Reverse Supply Chain Management E-Waste Handling System Review

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Abstract:

As per the detailed study, from the last few years the Reverse Logistics is gaining an extremely high importance. Due to the demands for rising environmental awareness as well as economic pressures this type of Electronic Waste Handling system tends to be in ultimate requirement. As a matter of fact, it would be beneficial to the individual companies in terms of increasing the effectiveness and efficiency of their recycling process which creates the optimum supply chains. However, this recycling technique can be applied in various circumstances.

The primary strategies which can be used in such versatile situations are lean, and agile. Ultimately, every electronic industry implementing this recycling system must possess good commercial returns for all the maintenance and repair services they take up. By doing comparative analysis, we have tried to prove the practical importance of RSCM E-Waste Handling System.

Key Words: E-waste , Reverse Supply Chain Management of E-waste handling system

Introduction:

Figure 1: Products Flow in a general Reverse Logistics System

First of all, once the electronic products are delivered to the end customers, it is not the end of the electronic product life. They can be considered as the used products and taken back through the supply chain system. This certainly helps in reusing, recycling, remanufacturing, and repairing in the best possible manner.

However, integrating all these will give rise to the fundamental process of reverse logistics. Most evidently, this process of reverse supply chain Management is clearly depicted in the figure 1. This process is the integration of both service components and environmental components.

In addition, we have made the comparative analysis between forward and reverse logistics. The process of forecasting is difficult in case of reverse logistics. At the end, the quality of the product will not be uniform in reverse logistics. However, the pricing depends on various and tends to be inconsistent factors unlike forward logistics. In reverse logistics, the management of inventory and product life cycle is extremely complicated.

However, establishing such a system requires the huge amount of investment from the electronic industries point of view. On the positive side, it can bring an excellent profits, top-notch corporate image, and better customer satisfaction in order to maintain their long term relationship. In order to take part in solving the increasing environmental concerns, the electronic companies are posed to the responsibility of implementing reverse supply chain management systems.

However, the companies must be ready to face certain number of definite challenges after the installation of reverse logistics system. The conflict can arise between retailer and manufacturer because of the delayed time in returning the processed product returns. It becomes very important to maintain the clean working partnership which will result in mutual benefit.

The chief elements must be understood clearly before setting up the reverse logistics system. The firms must assure the negotiation of the returned product price. Most prominently, one should be well aware about how to financially manage the whole process. Another important fact is, it is not mandatory for the firm to keep all the processes in house. Outsourcing the functions of reverse logistics tends to be beneficiary.

The extended product responsibility abbreviated as EPR must be adapted by the electronic industries. It is helpful for finding new ways to prevent pollution along with the minimization of energy usage.

Consequently, the reverse flow process of the electronic good as shown in the figure 1 must be definitely a part of logistics planning. Altogether, it will make up the complete supply chain management of the organization. The adaptation to this new supply chain helps the companies to achieve reliable competitive advantages. Gradually, the trade-offs between the product quality and cost is brought forward along with the betterment in product price as well as customer service.

Literature Review:

Generally, the electronic goods possess shorter life cycle. As per the statistics, in the United States 325 million personal computers became outdated in the time period between 1985 and 2005. As a matter of fact, the toner cartridges are remanufactured with the help of 12,000 companies holding 42,000 workers and reaching $1 billion sales every year.

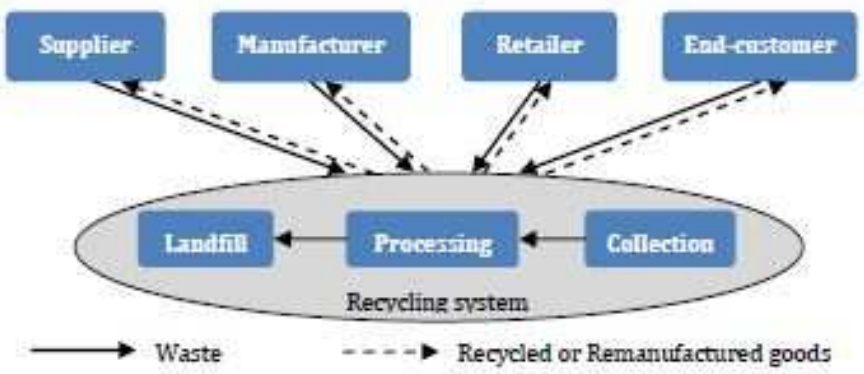

Figure 2: Flow of electronic goods in reverse supply chain logistics system

Since, the field of reverse supply chain management is new in the field of business logistics, the perfect analysis of the efficient implementation must be done in prior by all the electronic industries. As per the figure 2, it can be depicted that the hazardous as well as non hazardous electronic waste is collected from various sources such as main supplier, manufacturer, retailer, and end-customer. Later, these collected wastes are processed and made to undergo necessary treatment. Finally the recycled and reformed products are sent back to respective sources.

The term waste can include used products, obsolete products, excess inventory, production scrap, damaged products, seasonal inventory, packaging materials, and many other types of residues. As a matter of fact, the reverse logistics system connects the end-customers and suppliers through manufacturers and retailers. Moreover, this E-Waste handling system can distribute the products in the reverse direction, unsold goods is returned, returning damaged and wrongly delivered goods, recalling of products, and management of wastes. Most evidently, the process of how the waste goods are treated in the reverse logistics systems is represented in the standard hierarchy diagram as shown in the figure 3.

Figure 3: Hierarchy of the activities of Reverse Logistics system Treatment

As per the interpretation from the figure 3, the reuse is given the top priority in the reverse supply chain Management system. Consequently, down the hierarchy the process of remanufacturing as well as recycling is followed. Lastly, the wastes are either deposited in the landfills or energy recovery disposals. The hierarchy structure can also be inferred in terms of different characteristics.

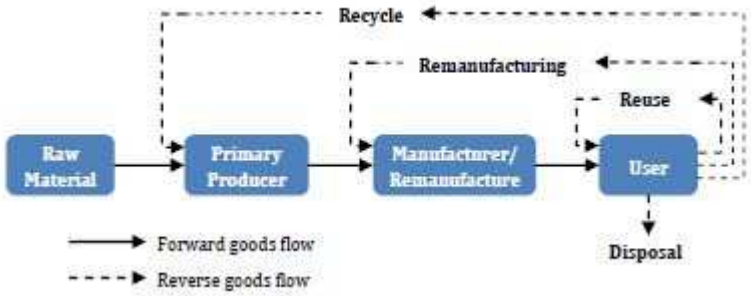

Figure 4: Various activities in the reverse supply chain system

In the first place, the electronic products will be reused by the end customers for exactly the same purpose will certainly improve the efficiency of the recycling system. In the next level, sometimes the products need to be recycled or remanufactured. However, this lowers the quality of the goods as compared to the new goods. Finally, the products can also be disintegrated into its components. After analyzing their working functionalities, the damaged parts are chosen to be safely disposed into the environment. As a result, the activities mentioned in the hierarchy can b interlinked based on the activities which are also represented in the figure 4.

Methodology:

Figure 5a: Reverse Logistics Supply System

As shown in the figure 5a, the customer can return the waste goods which mainly include unwanted wastes, defected pieces, products having warranty problems, recalls, along with the problem of miss-shipments. The most challenging fact while recycling the e-wastes is linked with the regulatory policies. Hence, the firm must focus in effective planning of reverse chain design. The firms must treat the reverse logistics as a value and brandenhancement stream instead of e-waste treatment stream.

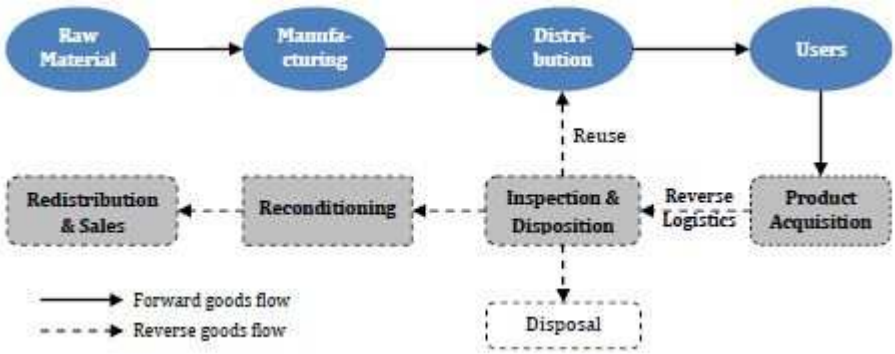

Figure 6b: General process of Reverse Supply Chain Management E-Waste System

Before the installation of this E-Waste handling system, the electronic industries must analyze the appropriate structure. The structure of the system they choose must be cost and value efficient in order to improve the effectiveness of the overall installed system. In order to do these, the companies must analyze their major activities which are of critical importance for the industry. Additionally, you can opt for outsourcing some of the activities so that the company's overall cost efficiency are maximized to the nest possible level. Apart from choosing the appropriate activities, the

companies must also learn about the primary components of the reverse supply chain management system. This will ensure to the better management and control of all the stages of waste handling process. However, on the general basis, there would be 5 distinctive processes in a reverse supply chain system. These processes are clearly mentioned in the figure 5. In order to enumerate them:

- Product Acquisition
- Reverse Logistics
- Inspection and Deposition
- Reconditioning
- Re-distribution and Sales

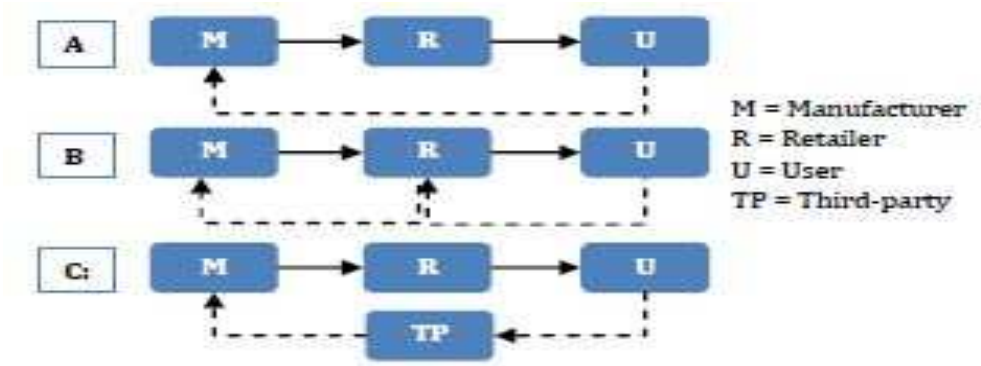

Figure 7: Types of collecting wastes

As a matter of fact, the fixing of reverse E-Waste handling system in the industry does recommend the high amount of investments. To be more precise, each step ranging from the acquisition of waste goods and waste deposition being involved in the reverse logistics system will pose a definite cost. So, the systems are designed in such a way as to minimize the economical requirements as well as increase in the commercial returns of all the goods selected for recycling. In order to achieve this, the process of acquiring the electronic wastes must be strategic and well planned one.

As depicted in the figure 6, there are typically three methods for collecting the electronic wastes. The first method named as A refers to the collection of wastes directly from the users itself. Secondly, the method named as B refers to the collection of wastes from the retailers, and finally the method named as C refers to the collection of wastes from the third party companies. As a concluding point, it would be better to choose the collection method C. This is because remanufacturing would prove beneficiary for the manufacturing companies. Additionally, the third party companies will be in contact with the manufacturers. Hence, the electronic manufacturing industries must strategically choose the E-Waste collection methods in order to improve their revenue generation.

However, the efficient use of inventories is highly recommended in order to make customers purchase more number of new goods. The clean channels and fresh inventories improve the profit margin. Additonally, choose the disposal techniques strategically. This is because the legal disposal issues seems to be highly complicated and it has become difficult to dispose non-salvageable materials.

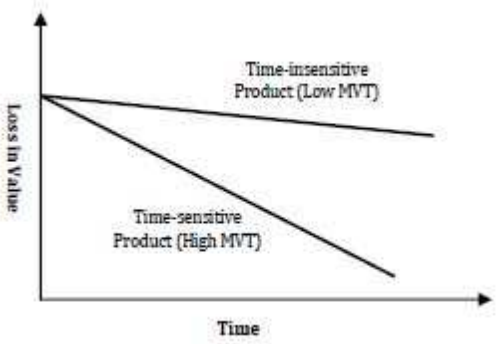

Figure 8: Loss in Value against Time Analysis

In the reverse supply chain E-Waste handling system, the time value handling plays an extremely important role. From the graph in the figure 7, it can be concluded that the cost efficiency is inversely proportional to the response time taken by the waste handling system. In other words, it can explained that the cost effective reverse supply chain system takes more time for process of handling e-waste. The collection of waste goods and re-distributing of the recycled products takes large amount of time in case of cost efficient systems. On the negative side, the delay in processing time will definitely reduce the quality of the goods. So, every time the product must be analyzed for its marginal value of time since it is the significant product configuration concerning the reverse supply chain system. Most evidently, the term marginal value of time can be explained as the loss of value for every unit time spent during the E-Waste handling in the reverse supply process system. Ultimately, it can be used to determine the costs of time delays. As a whole, the figure 7 depicts that the products from various industries and categories have different marginal value time.

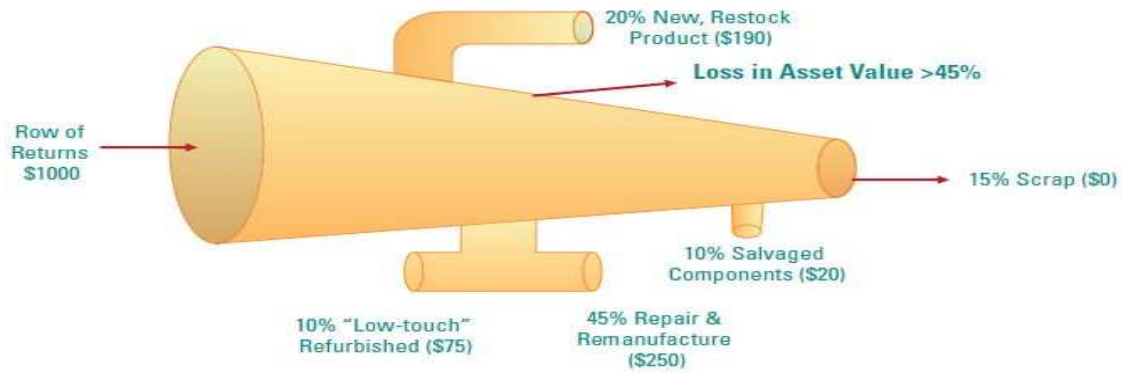

Figure 9: Diagrammatic Representation of Product Returns as Shrinking Pipeline

In the figure 8, depicts the way in which the products lose the time value in the reverse supply chain management system. On the other hand, this type of loss is dependable on the product category. For example, the products such as laptops and Personal Computers have greater time value depreciation when compared to the products such as machine tools.

Figure 10: Efficient Reverse Supply Chain Management System with the centralized theme

As a matter of fact, the reverse supply chain system can be regarded as efficient when it completely focuses on lower cost in the overall processing technology of the electronic product returns. In this type of design, the cost efficiency is maintained in the higher position where as the speed of the process has gone down. Hence, there is a trade-off exists between the speed and cost efficiency. Most prominently, this type of process treatment can be applied only for those products which has shorter value depreciation or time depreciation.

When the stages of testing and evaluation are centralized as depicted in the figure 9, the cost efficiency in the reverse supply chain system can be achieved. Ultimately, the product returns are tested and evaluated at the central facility being designed and then the credit is issued. However, the resellers or retailers do not take part in the activity of product evaluation at any cost. As a result, the shipping costs can also be reduced by shipping he processed products to the manufacturers in bulk. Once the product passes through the testing phase, it is strategically disposed in the relevant category such as scrapping, restocking, salvaging, or refurbishing. This centralized system certainly minimizes the processing costs to the great extent. On the negative side, the figure 9 proves that there is a considerable delay in differentiating the products since all the product returns are shipped to the center facility. Hence, this is referred to as the system design involving postponement strategy.

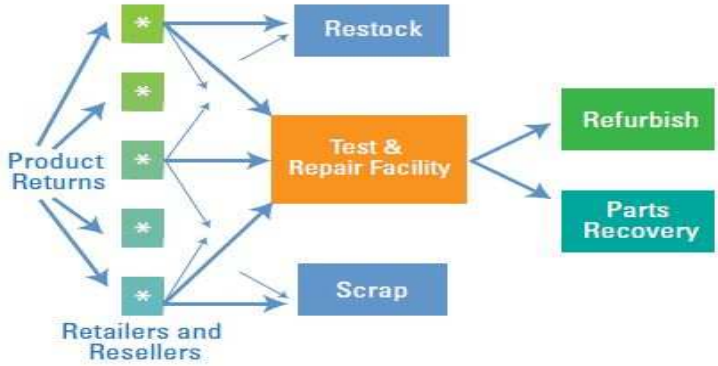

Figure 11: Decentralized based Reverse Supply Chain Management Process

In the previous figure, centralized system used the concept of postponement strategy. As depicted in the figure 10, the decentralized system makes use of preponement strategy. When personal computers are taken into consideration, they tend to have higher asset value over time. For such products, t better to prepone the testing phase and evaluation phase. Most importantly, this methodology ensures the unused product returns are immediately restocked which was not possible in the case of centralized system. The testing phase is actually conducted at the point of return by the retailers or resellers. As a whole, it must be technically feasible and might demand expertise development from among the retailers as well as resellers. It would become important to incentivize the resellers through the shared saving contracts with the manufacturers. Additionally, the establishment of inventory process managed by vendor is highly recommended in order to deal with large retailers. It would also be better if they maintain their own technicians for testing the product returns.

Conclusion:

After the detailed analysis of the reverse supply chain management Electronic Waste Handling System, it is understood that one must choose the proper strategies and the characteristics of the product returns since it plays a very important role in installation of relevant reverse logistics by the companies. The companies are recommended to predict the market demand, life cycle of the product, and lead time replenishment. The companies must handle the processing strategies in accordance with the circumstances such as predictable product demand, product demand is unpredictable and lead time is short, or when the lead time is long along with the unpredictable product demand. Ultimately, the implementation of RSCM is extremely important.

The concept of reverse logistics must be strategically used in order to meet the market's competition. From the last few years, the return policies are made liberal. However, there is also a misconception that buying back the used and unwanted products do not meet the needs which must be removed completely. Ultimately, the reverse logistics is recommended to be installed by the companies. This will ensure the product brand enhancement and also serves as the marketing incentive.

If the reverse supply logistics system is installed by the firms, the value of the products essentially increases and ensures the provision of quality products by satisfying the end-consumers. With such an environment friendly implementation, the landfills can also be reduced to the significant level. Additonally, the recycled materials can be circulated for the efficient resource usage which ultimately reduces the usage of raw materials. As a result, the environmental hazards can be controlled by converting the hazardous products into green product.

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Four jail inmates enter Limca Book of Records for making app: Four jail inmates of Haryana's Bhondsi Jail have entered the Limca Book of Records for making an app called 'Phoenix'. Installed at 11 Haryana prisons, the app helps in managing prison canteens and case history of prisoners. To make the app, prisoners were for the first time, sent to other jails within the state for "work purposes."