

Reducing E-Waste of Consumer Electronics Through Reverse Logistics

Lori Molinari

Abstract

With the increasing innovation of new electronic devices continually entering the marketplace, manufacturers and retailers are seeking partnerships with third party logistics (3PL) providers that can decrease e-waste through reverse logistics for end-of-life devices. With the general public's sentiment to preserve the environment for future generations, manufacturers and retailers as well as their supply chain partners have a commitment to reducing negative impact on the environment. This paper specifically focuses on how partnership with a 3PL (Third Party Logistics) provider can decrease e-waste through reverse logistics for consumer electronics manufacturers (OEM – original equipment manufacturer, ODM – original device manufacturer) and retailers.

1. Introduction

Reducing electronic waste (also termed e-waste) through eCycling, has been a priority for consumers and lawmakers [1]. Americans own approximately 24 electronic products per household (with the advent of Smartphones, PDA's and GPS units), according to the Consumer Electronics Association (CEA) [2]. While this trend in consumer purchasing has created opportunities for manufacturers and retailers, it has also come with consequences. In 2007, only 414,000 tons of consumer e-waste (cell phones, televisions, computers and accessories) out of 2.25 million tons (18%) were recycled according to the U.S. Environmental Protection Agency. The remaining e-waste was disposed of in landfills [1].

Currently, there is no federal legislation in the U.S. mandating eCycling of e-waste, but many states and municipalities have issued extensive regulations at the local level. The European Union (EU) has been more aggressive in controlling e-waste and continues to increase these initiatives [1].

These actions by the US and EU reflect the general public's sentiment, which is to preserve the environment for future generations (sustainability). Companies that do business

with the manufacturers and retailers are also affected by this sentiment and therefore have a commitment to reducing negative impact on the environment [1].

This paper specifically focuses on how partnership with a 3PL (Third Party Logistics) provider can decrease e-waste through reverse logistics for consumer electronics manufacturers (OEM – original equipment manufacturer, ODM – original device manufacturer) and retailers.

“Companies that combine the ‘reduce, reuse, recycle’ mantra with the supply chain wisdom of managing costs and stamping out inefficiencies are developing reverse supply chains that help the Earth, the customer, and the bottom line [14].”

This paper first discusses why manufacturers partner with 3PL's, then discusses repair and refurbishment, then recycling, followed by discussion and conclusions and then provides recommendations.

2. Why manufacturers partner with 3pl's

Electronics manufacturers want to focus on their core competencies, which are R&D, customer retention and expanding market share. Manufacturers often do not wish to invest time and resources to manage the complexities of waste reduction. Instead, manufacturers will partner with a comprehensive third-party logistics (3PL) provider to establish effective reverse logistics operations. The comprehensive 3PL has expertise in identifying viable markets for devices as well as components and preventing items from reaching landfills. Moreover, a 3PL has the capacity to manage high volumes that could possibly be overwhelming for manufacturers [1].

The 3PL can help a manufacturer to avoid fixed costs in a supply chain operation. These include technology systems, facilities and personnel as well as overhead [1]. Where manufacturers mainly have fixed costs in labor, such as full time employees and additional costs such as benefits, a 3PL can leverage a workforce that is more flexible. A 3PL can quickly ramp

up for a new project by either acquiring new contract employees and training them, or moving current employees from a slowing project to a new project. Additionally, with this flexible workforce, there are opportunities to increase the diversity in the workforce, as well as partner with vendors to increase diversity spend. Diversity spend is growing in importance for many large manufacturers today as they develop their diversity spend objectives and seek diversity partners to achieve their goals.

Returns management has been a struggle for many retailers [5], OEM's and ODM's. On a continuum, returns range from being overly complex processes to being a very simple solution of leaving returned products in a corner of a warehouse to gather dust [5].

Managing returns can be a catch 22 for supply chain managers. Retailers must satisfy their customers to establish loyalty even if that means accepting product returns that exceed the manufacturer warranty period. Also, manufacturers must satisfy the retailers to maintain and improve their accessibility to the market. The entire process revolves around the issue of cost, where ultimately someone must bear the cost [5].

Manufacturers and distributors must be poised in flexibility and adaptability to successfully compete in the continuously rapidly changing environment. These organizations may partner with a vendor that can remanufacture or refurbish products and parts, and convert damaged inventory into salable goods to recapture value that would otherwise be lost. Supply chain executives and managers need to understand that outsourcing the reverse logistics process is different from outsourcing the data [8].

By outsourcing returns, the company needs to leverage the intelligence that can be collected and organized by automating the processes. Companies can lose the critical competitive advantage that comes from data that can help detect or prevent quality and design issues or provide better understanding of customer buying behaviors, if the company is not involved in gathering, collecting and organizing the data [8].

Extending products to secondary markets to extend end of life also comes into play [8]. A professional vendor specializing in reverse logistics continuously looks to improve the processes for the manufacturer to decrease costs and improve efficiencies and to maintain and grow the valuable relationship.

The literature suggests that until a single department or individual (senior director or higher) owns the entire costs and inefficiencies of poor reverse logistics, no executive emerges as the champion to assemble the resources needed to address problems and take advantage of opportunities [8].

Selection of third-party options are often guided by a firm's strategic performance requirements. Businesses view third-party sources as a logical choice for handling reverse logistics activities with their need to focus on their core competencies [9]. For example, companies like AT&T and Verizon want to focus on getting people and companies to sign service contracts, instead of focusing on returns and order fulfillment of devices. While these companies also make a commitment to keeping e-waste from entering landfills, they will often utilize a third-party to handle asset recovery and disposition as well as recycling and auctions. Keeping batteries, precious metals and plastics out of landfills and converting these once used parts into refurbished products, warranty replacements or recyclables keeps the cost of replacement with new products low and helps environmental sustainability and green market reputation. Third-parties with reverse logistics as a core competency have efficiencies of operation and are able to combine volumes from multiple companies to establish economies of scale by performing these operations for many companies simultaneously [9].

3. Reverse logistics

Reverse logistics is a crucial and growing part of the supply chain process [6]. Reverse logistics has been defined as the process by which companies become more environmentally efficient through recycling, reusing and reducing the amount of materials

used. Government legislation is often a driver. At least 19 states have passed laws requiring manufacturers of consumer electronics products to pay to dispose of those products. The EU has enacted similar legislation. There can be significant economic value in a product when a customer is finished using it. Also, having a “green” company image can increase product sales, and customers are beginning to expect businesses to provide a greener solution to waste [4].

Reverse logistics has also been defined as the return/exchange, repair, refurbishment, remarketing and disposition of products. Reverse logistics has become an important way for companies to improve visibility and lower costs across the supply chain [8]. The reverse logistics process starts with the point of consumption and ends at the point of origin, with the purpose of recapturing value or ensuring proper disposal [5].

Effective returns management is about effectively managing the 5Rs of returns: retail management, relationship management, returns management, repair management and recovery management [5].

The warehousing and fulfillment activities of managing returns are often the most visible part of a company’s returns process. Having a dedicated returns facility or outsourcing returns management sharpens the focus around core activities associated with returns management. There is more value in products that have been repaired or refurbished as compared to those that are sold as scrap or salvage. There is also a market for harvesting product components and selling them as spares [5].

Disposition refers to the activities that place product back into inventory or temporary storage, repackaging, repair, refurbishing or remanufacturing [9].

In an empirical examination of product returns processing in the manufacturing, wholesale/distributor and retailing sectors, products that went through the return process were generally dispositioned in the following manners:

1. Returned directly to inventory (88.3%) recovery rate high

2. Repackaged and returned to inventory (61.4%) recovery rate high
3. Repaired or refurbished (4.1%) recovery rate high
4. Destroyed and sold as scrap (81.8%) recovery rate low
5. Turned over to a third-party/secondary market (19.0%) recovery rate medium
6. Donated to charity (37.2%) recovery rate low-medium
7. Other (19.9%) recovery rate low

The above figures refer to the percentage of companies in the study responding that they utilize the named method of disposition [9].

Progressive companies are taking a more aggressive approach to managing returns, focusing on getting products back into the existing sales channels faster through multiple channel options. For example the product could be:

1. Sold as new in an existing channel
2. Sold at a discount in own shop or through another outlet
3. Repaired and sold as a graded product
4. Returned to the supplier for credit
5. Sold on the secondary market
6. Sold on the online marketplaces such as eBay and Amazon
7. Refurbished, inspected, tested, recycled, repackaged, re-warranty
8. Stripped for spare parts [5].

The returns market is still developing, and there is real strategic value in reverse logistics management in terms of the following:

1. Reducing the costs of returns
2. Increasing the value of salvage – disposition route and forward sale
3. Data capture supporting reliability, maintainability and dependability of products
4. Reducing transportation and warehousing costs
5. Full control and visibility of the returns process
6. Reducing landfill waste [5].

Retailers and manufacturers mainly focus on customer service, gross margin, administrative accuracy, product viability and environmental sustainability. With the increasing cost of sending waste to landfills,

reverse logistics is a high priority for the retail agenda [5]. This means that reverse logistics activities will continue to increase in the future as a priority for other entities as well. The opportunity for logistics companies and 3PLs is endless for this emerging market where their capabilities will be a sought after as an asset to manufacturers, OEM's, ODM's and retailers. Partnering with a third-party can create a supply chain value proposition that increases effectiveness, efficiency, green image and diversity spend.

There are additional benefits to reverse logistics. Many manufacturers want to protect their proprietary and intellectual property knowledge from falling into competitor's hands [4], and manufacturers also have a commitment to making sure that customer private information is erased (or flashed) from returned devices that may be re-distributed to other end users after repair or refurbishment. Improper flashing of customer private information can result in manufacturer embarrassment or possible litigation.

Manufacturer's distribution systems are typically designed for efficient forward flow from the warehouse to the customer, however the reverse flow can be costly and inefficient, cutting into profits and causing headaches for the producer [4].

Reverse logistics must perform three main functions: collecting the returned product, sorting and testing the condition of the product, and reprocessing the product. Sorting and testing are necessary to determine the condition of the product. Some products may be worthless and some may be in nearly perfect condition for refurbishment [4].

The manufacturer must decide which investments need to be made, and then partner with a 3PL to determine what products are viable for repair and refurbishment, or component harvesting. The goal of the operation for the manufacturer may be to break even or produce revenue. The 3PL would apply the appropriate solution based on the manufacturer's strategy. A partnership between a manufacturer and a 3PL would involve start-up costs, transition to break-even and ultimately possible profitability [1].

Returns management or reverse logistics has historically been a fly in the ointment for major logistics companies claiming to offer genuine end-to-end supply chain management. While there are a small number of companies that specialize in returns management, the development of integrated systems and processes for efficient handling of returned products has been at the bottom of most major players' agendas [5].

Outcomes for returned products can be as follows, which is a descending list of most common to least common practices:

1. Reselling through primary stores or sales channels (50+%)
2. Discounting for sale through secondary channel or outlet stores (almost 20%)
3. Returning to vendor for credit (approximately 15%)
4. Reselling through primary stores or sales channels with significant reconditioning and packaging (slightly less than 10%)
5. Destruction (slightly less than 10%)
6. Donating to charity or nonprofits (less than 5%)
7. Disassembling and selling as component parts or scrap (less than 1%) [6].

There is a rising global interest in reverse logistics. Companies have the opportunity to increase their profit margins and minimize losses through efficiently handling returns. Many companies are discovering that they can maximize secondary market opportunities like eBay, Craig's List and factory outlet malls to recoup some losses in their returns [7]. Returns provide a revenue generating opportunity to recapture value. Effectiveness comes by returns working in conjunction with the forward flow. Reverse logistics can also be a part of an overall green initiative, reducing the overall footprint by reducing the number of shipments items make across their lifetime as returns [8].

The following section specifically focuses on a more detailed discussion of repair and refurbishment, which are part of reverse logistics.

3.1 Repair and refurbishment

Repair and refurbishment operations are inherently green concepts that keep devices in the supply chain, creating revenue through secondary markets or warranty exchanges. The process can be relatively easy and inexpensive. Many devices are returned with little or no defects because of situations like buyer's remorse. For these situations, the devices can be cleaned, polished and then used to fulfill new orders to customers. Other devices must be evaluated to determine if repair is economically feasible. The 3PL conducts "triage" in this situation to determine if repair is cost effective and what work would need to be performed. The unit would then be repaired and tested to meet manufacturer specifications. The device is then released back into the marketplace creating revenue, instead of waste [1].

As discussed in the previous section, cell phones and other equipment require specialized care since they contain personal information. All data is permanently erased from these devices to ensure customer privacy and to protect the manufacturer. The personal information must be properly discarded to prevent identity theft and to avoid customer backlash [1].

Repair and refurbishment also requires the acquisition of spare parts. Planning and forecasting what parts are needed and when is important. There can be a spike in returns that coincide with special promotions and holidays. The parts must be adequately stocked to facilitate the refurbishment process for these time frames or seasonal fluctuations [1].

In refurbishment, profitability is derived from revenue of a returned device that would otherwise have no value. If a manufacturer partners with a 3PL to refurbish a device for \$2 and then sells it for \$10 a profit is made, even if the device was originally worth \$90. Sometimes, a refurbished product can recoup almost all of the original costs depending on the availability of new units and popularity. Refurbishment may not make sense for every product [1].

Products can be used for warranty replacements and/or resold with an indication

that they are not "brand new." Types of products that that can be used in this case are returned electronic components that may have small cosmetic imperfections not impacting usability, or ones having a defective part that can be replaced to working order [9].

Often returned items are not defective but have entered the return stream because of customer inability to operate the device [9]. In the returns industry, this phenomenon is often termed NTF, or no trouble found. Once a device is found to be operationally non-defective, it can then be restored to a like new condition and used again in the forward flow for warranty replacement, saving new devices from being used at a higher cost for fulfillment or replacement.

It is important for a company and its logistics partner(s) to help the customer to understand how to operate the product to reduce returns. This can be accomplished through including welcome letters, how-to guides and easy start up guides to help the customer successfully set up the product for use. Customer care call centers that help customers with technical questions also reduce the volume of returned products due to customer inability to operate the device. This phenomenon is called "returns avoidance" and is addressed specifically in the discussion and conclusions section of this paper.

The following section discusses recycling, which is also a reverse logistics function.

3.2 Recycling

If refurbishment isn't an economical option, the creation of e-waste can still be avoided through recycling. Recycling includes harvesting of parts by disassembling the unit and organizing the material types. Manufacturers and retailers can partner with recyclers who can extract and collect this material in bulk for auction to a variety of buyers. Electronics contain toxic materials, and require special handling of ferrous and heavy metals that can be smelted and reused. Glass, plastics and other materials can be grinded down for other applications [13].

When a consumer upgrades to a new cell phone, what happens to the old one? Decisions about what to do with the old phone can have serious implications. Cell phones contain materials such as copper, plastic, and precious metals. These components need to be recycled to conserve natural resources and to prevent greenhouse gas emissions and pollution. Recycling 1 million cell phones saves enough energy to power more than 19,000 homes for an entire year. However, people are not recycling their consumer electronics. In 2007, only 18% of the 22.5 million tons of discarded consumer electronics including cell phones, TV's and computers in the U.S. were collected for recycling. The remainder of e-waste is being disposed of primarily in landfills [3].

AT&T has a program called "Reuse and Recycle" which allows consumers to donate unwanted wireless phones, PDA's, accessories and certain batteries to be recycled regardless of the wireless provider. Consumers can drop off old cell phones and any AT&T store, or mail them in with postage-paid labels downloadable from AT&T's website [3]. These cell phones can then be recycled, reused, or refurbished. The parts can also be harvested to be re-used in the forward flow. Components like cords, LCD's and batteries can be expensive to replace with new components, and reusing these components can save money in the supply chain and reduce harmful effects on the environment.

AT&T typically would partner with a 3PL which would receive these devices to be properly handled through the necessary asset disposition. A 3PL could also collect glass, plastics and precious metals in bulk to be auctioned to offset processing costs [1].

A 3PL with testing capabilities can extract components such as batteries and accessories to determine if they meet manufacturer specifications. If so, then these components can be utilized for refurbishment to reduce repair costs, or auctioned at a higher price since companies will pay more for operational equipment [1].

Currently in the U.S. there are no regulatory barriers for establishing a recycling organization. There are many unscrupulous providers that mismanage materials. They may

illegally dump parts in landfills or covertly transport materials to foreign countries for disassembly which can be harmful to workers as well as the environment. If authorities detect these reprehensible activities, the recycling company would be liable and there could be civil and criminal penalties for manufacturers [1]. Therefore, it is imperative that a manufacturer partner with a reputable 3PL to carry out asset disposition activities on their behalf.

Recyclers may dispose of used products in what is termed a "zero-to-landfill" manner, meaning that products are disassembled completely and materials are entirely recycled. The materials include glass, heavy metals, plastic and electronic parts, which are all separated and recycled independently [4].

Manufacturers are becoming more aware of the need to reduce production waste through asset disposition. It makes good business sense since the cost of new natural resources are increasing dramatically as resources are becoming more scarce [4].

The next section contains a discussion and conclusion for this paper.

4. Discussion and conclusions

E-waste is expanding as quickly as consumer demand for the latest electronic devices. Without careful management of this material, brand reputation and the environment could be compromised [13].

The opportunity for logistics providers to provide closed-loop or 360° solutions to retailers, manufacturers, OEM's and ODM's which integrate e-fulfillment with returns management is clear [5].

A company must start with the first question, which is can returns be handled in house or should they be outsourced [7]? If returns are not a part of a company's core competency, generally it can be more efficient for a company to outsource returns to a 3PL specializing in returns management. It is time to outsource if returns aren't a company's core competency [7]. There are several reasons for a

company to partner with an expert such as a 3PL:

1. If the return is not going to be resold right away
2. If the company handles sensitive products like pharmaceuticals or electronics that have laws and complex protocols involved in the reclamation, recycling and disposal process
3. For high-tech electronics, products must be disassembled, precious metals salvaged, and plastics recycled, this is an industry in itself.
4. For low volume returns, the cost can be shared with other companies through a shared operation. It may not be economically feasible to set up a dedicated reverse center for low volume operations.

When selecting a 3PL, a company needs to evaluate the reverse logistics supplier's IT platform to ensure ease of integration with existing systems, manage all operations and achieve complete transaction visibility [7].

Speed is imperative regardless of who handles the process. The goal is to convert returned assets into profit quickly in a sustainable, environmentally conscious manner. When capital is tied up in inventory or slow moving inventory, a company is losing money [7].

Stephen Fraser (former CEO of Genco Supply Chain Solutions) says that a company needs to review all of the economics, practices and processes in reverse logistics to get a full picture of the potential for returns. This includes manufacturing, purchasing agreements with manufacturers or retailers (specifically return allowances and practices), returns processing locations and providers, repair and refurbishment practices and liquidation costs [7].

If a company needs to make a fast decision, consulting with a third-party logistics (3PL) or consulting firm specializing in reverse logistics may be the best option [7].

In spite of the growing importance of reverse logistics and product returns processing in the business and academic literature, these activities have not been found to be of widespread high level importance within

organizations. While senior executives are often given the responsibility of overseeing the reverse process, it is not their main function. Executives generally handle the reverse function along with their other responsibilities, so product returns processing is still a "part-time" activity in most organizations [9].

It would seem that with this finding, that outsourcing reverse logistics would be a priority for organizations. However, while some companies do outsource these activities, results of Stock and Mulki's (2009) empirical study suggested that a vast majority do not. Outsourcing of reverse logistics functions have been partly driven by the firm's desire to redistribute products quickly to recover value [9].

In the remanufacturing sector, electronics and computer companies such as HP/Compaq outsource product returns while other firms such as CDW and Tech Data handle returns internally. Thus, the market potential for product returns outsourcing is greater than presently thought. Third-party reverse logistics companies have increased opportunity if they can convince companies that outsourcing is a viable alternative to doing it themselves. Most firms use existing facilities to handle both forward and reverse flows, so the market potential for outsourcing is significant [9].

Since many firms do not place adequate emphasis on the product returns process, handling returns takes them longer to process themselves. Actual processing costs are higher and discrepancies and reconciliations are greater, and also cause customer dissatisfaction [9]. This provides the opportunity for a third-party to lower processing costs, and decrease discrepancies and reconciliations, and therefore increase customer satisfaction for these firms. This value proposition is something that firms should entertain in partnering with a professional third-party provider of reverse logistics.

Returns avoidance refers to not having returns at all. That would be the best way of optimizing the product returns process. Returns avoidance is accomplished through policies that minimize product returns. These strategies focus on customer education programs that train

the customer to understand the proper operation and use of the product. This is critical since approximately 50% of the product returns in consumer electronics are not caused by product defect, but are due to customer difficulty in operating the product [9]. It is not uncommon for a manufacturer to outsource this small part of customer education. A manufacturer may outsource to a third-party to print a welcome letter as well as a quick start guide on how to set up the device for proper use. The third-party would print this collateral and place it in with the product packaging for forward flow in the form of order fulfillment. This then helps the customer to properly operate the equipment, satisfying their expectations, strengthening the relationship between the company and the customer, and therefore increasing customer repurchase behaviors and positive word-of-mouth transmission to other potential buyers of the product. This also decreases return rate and costs associated with the reverse flow.

Manufacturers may also have customer care technical call centers or outsource call centers to assist customers with products, therefore significantly reducing the return rate for high-tech products, as well as improving service while decreasing costs [10].

5. Recommendations

3PL's and manufacturers establish clear rules about which products can be returned and under what conditions. They also establish how the customer will be credited and how the returns will be handled [11]. Multiple authors have indicated that firms often utilize return authorization (RA's) to accept returns [9]. This is also termed return material authorization (RMA) in the logistics industry.

Reverse logistics as well as forward logistics of devices in the consumer electronics industry can be a complex business. Setting up a program to outsource these functions for a manufacturer or retailer involves many areas of the 3PL to collaborate and formulate a solution. This includes industrial engineers and solutions teams applying very complex cost and pricing models, including all of the costs associated with

performing a process which can involve parts, materials, labor, repair times, inventory, purchasing, overhead, IT, security, transportation and many other factors.

This part of the supply chain is known as "last mile and back again logistics" meaning that it is the part of the supply chain closest to the end user of the product in the forward and reverse flow.

The supply chain for consumer electronics (CE) is well established and dominated by global OEM's, retailers, e-tailers, distributors and ODM's. Historically these entities have focused on the forward flow of order fulfillment through sales and distribution of new products. These players have traditionally lacked the resources and expertise or interest to maximize recovery of returns, minimize repair costs and manage the disposition of end-of-life products. This lack of focus has resulted in a less developed aftermarket which is inefficient, and highly fragmented relative to the forward supply chain. This phenomenon has created vast growth and opportunity in the aftermarket [12].

In addition to returns management, repair and refurbishment services, and end-of-life management / e-recycling, the consumer electronics aftermarket entails other functions such as warranty management, customer service, reverse logistics and warehousing. The importance of aftermarket functions in the consumer electronics industry is evident in the increased growth and profitability among aftermarket service providers since 2006 [12].

OEM's are actively outsourcing forward and aftermarket functions to cut costs and focus on their brand development and the introduction of new, higher margin products [12].

With the customer returns of electronics averaging between 4% and 6% of total retail sales, the increasing volume of returned devices is an ongoing challenge for retailers, distributors and OEM's. Product innovation and shortened lifecycles of devices are increasing the volume of units in the marketplace. Returned merchandise also continues to increase because of flexible return policies. OEM's are tightening and even eliminating return privileges for retailers and distributors, causing an increase in

the volume of returns that remain in the channel. Because of these trends, forward supply chain participants are increasingly seeking aftermarket partners to maximize recovery of customer returns. These partners must have capabilities to perform test and repair and manage returns while not hindering the sale of new products in the forward supply chain flow [12].

End-of-life management and e-recycling is a fast growing aftermarket function, designed to erase customer private information, lower the cost for consumers to own electronic devices, and ensure compliance with environmental regulations. Providers of end-of-life services are in high demand from OEM's, technology leasing organizations, system integrators, small to medium enterprises, and corporations all seeking partnerships to minimize costs and liabilities associated with owning electronics [12].

6. References

- [1] ATC Logistics & Electronics. "Green Logistics: Sustainable 3PL Practices for Reverse Logistics and Asset Management (A White Paper by ATC Logistics & Electronics)". No date.
- [2] Consumer Electronics Association. "Market Research Report: Trends in CE Reuse, Recycle and Removal". April 2008.
- [3] AT&T magazine. "Reduce, Reuse, Recycle: Join AT&T in eliminating electronic waste". Spring 2010, pp. 3.
- [4] T.J. Barker and Z.B. Zabinsky, "Designing For Recovery", *Industrial Engineer*, April 2010, pp. 38-43.
- [5] S. Booth, "Closing the retail logistics loop", *Focus*, December 2009, pp. 36-38.
- [6] B. Tomkins, "Best Practices for Returns Processing", *Multichannelmerchant.com*, October 2009, pp. 40-41.
- [7] L.K. Rogers, "Going in Reverse to Move Forward", *Modern Materials Handling*, September 2009, pp. 28-31.
- [8] P. Anderson, "How to Succeed in Reverse Logistics", *Material Handling Management*, August 2009, pp. 41-42.
- [9] J.R. Stock and J.P. Mulki, "Product Returns Processing: An Examination of Practices of Manufacturers, Wholesalers/Distributors, and Retailers", *Journal of Business Logistics*, Volume 30, No. 1, 2009, pp. 33-62.
- [10] M. Bernon, J. Cullen and J. Gorst, "Supply-Chain Management: Mike Bernon, John Cullen and Jonathan Gorst Explain Why Financial Managers Can Play a Key Role in Reducing the Costs of Reverse Logistics", *Financial Management*, no date, pp. 42-43.
- [11] B. Trebilcock, "Outsourcing Reverse Logistics", *Modern Materials Handling*, June 2008, pp. 18-19.
- [12] Livingstone Partners publication, www.livingstonepartners.com "Electronics Supply Chain Analysis", Livingstone flash report, January 2010, pp. 1-3.
- [13] B. Morris, ATC Logistics & Electronics: News & SKU's, "Going Green: Best Practices for Managing and Preventing e-Waste", July 2010.
- [14] A.R. Partridge, inboundlogistics.com, "Green Reverse Logistics Brings Many Happy Returns", January 2010.