

Reverse Logistics Practices Cases Analysis using Text Analytics.

Dr. K. Sri Yogi⁵, Sindhu Abbidi¹, Vishweshwar Gupta Komaravelli
Ashfaq Ali Baig² and Rasuri Pranav⁴

KLH Global Business School

Koneru Lakshmaiah Education Foundation, (Deemed to be University)

Hyderabad Campus, Telangana State- India

dr.sriyogi@outlook.com, sindhuabbidi.0108@gmail.com
vishweshwargupta@gmail.com, ashfaqbaig1667@gmail.com
rasuripranav@gmail.com

Abstract

This paper enquiry into Reverse logistics process and some of the best practices identified and corroborated. This study also made an attempt to incorporate the best practices using some successful factors from the existing literature. Some of the cases identified are: Amazon, DHL, Dell, Apple Inc. The observations from the cases are the process of reverse logistics and the strategic component each company has adopted to have a significant impact. Some of the key factors to be considered for best practices in reverse logistics practices are: Collecting, Screening, Refurbish or resale. Using text analytics-Bigram : generic configuration, late postponement, life cycle asset recovery modular design, turnaround time, cosmetic repair, individual repair system reuse, reverse logistics, centralized return, free return logistics hub as weighting scheme factors for four cases considered in the study are identified.

Keywords

Reverse Logistics, Case studies, Best practices, Text analytics

1. Introduction

Manufacturing can be considered one of the major sectors of businesses. Firms often look for opportunities and defects in the system so they can overcome them. Logistics is the key of manufacturing as it ensures optimal use of resources. Reverse logistics is a small part of logistics. We can define reverse logistics as “*The process of planning, implementing and controlling flow of raw materials, from the consumers to the point of origin*”. In other words, Reverse logistics is the process of flow of materials from users to the re-users. This paper contains the basic concepts of reverse logistics. It also covers the reverse logistics activities and how it affects the internal management.

The globalization and automation of operations and supply chain has resulted in mass production and mass supply to consumers. Hence the rise in reverse logistics is evident, this also leads to an amount of industrial waste. Objectives of this study are: To identify best practices in reverse logistics in Indian context, identifying the key factors to be considered in best practices implementation of reverse logistics.

Definitions of Reverse Logistics:

DHL, a renowned third party logistics company uses the following definition for reverse logistics Hans-Christian Pfohl, (2004) “*Reverse logistics can be defined as the application of logistics concepts to residues in order to create an economically and environmentally efficient residue stream by using all activities of spatiotemporal transformation, including changes in amounts and types.*”

Dale S. Rogers and Ronald S. Tibben-Lemke(1998) use the definition for 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 consumption to the point of origin for the purpose of recapturing value or proper disposal.”

James R. Stock (1998) defines reverse logistics as, *“the term most often used to refer to the role of logistics in product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, and refurbishing, repair and remanufacturing.”*

The European Working Group on Reverse Logistics, REVLOG (1998), defines reverse logistics as, *“the process of planning, implementing and controlling backward flows of raw materials, in process inventory, packaging and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal.”*

Ronald (1993), gives the definition of reverse logistics based upon the direction of flow as *“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.”*

Pohlen and Farris (1992) define Reverse Logistics in their article “Reverse Logistics in Plastics Recycling” as *“the movement of goods from a consumer towards a producer in a channel of distribution.”*

Reverse logistics is completely focused on the research area, where they get back to the products where the consumers are no longer interested. Reverse Logistics is the procedure where the products which get delivered to the demanded customer, if that particular product is a wrong product or maybe a defective one and sometimes it could be damaged. In these cases reverse logistics comes in. The way of managing the products which can be no longer used or no longer wanted by the customer because of the dissatisfaction caused by the product to the end user. In addition, most of the organizations are considering this Reverse Logistics as an important procedure which involves in the decision making process and development of the organization’s supply chain. Reverse logistics can be seen in sectors like purchasing of raw materials and also the leasing equipment and machinery. Reverse logistics is the process of supply chain procedure of returning the end products or raw materials to the manufacturer or the seller. There are numerous reasons for this reverse logistics system to come in.

Process of Reverse logistics:

Collection: Retrieving the items from the end-user by store drop offs or parcel pickup’s.

Sorting: The products are thoroughly inspected, the quality and condition of the product is assessed to understand the type of recovery required. The products are sorted based on the type of recovery i.e. if the product is as good as new then it is sent back to the inventory, but if the product has any damage then it needs to be sent for recovery

Recovery: The damaged products are dismantled and analyzed. The unnecessary items are scrapped out and the useful items are recycled and refurbished.

Redistribution: After several layers of mending and screening the goods are sent for resale at the same or lower price.

Best practices of Reverse logistics in Indian Context:

India is one of the fastest growing economies, and as such, Reverse Logistics processes are gaining attention from companies all over the world. The top Reverse Logistics processes in India include:

Supply Chain Strategy: This involves implementing an effective supply chain strategy to ensure that products are efficiently delivered and returned.

Automation: Automation of processes is a key element for reducing costs involved in returns and recapturing revenue lost.

IT Infrastructure: A strong IT infrastructure is important for efficient tracking of products and their movement throughout the reverse logistics process.

Gamification: Companies are using gamification to incentivize customers to return products, which in turn helps reduce the number of returns and improve customer loyalty.

Customer Support: Providing timely customer support helps build trust and encourage customers to opt for Reverse Logistics processes.

In India, software solutions for reverse logistics processes include:

1. ORO Logistics: This is a cloud-based SaaS platform that helps with reverse logistics operations such as returns management, order tracking and supply chain visibility.
2. Ginesys: This is an inventory management solution that helps companies optimize the reverse logistics process by providing real-time insights into shipment tracking and product returns.
3. Cloud Cherry: This AI-driven customer experience management tool helps organizations to provide personalized assistance to customers during the reverse logistics process.
4. Bright pearl: This is an omnichannel retail platform that supports businesses for managing their back-end reverse logistics processes like returns processing, refunds, and inventory optimization.

1.1 Objectives

Within their limited reach, researchers could not find any single study dealing with different issues of reverse logistics in one place and that too, in the context of pharmaceutical supply chains operating in India. This scenario indicates a scope to study the subject further. Hence, the researcher has framed the following objectives for this study to understand the context of practices in the four cases considered from the literature, to find common factors as a weighted scheme from original text of four cases using Bigram.

2. Literature Review

Internationally available and refereed scholarly journals and publications were used as the sources for this literature review. The search for contemporary journal publications was carried out on Scopus, Google Scholar, Emerald Insight and refereed international conference publications. The keywords used in the search were reverse logistics, case studies, supply chain, closed loop supply chain.

Author (s)/ Year	Findings / Significant Contributions
Avinash Kumar Pathak et al., (2020)	Downsize the proportion of returns by optimizing our forward deliveries, it will also help in improving our reverse logistics since it will reduce the number of pick-ups and thus, improve the efficiency
Janusz Grabara et al., (2019)	Reduce the generation of debris, and the level of use of non-renewable raw materials, by using the so called. "Clean technologies" and integrated supply chain
Chiranjib Biswas and Walid Abdul-Kader (2018)	with the right attitude of the management towards return and implementation of IoT in the process, including development and integration of the right stochastic model with ERM for predicting the near perfect return ratio
S. Senthil, (2018)	User friendly and smart decision support system may also be developed
Prashant K. Giri et al., (2018)	Reverse logistics should no longer be seen simply as a cost center for retailers
Pan et al., 2015; Chen et al., (2017)	Crowd sourcing solution to collect city-wide e-commerce reverse flows
Chen, C., et al., (2017)	Using taxis to collect citywide e-commerce reverse flows: a crowd sourcing solution. International Journal Production Research, 55(7),pp. 1833 – 1844
Ahmed Alshamsi, Ali Diabat (2015)	RL process encompasses the compilation, examination, recycling, renovating, and remanufacturing of used items, involving leased or owned tools and machines.
Güldem Elmas, Fevzi Erdoğan (2011)	Reverse logistics will be one way to reduce costs, increase revenues and customer service levels and help to obtain market advantage
Ramanathan (2011)	Handling of product returns plays an important role in shaping customer loyalty for both low-risk products and high-risk products but not for products that exhibit medium level of risk
ShaligramPokharel (2009)	Growing recognition of RL as a driver of supply chain and logistics
Guide and Van Wassenhove (2009)	Emphasized that the volume and quality of returns are the major drivers of RL functions
Xiaoming Li and Festus Olorunniwo (2008)	In order for the customers to be fully satisfied with the returns outcome, the process has to be robust and customer-focused
Guide et al. (2006)	Companies facing large returns and high recoverable product value should adopt a responsive reverse network
Blackburn et al (2004)	Broadly two categories of product returns: returns with high marginal value of time (MVT) and the returns with low MVT
Savaskan et al (2004)	Retailer happens to be the most effective agent for collection of returned products

Mukhopadhyay & Setoputro (2004)	A generous return policy would increase revenue but at the same time would increase cost due to increased likelihood of returns
Rogers & Tibben-Lembke (2001)	Indicated in their findings that the competitive pressure is the dominant reason for most of the firms in taking back the returned goods
Guide et al. (2000)	Uncertainty in product returns, imbalances in return and demand rates and the unknown condition of returned products make the production planning and control of remanufacturing extremely complicated

3. Methods

The case study is the most flexible of all research designs, allowing the researcher to retain the holistic characteristics of real-life events while investigating empirical events. In general, a case study is an empirical inquiry which investigates a contemporary phenomenon within its real-life context: when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used. (Yin 1984: 23) We have used qualitative. Multiple cases are used in this paper as “replication logic” is supposed to reveal support for theoretically. Number of case replications depends upon the certainty wanted to achieve & richness of the underlying theoretical propositions. For this research units of analysis is embedded design which include multiple units of analysis; study may include main & smaller units on different levels looking for consistent patterns of evidence across units, but within a case. In this work few case studies considered have embedded design.

Sample: Our main objective of this research is to understand Reverse Logistics and its practices. Focused on examples those are widely accepted in industry on social, environmental and economic issues in Reverse Logistics. Data was collected from various secondary resources. The five firms covered for case study analysis are : Amazon, DHL, Dell, Apple Inc. Reasons why these cases were attractive to be included : Majority of firms are known for its significance practices of Reverse Logistics, Cases considered under this study covered the process of Reverse Logistics i.e., Collecting, Sorting, Recovery, Re-distribution.

4. Case Studies

Case on Amazon

From robots to in-person returns, Amazon is redefining the returns process. Returns create billions of pounds of waste in entire walls of shame In warehouses around the world. Amazon is trying to change all of that where Amazon Absolutely leads in trying to be the easiest, lowest Friction return experience for the customer. Amazon CEO Jeff Bezos says 30% of all purchases are returned. Forrester research shows that e-commerce will see \$207 billion returns in the year 2020. More than \$100 billion in returns happen in North America which contributes to huge costs for manufacturers and retailers. 79% of consumers want free return shipping and 67% check the returns page before making an online purchase. Amazon gives 30 days after the customer receives the product, and Amazon wants to know why the product has been returned. 34% say that there is a size, fit or color issue, 21% say the item was damaged, broken or no longer functional. Amazon has brought Kiva robots as a solution to this problem, Kiva robots filter the label of each product and take it back to its place. This reduces all the unnecessary wastes and leads to less unsold goods which is an agitation. In response to this Amazon launched a programme Fulfillment by Amazon (FBA) donations, and Amazon warehouse which donates and sells products at a lower cost. Online retailer Amazon has pledged to become carbon neutral by 2040 for which they started using recyclable materials for packing their products.

Case of DHL

DHL provides full traceability of materials along the supply chain for industrial and commercial orders for the customer. 30% of staff are contracted on a temporary basis so the company can respond quickly to abrupt variations in demand. During peak periods, such as product launches, DHL also puts into action a second shift on demand to meet customer demand. DHL has opened a new repair centre at its distribution centre in Wrexham, which aims to improve the customer's return and repair logistics. The company has built an integrated screening, testing, flashing and cosmetic refurbishment operation at the site. DHL has taken full ownership of the end-to-end repair process for all products returned or damaged at the depot. DHL has opened a new warehouse in Belfast, which can test and refurbish up to 37,000 units of reverse logistics equipment per month. DHL's first order of business was to provide a

full evaluation of an existing customer's equipment. Customer can now test and refurbish a total of 98,000 units a month at the customer's site near Lisbon. This allows for a faster resolution of equipment defects and reduced inventory at low repair cost. Units that previously had a turnaround time of a month and a half are now available within three to five days.

Case on Dell

Dell is one of the market leaders in the computer industry. Dell achieved its status through its unique built-to-order program. This program offers virtually unlimited product configurations to the customers at competitive prices. Dell's modular design enables it to produce a wide variety of products. Dell customers can place their orders in three ways: mail, online, or through a sales team. Sales team negotiates the orders and offers promotions to offset any delay arising due to scheduling or shortage of certain components. Instead of keeping its own inventory, vendor-managed inventory is kept at locations closer to the Dell facilities. Dell keeps reserved space in planes across the world so that any part can be flown to its destination. In 2006, it revealed its plan to triple its product recovery by 2009. It has to deal with three types of returned products: new products, used products for donation, resale, or reuse and disposed of. Dell has one of the best recycling rates in industry.

The company maintains logistic hubs close to their regional plants in order to decentralize the reverse logistics activities. Some of these activities have been outsourced, for instance, to Genco Supply Chain Solutions. Dell's return policy requires customers to return unwanted computers through a 3PL within 21 days of purchase. Returned computers are entered into Dell's inventory and shipped to a logistic hub. For business customers, Dell provides an asset recovery program. Asset recovery teams visit customer sites and haul away the computers as part of the business contract. Dell's late manufacturing and minimal inventories are the source of efficiency of its reverse logistics scheme. Spare parts inventory is used in case of service calls when they can be used for replacement of components of computers acquired for resale. If the computers are sent for donations, they are checked and refurbished if necessary, and then they are sent to the National Cristina Foundation.

Case on Apple Inc

Apple manufactures and sells a variety of electronics computers (Mac), phones (iphones), iPods, storage devices, speakers, headphones etc. Apple sold more than 45 million units of iPod according to their annual sales report in 2007. It opened its first official Apple retail store in Virginia and California. Customers do not have to pay for shipping and handling and are able to pick up their products at the service centers instead of having them shipped thousands of miles away. Apple has added an online return system, in which a customer fills out a return form and once the application is completed successfully Apple sends a packaging box for the customer to ship back to them. This can be for either trade-in or whatever the case may be. If a customer goes to an Apple retail shop and asks for a take back or replace, the product is checked and if it is still under warranty or has a defect it is taken and shipped to the testing and disassembling center for testing, remanufacturing, recycling or disposal.

The customer does not have to pay for shipment. Apple has been working on ways to minimize the impact their products have on the environment. In 2010 Apple introduced the Apple Battery charger for recharging batteries, instead of the disposal of alkaline batteries and this reduces waste by 78%. (Apple Inc, 2012). Their first policy was developed in 1990 and they have been designing new means of energy efficiency, reducing environmental impact via digital consumption. Apple is devoted to protecting and shielding the environment, health and safety of employees, customers; in fact the whole planet from environmental hazards. The enterprise has since eliminated the toxins from their products becoming the first laptop manufacturer to do so. Because of the issues about landfill sites Apple has devised a means to meet the energy requirements of their landfill site in Carolina using renewable resources. Apple Inc has a life cycle assessment process that evaluates the effect a product has on the environment throughout its life cycle. A previous challenge that Apple had was the consumer mindset about environmental issues but the public have a better opinion about Apple products in recent years because of how Apple has tackled and improved the environmental issues they had.

5. Discussion

The businesses are focusing on effective strategies to reduce the expenses of reverse logistics and gain some benefit from it. The returns procedure is being redefined by Amazon. billions of pounds of garbage produced by returns fill huge walls of shame at storage facilities all throughout the world. As a remedy to this issue, Amazon has introduced Kiva robots. These robots filter each product's label and return it to its proper location. At the location, DHL has established an integrated operation for screening, testing, flashing, and cosmetic renovation. All products returned to or damaged at the depot will henceforth be repaired entirely by DHL.

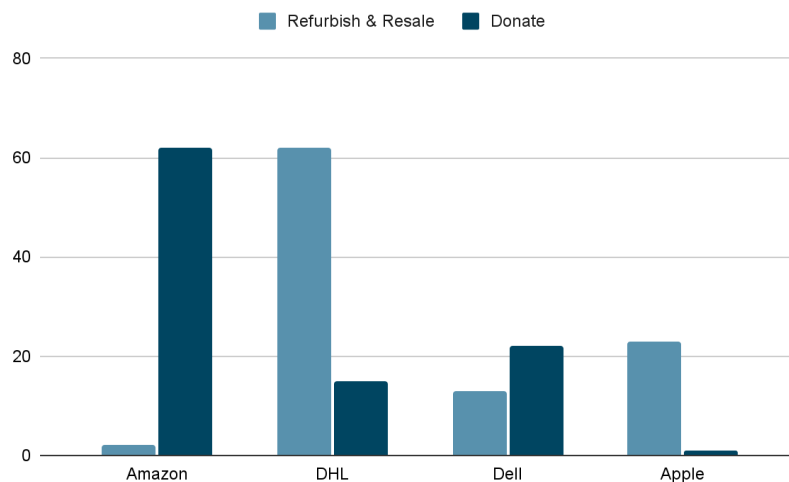
Dell's reverse logistics strategy benefits from its late manufacturing and low inventories. When replacement parts for computers purchased for resale are required for service calls, spare parts inventory is utilized. The life cycle assessment procedure used by Apple Inc. assesses the impact a product has on the environment throughout the course of its life.

Table 1. Process of Reverse logistics being practiced by Firms in case sample:

	Collecting	Sorting	Recovery	Re-distribution
High	Amazon & DHL	Amazon & Dell	Dell	Apple & Dell
Medium	Dell	-	Apple	Amazon
Low	Apple		-	DHL

When compared to Dell and Apple, who often accept returns in-store, Amazon and DHL are better at collecting returns. The highest Sorting range of returned goods is between Amazon and Dell. Due to their recovery and reuse of the repaired items, Apple and Dell are knocked out of the top two spots. Redistributing from Apple and Dell is relatively low at Amazon and Dell.

Figure 1 shows the Comparison of the refurbish & resale and donations made by companies discussed above



The Figure1. shows the percentages of donations, refurbishing, and resale made by Amazon, DHL, Dell, and Apple.

DHL has created an integrated screening, testing, flashing, and aesthetic refurbishing operation at the site itself, giving it the most refurbishments and resales. As it takes returns covered by the guarantee and refurbishes them, Apple comes in second for refurbishment. Dell repairs its products and keeps the functional components as spares. With the establishment of the Fulfillment by Amazon (FBA) contributions programme and an Amazon warehouse that distributes its returned goods, Amazon is one of the top companies for charitable giving.

Table 2. A Bigram

Bigram United	n	Coll. ratio
generic configuration	2	412
Late postponement	2	412
Life cycle	2	412
sc digest	2	412
set_top	2	412
top_boxes	2	412
asset recovery	2	274.67
flexible labour	2	274.67
modular design	2	274.67
supply chain	4	206
turnaround time	2	164.8
functional test	2	137.33
sales team	2	137.33
cosmetic repair	3	54.93
individual repair	3	51.5
system_reuse	2	45.78
reverse_logistics	12	42.26
centralized_return	2	41.2
free return	2	41.2
logistics hub	2	30.52

Table 2: Shows a Bigram, A bigram or diagram is a sequence of two adjacent elements from a string of tokens, which are typically letters, syllables, or words. The above bigram has been extracted from the case studies mentioned above by using text segmentation. Bi-gram alphabet was used as a weighting scheme to represent document contents of the four case text from the existing literature

6. Conclusion

Reverse logistics consists of four processes, according to our study: collection, sorting, recovery, and redistribution. To increase the effectiveness of their returns management, the organizations must concentrate on these. The instances involving Amazon and Apple demonstrate how mishandled returns result in unnecessary dumps and environmental risks. For the enterprises, effective collection and processing are essential. For instance, Amazon has made Kiva robots available for effective dump sorting.

Case studies demonstrate that effective returns management also generates goodwill and value. Apple is committed to safeguarding the environment, the health and safety of its employees and customers, as well as the entire world from environmental dangers. Since then, the company has removed the poisons from its products, making it the first laptop maker to do so. Dell stands in the next place for donations, the returned goods are refurbished if necessary and sent for donation. Using text analytics-Bigram : generic configuration, late postponement, life cycle asset recovery

modular design, turnaround time, cosmetic repair, individual repair system reuse, reverse logistics, centralized_return, free return logistics hub as weighting scheme factors for four cases considered in the study are identified.

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