind of product is sometimes returned to vendors if the demand is low. Moreover, products are returned to vendors due to manufacturing faults, and product defects. On the other hand, some products are returned as unopened or unused. Therefore, these products can be sold as new or sold via discount stores. There are several advantages when products get sold through the outlet. Some of them include knowledge of product location, product control, and visibility. (Rogers and Tibben-Lembke (1998)). Other options include secondary market or donation to charity. Usually, the secondary market focuses on close-out, surplus, low pricing, and so on. The last option is donation if none of the methods work. Retailer or manufacturer does not get any monetary value, however, a donation to charity increases brand image, and the company is considered a better corporate citizen. The next option is refurbishment or remanufacturing by replacing parts or other changes. Lastly, products are sent to landfills or recycling because of safety regulations. Re-useable parts are taken out before products are sent to landfills. Moreover, products need to be cleaned, refined, and non-hazardous before they are sent to landfills. (Rogers and Tibben-Lembke (1998)).

Current Examples of Reverse Logistics

United Parcel Service

UPS is one of the leading logistics providers when it comes to transportation. According to their website, “Operating in more than 220 countries and territories, UPS is committed to moving our world forward by delivering what matters. Beginning as a small messenger service

started by enterprising teenagers and a \$100 loan, UPS and its more than 500,000 UPSers around the globe are a transportation and logistics leader, offering innovative solutions to customers, big and small". (UPS.com). Customers are getting reverse logistics benefits from UPS and companies are partnering with UPS for reverse logistics benefits. For example, HP partnered with UPS for their recycling programs and they were able to convert more than 18 million materials from landfills. (Yen-Chun & Wei-Ping, 2006).

Walmart

Reverse logistics is a big part of Walmart's supply chain. According to, " Retail returns, reverse logistics ramp up for the holidays, " Each year Walmart processes 45 million cases of returned merchandise through its regional return centers and 40% of that volume will come through in January and February following the hectic holiday buying season".(Souza, 2013). Moreover, Walmart usually sends all their defective products to the supplier or it goes to donation if the certain criteria do not meet. Moreover, the retailer tries its best to re-use or refurbish the returned products for better sustainability. " When products aren't sent back to the vendor for credit or donated to charity, they are either recycled or sent to landfill as the last resort". (Souza 2013).

Reverse logistics and Environment:

Reverse logistics is related to sustainability and environmental performance. Going green means promoting environment-friendly options and maintaining natural resources. According to, " Green Supply Chain Management: A Necessity for Sustainable Development", " Companies are adopting contemporary GSCM practices for the improvement of environmental performance and have competitive advantages. Moreover, GSCM is practiced in varied ways. It is integrated not only into the inbound supply chain and outbound supply chain but finally completes with

reverse logistics and reaches the end-user through recycling and reuse”. (Verma, D., Dixit, R. V., & Singh, K. (2018).

The success of a reverse logistic program plays an important role when it comes to the company reward system. For example, Sony corporation produces a lot of waste according to the supply chain news. However, Sony is making environment-friendly products nowadays to fulfill their Zero towards environment mission. ”. (Verma, D., Dixit, R. V., & Singh, K. (2018).

Challenges in Reverse Logistics

Most manufacturing companies face different kinds of challenges throughout the whole reverse logistics process. Manufacturer-retailer conflict is one of the most important ones. For example, when any product gets returned to the manufacturer, both parties disagree on product condition, the value of the item, and response time. Most of the time manufacturer blames retailer for the return and blame them for negligence, and poor planning. On the other hand, retailers suspect that the product came back due to manufacturing defects. Both parties should come up with a process to avoid this kind of conflict. Otherwise, the whole process of reverse logistics becomes very difficult because of the lack of mutual understanding between manufacturer and retailer. Secondly, the lack of a defined reverse logistics process is creating issues for the companies. For example, cycle time increases if there are too many touchpoints. Hence, the total waiting time for any product return increases rapidly. Lastly, the product return process gets difficult when all supply chain parties are not on the same page.

Recommendation and Implication

Reverse logistics is the process of controlling the flow of goods and it can be improved. Firstly, return policies should be stated while selling any product. In that case, buyers know what to expect when they want to return any product. Sellers should assure buyers that returns will be handled properly and a step-by-step process or guide will help them to decrease any kind of delay. Secondly, considering repairing, reselling, and refurbishing will help in the long run. Items can be listed for a lower price and that will encourage the customers. Retailers or manufacturers should create a return area for sorting purposes as well. For example, Patrick Boyle from Verizon mentioned that they keep all their returns in one area and sort them based on return time. It helps the warehouse team to keep the warehouse organized and the products are routed correctly. Furthermore, he mentioned that Verizon always packs return labels with all of their shipments so that it becomes easier for the customer to return. Other retailers should follow this process to improve customer experience. For example, paid return labels can be a part of a pilot program to avoid any kind of shipping charges. Next comes customer experience which is heavily dependent on visibility and transparency. Nowadays customers expect to track their returns. Therefore, the supply chain needs to be efficient enough to strategically handle the reverse logistics network. Lastly, sustainability plays an important role when it comes to reverse logistics. Leading companies should concentrate on waste reduction, environmental improvement, and carbon footprint. To keep running the logistics resources, companies should focus on effective reverse logistics. Moreover, it helps the organizations to boost their reputation by engaging themselves in sustainability activities.

Conclusion

This seminar paper focused on the basic concepts of reverse logistics and it was a tedious job to gather all the necessary information to complete the project. Companies face several challenges while building a reverse logistics process. Some of them include a lack of defined reverse logistics process, manufacturing conflict, and inefficient return process. This seminar paper highlighted all these challenges in detail to achieve the goals of the project. However, these challenges are compelling enough to build a reverse logistics process. Uncertainty is a big part of reverse logistics as the manufacturer or retailer does not know the timing of product return. Therefore, an effective reverse logistics process is necessary to optimize activities like recycling, remanufacturing, disposition, and transport. Lastly, because of the time constraint, I was not able to discuss the government regulations of reverse logistics practices. In the future, companies should concentrate on ERP regulations for an effective supply chain. The future of reverse logistics depends on minimizing disruptions from the whole return process and this can be done by utilizing all parts of the return process.

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