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An Outline of Reverse Logistics

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Abstract:
Reverse logistics is a field to be studied and researched for the environmental benefits, customer satisfaction, cost optimization, profit maximization and reduction of waste. Effective reverse logistics process cleans up the mess in a company. In this paper, we are trying to understand reverse logistics processes from extensive review of literature. This article uses the reverse logistics literature in the context of manufacturer, distributor, retailers. The main objective of this article is to provide the basic knowledge of reverse logistics, its processes and activities for better understanding of reverse logistics and to encourage researchers to work more on this topic of reverse logistics. We have discussed about the type and causes of product returns, economic feasibility in reverse logistics process and the government regulations that benefits the environment.

Keywords: *Economic feasibility, government regulations, product returns*

1. Introduction

1.1. Definition

According to Moritiz Fleishman (1997), "Reverse logistics is the management of the flow of materials opposite to that of the conventional supply chain. This is the process of moving the goods from the final destination, back to the place of manufacture in order to recapture the value of products either by reprocessing, refilling, refurbishing, repairing, or recycling".

Rogers and Tibben Lembke (2001) states Reverse logistics as "the process of planning, implementing, controlling the efficient. Cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of customer receipt to the point of origin to recapture value or appropriate disposal".

Reverse Logistic association defines reverse logistics as "All the 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 environment resources"

2. Importance of Reverse Logistics

Many organizations still do not concentrate much on the returns logistics process. They do not realize the hidden profit and ultimate customer satisfaction related to it. Trying to understand the customer satisfaction at the first step of reverse logistics that is the product return. Whenever the product is returned back to the retailer, the service given to the customer at the point of buying and the service given to the same customer when returning the product is different. That is the level of service at the time of buying is decreased at the time of returning the product which affects the customer very badly. The customer gets a kind of dissatisfaction and the customer gets frustrated and then it creates a bad impression about the retailer and further the customer decides not to deal with any purchases with the same retailer. According to James Stock and Jay P. Mulki (2009). It is possible for an organization to recapture the high value of the product sometimes it exceeds 80% of the original value of the product. Taking longer time in handling product returns leads to customer dissatisfaction. A reverse logistics network when well managed not only provides cost savings in procurement, transportation, inventory holding but also retain a customer.

Reverse logistics is more challenging than the forward logistics as there have been always a plenty of mess and disorganization in handling reverse logistics. Now-a-days many organizations are giving importance to reverse logistics as it also helps reduce the carbon footprint of the company, thereby creating a positive image for the company.

3. Objectives

1. Analyzing the type and causes of product returns that triggers reverse logistics
2. Examination of reverse logistics practices, processes and activities
3. Study about Government regulation on E-waste and EPR.
4. Economic feasibility and cost components in reverse logistics process.

4. Methodology

This article is conceptual and the data are taken from the review of literature from various articles. The method applied is a framed literature review, which seems to be a valid approach, as it seems to be a necessary step in understanding and structuring a research field and it is an integral part in conducting a research.

5. Review of Literature

The process is very neat and orderly in forward logistics. In forward logistics the items are packed, labeled with details, carefully loaded in cartons and pallets. Then finally loaded into a vehicle for transportation and finally reaches the market and then the customers. Transportation is the first step in case of reverse logistics. The customer returns products either due to the damage of the product, failure of the product, some products are also returned at the end of the life cycle, sometimes goods are returned after the expiry of its lease contract. M. Fleishmann, et.al., points out the types of items returned and the forms of reuse.

Types Of Items Returned	Reason	Forms of Reuse
PACKAGES (Pallets, wood)	Returned quickly, as it is no longer in use once the content delivered	Direct reuse-bottles, pallets and containers
ROTABLE SPARE PARTS (Machine parts, TV tubes)	Returned due to failure or defect	Restore working order by repairing
CONSUMER GOODS (Refrigerators, copiers)	Mostly returned at the end of cycle or due to some defect, or non-defective defects	Repair to restore working order
GOODS RETURNED AFTER THE EXPIRY OF LEASE CONTRACT	Expiry of lease	Return time is well-known. So can be planned appropriately
PAPER, PLASTIC, GLASS	Returned after use	recycling
MACHINERY TOOLS, ENGINES	Defect or malfunction	Remanufacture and bringing into new working condition either by disassembly or replacement operation
CIVILOBJECTS	upgrading	refurbish

Table 1: Product returns and reuse

The products are recovered by the above methods. Through recycling, materials are recovered. Whereas in repair and remanufacturing, it is an added-value recovery. Recycling is an open loop, that is, the product does not reach the producer, whereas remanufacturing is a closed loop, the products and the packaging reach the producer. The reverse logistics process is always triggered by a member in the supply chain. Marisa.P.de Brito, Rommert Dekker (2003) found that the return reasons can be broadly classified as manufacturing returns, distribution returns, customer returns. Surplus raw material, quality control returns and production leftover and byproducts are the manufacturing returns. Product recalls, B2B company returns such as unsold, wrong or damaged delivery, short lifetime remaining products, function returns such as carriers, packaging items are all distribution returns. B2C commercial returns, sometimes a customer after purchase of the product, in short time wants to return the product as it does not meet the requirements or needs of the customer, reimbursement guarantees give the customer an opportunity to change their mind in getting another product mostly in cases of garments, where the garment is returned either due to size, colour and fit, warranty returns, service returns for repair, end of use returns, end of life returns.

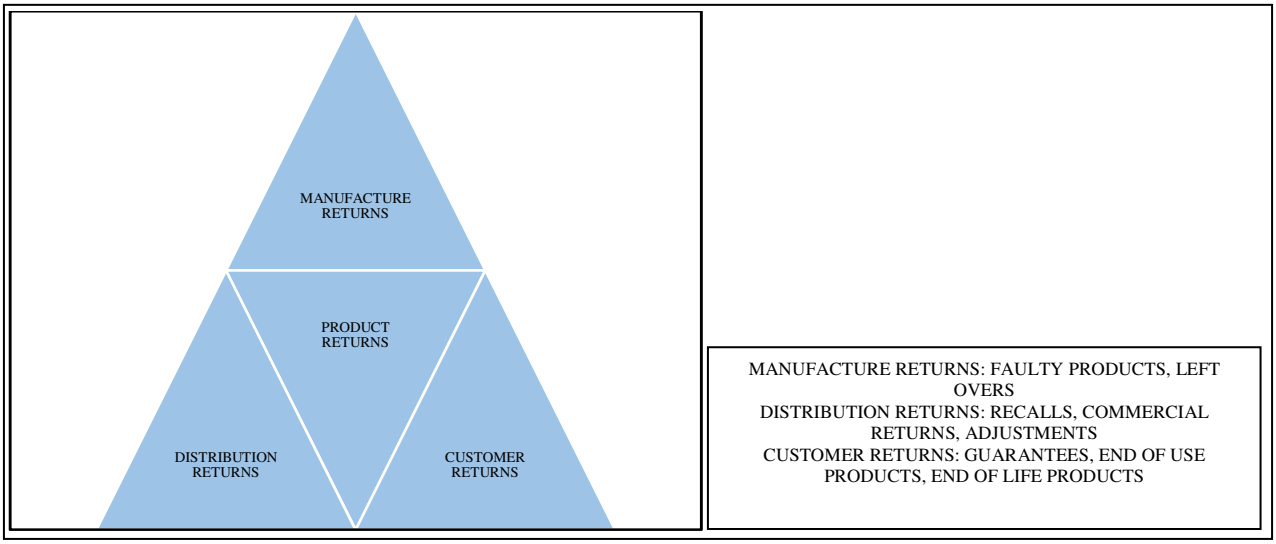

Figure 1: Broad classification of return reasons
Source Brito and Dekker, 2003

6. Reverse Distribution Channel and Reverse Logistics Activities

Manufacturers, suppliers, producers, distributors, retailers, logistics service providers, collectors, recyclers, secondary material dealers are all the members of the reverse distribution channel. The customer returns product to a collection center, where the product is collected, tested, sorted and transported for processing. The product is either sent to the repair center or remanufacture center, according to the condition of the product and then it is sold back in the primary or secondary market based on the quality.

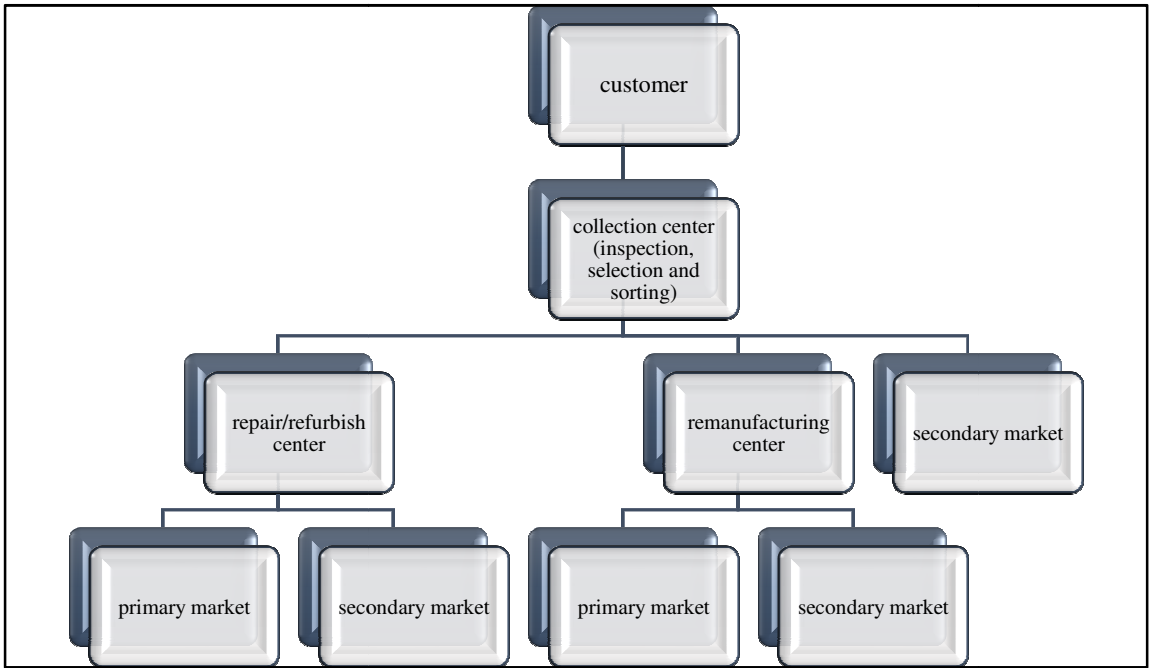

Figure 2: Reverse logistics activity
Source: S.K. Srivastava (2008)

During the movement of products through reverse, utmost care has to be taken to avoid inaccurate counting, damage to the product while loading, inaccurate paper work. According to Brooks Bentz (2015), there are three steps to optimize reverse logistics, the first step is the extensive detective work of what went wrong and finding the root cause of the product return. The second step is the recovery. The recovery is either material recovery or added-value recovery. Material recovery is through recycling. Repair and manufacturing are the added-value recovery. Profitability is the goal. Many organizations use 3PLs to handle. Outsourcing reverse logistics activity enables expertise in handling with less risk, product reaches market at a faster speed, creates a barrier that protects the company from the outsiders. There are some negatives also, that is, the company loses the information and data which help detecting the product quality, customer buying pattern which are very necessary for the company. The third step is the risk mitigation, handling dangerous and hazardous goods without the violation of government rules so that company reputation is not damaged.Sears, a chain of American departmental stores is now experimenting curbside fulfillment, where customers can drive to a parking lot, where the store personnel comes to process the delivery of the product and the product returns bought through online mode. The initial sorting and segmentation must be properly done and to do so the store personnel should be informed and educated, so that money not wasted on unnecessary transportation. The proper and right management of reverse logistics processes is very important for true supply chain management and that is the key for success. GENCO Product Lifecycle Logistics a third-party service provider, has developed a web enabled R-log reverse logistics software. R-Log handles any SKU that is sold online or at retail. This software houses the rules between the company and its vendors and it also suggests an appropriate disposition method for the product. This reduces the human error which in turn speeds up the process and can also reduce the labor costs. Also, less paperwork and manual processes.

Material recycling involves a new production process. In terms of direct reuse and minor repairs, no production process takes place. Sometimes, returned products which cannot be used are again turned into raw materials. Gupta and Talep (1994), designed an algorithm with two phases. In phase 1, the total number of products to be dismantled is determined and in the second phase, corresponding disassembly operations are scheduled for a time period. The parts are disassembled in the order of decreasing value in such a way until the marginal value of the disassembled parts outweighs the total cost incurred in disassembling.

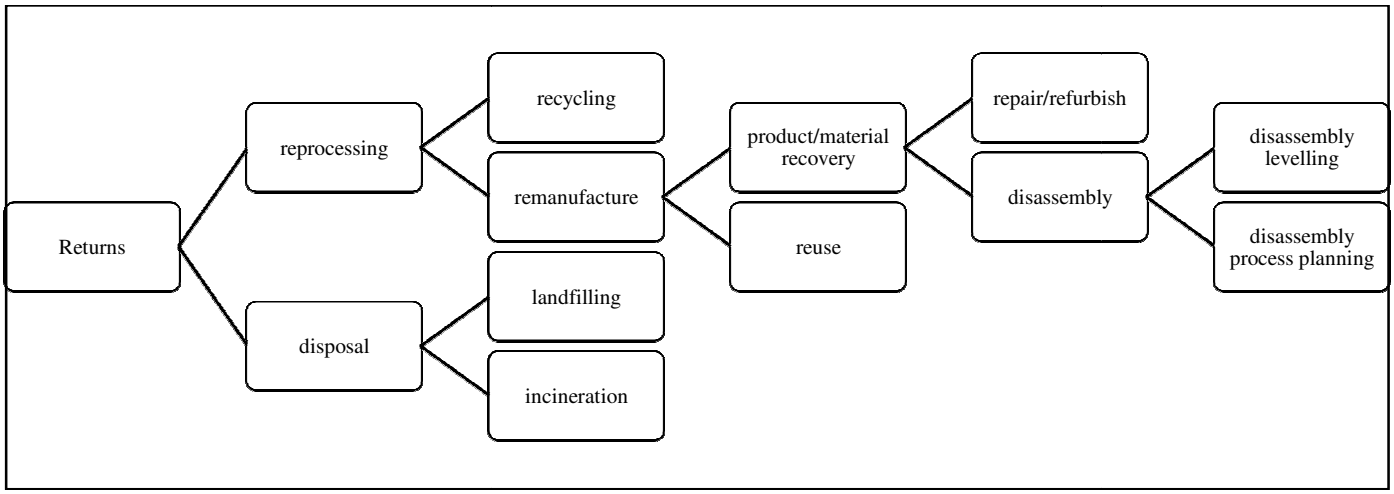

Figure 3: Returns processing

Reprocessing occurs at different levels, product, module, component, selective, material, energy levels as concluded by Marisa.P.de Brito, Rommert Dekker,2003. Once the product is inspected, the type of recovery is planned. If the product returned is of good quality, it can directly enter the market. Otherwise, appropriate reprocessing must be made for the product to enter into the market or proper disposal must be planned. Reprocessing is done at different Levels. Repair is done at the product level and product recovered. Refurbishing is done at the module level, for example, some products may need an upgradation before entering the markets. Remanufacturing is done at the component level, the products are dismantled and used. Retrieval of parts in the selective part level and recycling done at the material level. In the energy recovery process, the product is incinerated to gain energy. If none of the above methods work for the product, then landfill is the only option. Gengor and Gupta,1999 suggests product composition as one of the main aspect to look into before the planning of the recovery option, since hazardous materials require special treatments.

7. Government Regulations on E-Waste

NEP (National Environment Policy) gives legal recognition and strength to the informal system for collection and recycling of impartial e-waste. E-waste is the waste generated from electrical and electronic devices such as computers, cell phones, etc., In India there is no specific guidelines separately for e-waste, e-waste comes under Hazardous or Non-hazardous category. As per the guidelines for environmentally sound management of E-waste, March 2008, E-waste is covered under "the Hazardous and Non-Hazardous waste management rules, 2003".65 cities in India have produced more than 60% e-waste generation, 10 states more than 70% of e-waste generated. Maharashtra at the first place, Tamilnadu at the second place. So it is necessary that EPR (Extended producer responsibility) must be a mandatory activity in the production of electrical and electronic equipment, which is a protection strategy for the environment and will improve the producer responsibility for the entire life cycle of the product. E-waste dumping in India is dealt by Ministry of Environment and Forest.

The Government of India, Ministry of Environment, Forest and Climate Change Notification (2015) states the

7.1. Producers Responsibilities

Collection and channelization of e-waste with the principle of EPR. The producer must implement the EPR either individually or collectively through the Producer Responsibility organization by collection centers set up and organizing take back systems. Information regarding the contact details such as address, telephone details must be provided to consumers. The hazardous constituents and the hazardous nature of improper recycling of e-waste must also be indicated. The Deposit Refund Scheme implementation by the producers will be very effective as the consumer returns the end-of-life electronic and electrical equipment and gets the refund.

7.2. Bulk Consumer Responsibilities

E-waste generated must be channeled to collection centers, which are authorized or to a registered dismantle or through the take back services of the producers. Also, it has made mandatory to record the e-waste generated by them in form-2 for scrutiny by the pollution control committee.

7.3. Collection Center Responsibilities

E-waste collected must be stored properly in a secured manner to ensure no damage done to the environment while storage or transportation of e-waste. Maintain records of the e-waste handled in form-2.

8. Economic Feasibility

Any business unit concentrates on the reverse logistics and frames strategy only when there is a profit involved. Strategy choice for the failed spare parts can be made keeping in mind, the resulting profit and the lead time that is accepted by the customers. L. Van Stek (2012) suggests three strategies. The reprocess to order (RTO) model, waits for the decision on reprocessing or to purchase once demand occurs. There is very low risk and low inventory cost involved. The PUSH model, immediately reprocesses the parts that are failing once they are returned and waits to purchase additional new parts until the inventory reaches the point to place the order. In the PULL model both reprocessing and purchasing are postponed until the inventory reaches the reorder point. In the effective reverse logistics process, the delivery of serviceable parts and the pickup of failed parts should be combined so that the cost of transportation is minimized. While deciding on the price for the parts after reprocessing, two factors have been considered, the quality of the product and the attitude of the customer towards the reprocessed part. The reverse logistics processes are said to be economically feasible if the profit in the current situation with reverse logistics is greater than that of the profit in the current situation without reverse logistics.

Cost component	Cost included
Transportation	The cost of picking up failed parts, transportation between the service central warehouse and the supplier and delivering the serviceable parts to the customers
Inventory	The cost for keeping money locked up in inventory
Warehousing	The costs for the shelf/pallet place and the handling costs which are charged by the organization which operates the service central warehouse
Reprocessing/ purchasing	The costs for re-processing and purchasing parts, also including the inspection costs for failed parts and fixed order costs
Coordination	The costs for the time of staff that is spend on coordinating the reverse logistic process

Table 2: Cost components

Paul Rupnow (2006), suggested an equation for reverse logistic cost, the equation is that the total reverse logistic cost is the sum of processing cost, logistic cost, credits/replacement cost and asset depreciation cost. The processing cost involves the cost incurred while processing and handling returns, the logistic cost involves the freight cost associated with pickup, handling charges at the warehouse and the storing cost. The company has to either replace the product returned or issue a credit, and this procedure also incurs costs. The product returned must be disposed quickly to recover value otherwise some financial value would be lost hence the asset depreciation cost. A small improvement in one component of this equation, the processing would make larger changes in other components, helping to increase the bottom line profit of the company.

Investment in technology, training or software would improve the verification process, which in turn would help reduce costs in the other cost components. Moreover, investments in IT systems, would increase the visibility of the movement of the products so that companies can monitor the faster movement of products thereby reducing the depreciation.

Reverse logistics activities must be allowed to function separately as a separate entity. If the reverse and forward distribution activities are combined, it may lead to several confusions and problems. Firms may concentrate fully on forward distribution activity and concentrate on production of new product as it generates more revenue. Some firms deal with returns as quickly as possible in case of electronic and computer equipment, as the technology becomes out-of-date as new technology emerges. Some of the companies have collection centers and encourage customers to return their product after end-of-use or end-of-life and reward the customer. They do it so that their technology or the secret of their brand is not let out to other competitors, thereby maintaining a strong brand image.

9. Conclusion

This paper presents a basic outline of reverse logistics topics to enable new researchers understand the meaning of reverse logistics, the processes and the activities involved in the reverse logistics. Reverse logistics activities must function separately for faster value capture of the products. Once the products are returned, appropriate decision of reprocessing or disposal must be taken immediately to increase the bottom line profit of the company. Companies have started using third-party service providers for reverse logistics activities and there is a major development in the IT technologies to keep track of the faster movement of products to regain value. Researchers can research on the latest extended producer responsibility practices and the way it helps to conserve environmental resources.

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