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Reverse Logistics Association

USITC Hearing on Remanufacturing

February 28, 2012

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 **ESE SOLUTIONS**
Environmental • Social • Economic



REVERSE LOGISTICS
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USITC Requests

- General
 - What is the size and scope of the remanufacturing industry in the US (# of players, employees, \$s, units, etc.)?
 - What is the trade impact - imports/exports?
 - Are there any types of government policies that currently impede or support remanufacturing?
 - What types of policies could support the industry?

- Additionally, for RLA in particular:
 - What enters into the decision of whether to remanufacture or refurbish a consumer good?
 - Are these factors different from those involved in deciding whether to remanufacture or refurbish an industrial or commercial good?
 - What is the process for remanufacturing a consumer good?
 - How do the markets for new versus remanufactured or refurbished goods differ?

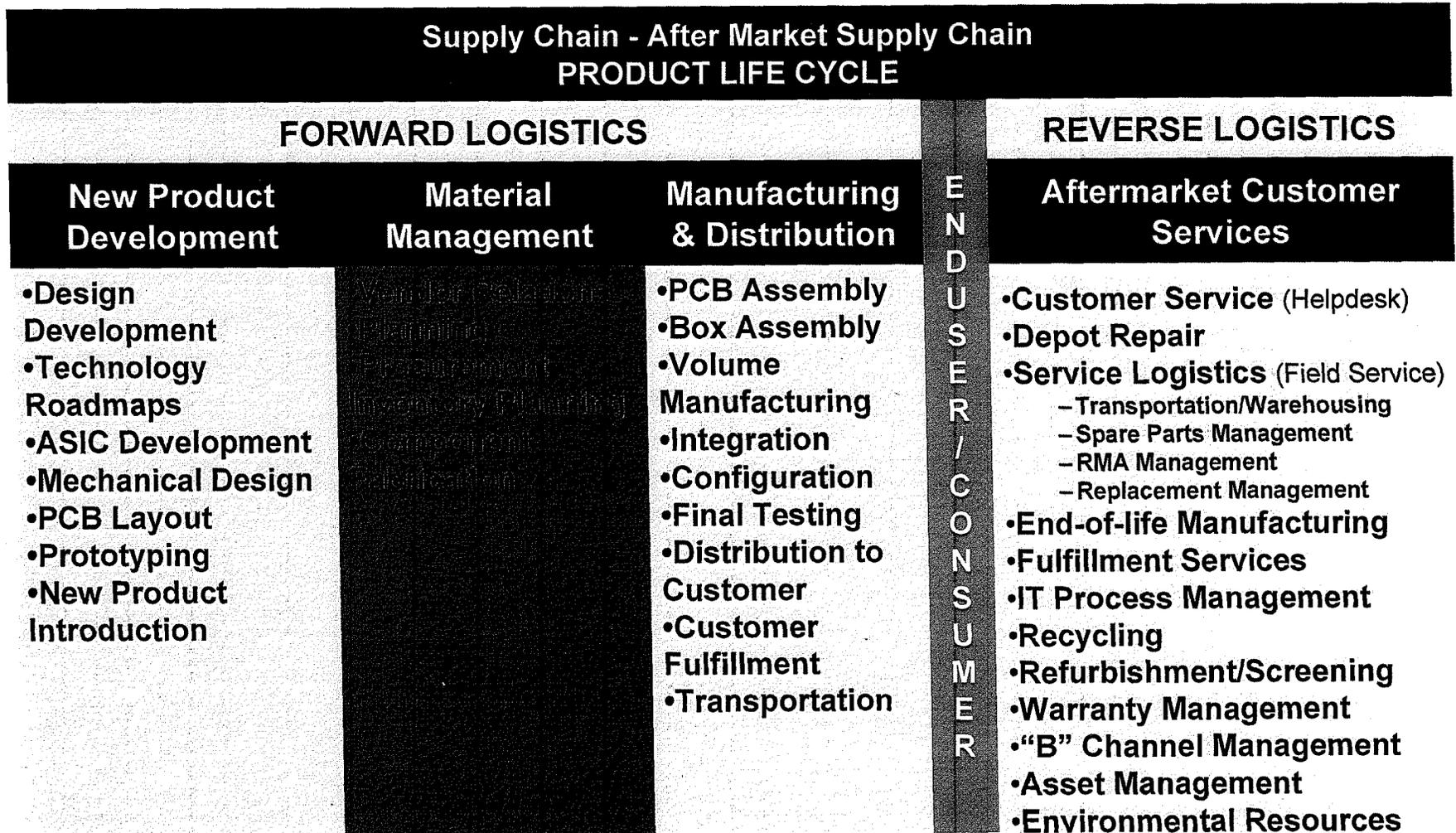
About RLA – Our Mission

- Why Was The RLA Formed?
 - To support third party service providers (3PSPs)
 - To educate OEMs & Retailers on why they need to outsource their RL
 - To enable Private Industry, Consultants, Academics & Governments connect and share new ideas and opportunities
- What Is The RLA's Mission?
 - To educate industries about Reverse Logistics processes which are common to all.
 - To produce events around the world where OEMs, ODMs, Branded and Retail companies receive information on RL support services.



About RLA – Reverse Logistics

▪ Where does Reverse Logistics Fit?



About RLA – Our Members



About ESE Solutions

- We assist our customers through developing, implementing and managing Sustainability programs while streamlining operations

Zero Waste

- Recycling
- Product Donation
- Source Reduction

Energy Management

- Efficiency
- Procurement
- Alternative Sources

Green Merchandising

- Eco-Certification & Branding
- Supplier Scorecards & Management

Communications

- EPA & Non-Profit Partnerships
- Employee Engagement
- Reporting

Sustainable Programs

- Reduced Operating Expenses
- Reduced Labor Impact
- Credible Communications

Our Findings

- Process

- Reviewed papers/presentation by members from academic community
 - Creating Value Through Product Stewardship and Take-back 2010 (CV) by Dale Rogers, Rutgers University; Zachary Rogers, University of Nevada; Ronald Lembke, University of Nevada
- Conducted conference calls with industry leaders
 - 3PSPs
 - Name brand OEM's

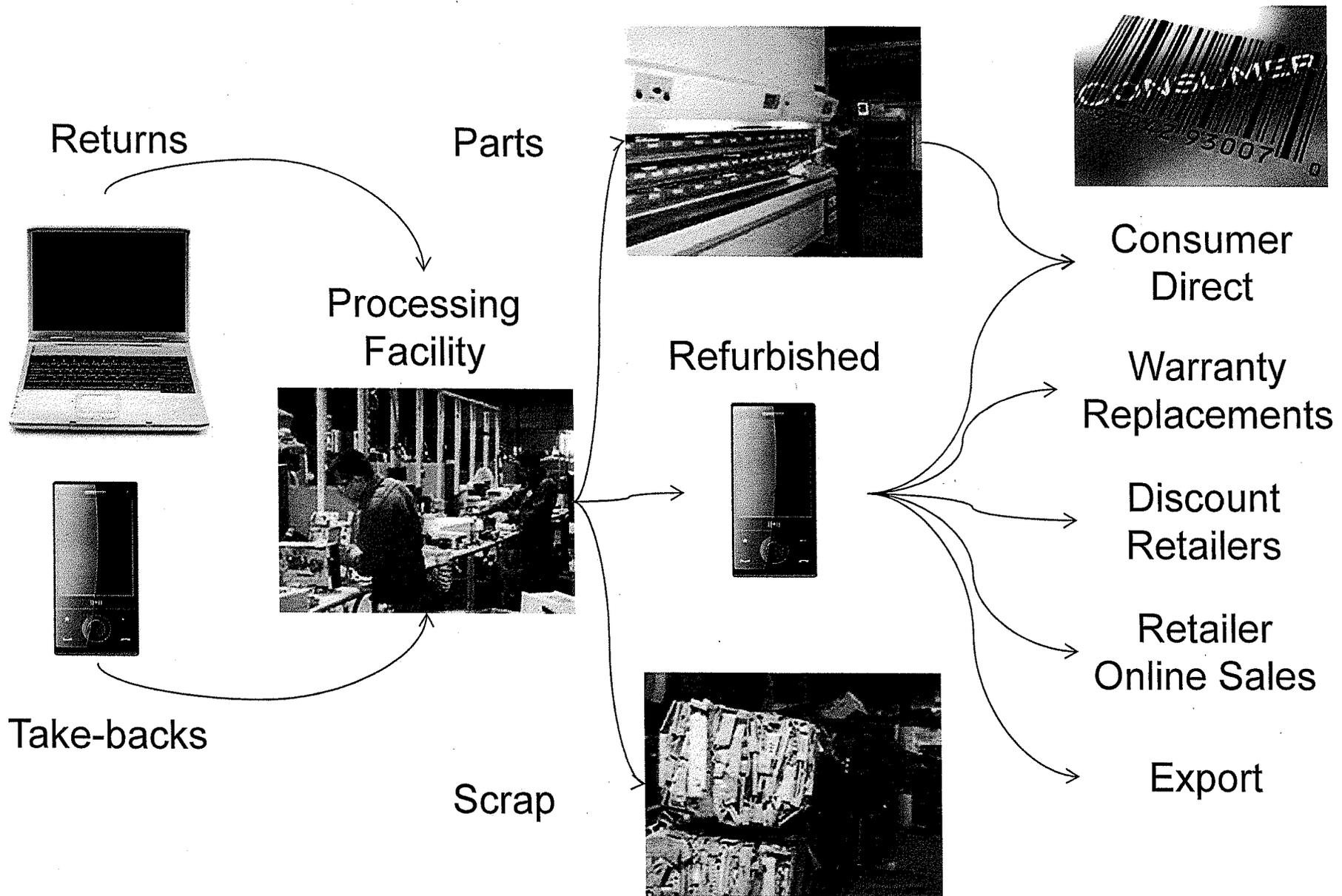
Our Findings

- Size and scope of remanufacturing industry
 - ~2.3% of GDP (CV)
 - Processing facilities number in the hundreds with thousands of ‘garage shops’ utilizing online distribution channels
 - Primarily North American activity
 - Estimated 80% taking place in NA with at least half of that in US
 - Consumers are becoming increasingly comfortable with purchasing refurbished product in place of new causing major retailers to evaluate how to capture this growing market
 - Manufacturers are increasingly using refurbished goods as replacements for warranty returns
 - The industry is growing as manufacturers:
 - Seek to have more control over their brands
 - Reduce costs and losses
 - Enter new markets where “A-goods” are not typically sold
 - Drive environmental sustainability initiatives

Our Findings

- Import/export impacts
 - Primarily a domestic activity serving domestic markets
 - Surplus product is exported when practical
 - Exports are limited in some cases by punitive taxation on used goods by certain countries
 - Viewed as an area of potential export growth with reduced trade barriers
- Decision process
 - Is cost of disposal greater than:
 - Resale, parts and/or scrap value less
 - Transportation, processing and marketing expenses
 - With consideration for environmental impacts, compliance costs and customer retention

Consumer Goods Refurbishment



Policy Recommendation

- Goal: Readily export refurbished goods that are surplus from the US and North American markets
 - Increases demand for consumer take-backs to offset costs of take-back/extended producer responsibility regulations
 - Reduces environmental impact of product disposal
 - Creates US jobs
 - Reduces trade deficit
- RLA requests ITC:
 - Take into consideration the impact of the used goods markets as well as new goods when negotiating trade agreements
 - Review existing trade agreements to clarify tax and duty requirements and renegotiate a less restrictive policy to existing trading partners such as Brazil

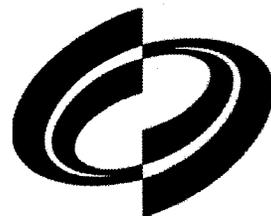
Thank You

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REVERSE LOGISTICS
ASSOCIATION®



Creating value through product stewardship and take-back

Product
stewardship

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133

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Abstract

Purpose – Secondary markets provide a place for unwanted items to be bought and sold, which diverts them from landfills, reducing the products' ecological impact and creating economic value. The purpose of this paper is study the secondary markets to understand the size of this important portion of the US economy.

Design/methodology/approach – The data were collected from financial reports, news articles, and interviews with subject experts. From all of these sources, the scope and size of secondary markets can be estimated.

Findings – Secondary markets are effective in diverting a large number of products from landfills, creating numerous jobs, resulting in substantial economic value in the process. Although not reflected in current government metrics, a conservative estimate is that the secondary market represents 2.28 percent of the 2008 US gross domestic product.

Research limitations/implications – Several of the secondary markets have many small players, with no strong trade associations or other authorities to estimate their size. The paper's estimates based on known sources are very conservative, perhaps underestimating the size of these sectors.

Practical implications – As society increasingly pays attention to the ecological impact of its products, secondary markets will play an important role in supply chains. Understanding the magnitude, structure and reach of these markets can help firms develop better product stewardship and lifecycle management.

Social implications – Individuals will not directly change their behavior from this research, but the findings should help companies behave differently, which in the end will offer products with lower ecological impact.

Originality/value – Secondary markets are an integral part of the US economy, and have not been adequately studied.

Keywords United States of America, Waste recovery, Salvage, Recycling, Second-hand markets

Paper type Research paper



1. Introduction

A consumer who purchases a refurbished laptop, or a college student who buys a used textbook are good examples of buying on the secondary market and getting additional value out of an asset. Secondary markets have become a significant portion of domestic economic activity in the USA (Rogers and Tibben-Lembke, 2006). Many companies recover, refurbish, re-manufacture, and recycle product for additional use elsewhere

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instead of throwing the product away (Bernon and Cullen, 2007). Secondary markets act as system “drains” where excess inventory or assets can be recovered and resold. The secondary market reduces waste and provides a stable income for a growing sector of the US economy, providing jobs for millions of workers around the world (Auray, 2009; Hansen, 2000). Salvage products are not only an important part of the domestic economy, but they also make up a significant portion of US exports. Wastepaper and scrap metals are listed among the top five US exported commodities (Mongelluzo, 2010), with wastepaper being the largest export out of the Port of Los Angeles, the largest US port. The majority of wastepaper is sent to China to be converted into cardboard boxes that will be used to ship products manufactured in China back to the USA (McCormack, 2008). Five of the 20 largest volume US exporters specialize in shipping wastepaper and one specializes in scrap metal (McCormack, 2008). From 1995 to 2005, the total weights of scrap iron and steel exported grew by 17.3 percent while wastepaper exports grew by 35.5 percent over the same period of time (Lyons *et al.*, 2009).

Firms have found that the secondary market positively impacts their environmental initiatives (Stock, 1992; Stock and Mulki, 2009) provides social benefits to their constituents, and produces healthy margins (Rogers and Tibben-Lembke, 2001; Daugherty *et al.*, 2001). Blackburn *et al.* (2004) wrote that the objective of most return supply chains is to carry out five key processes: product acquisition, reverse logistics which entails the transportation of the product, inspection and disposition, remanufacturing and refurbishing if required, and marketing which includes finding secondary markets for the recovered products.

Auray (2009) described the secondary market as consisting of retail store returns, surplus inventory, bankruptcy sale inventory and products that did not sell the first time around. Rogers and Tibben-Lembke (1999) found that the secondary market consists of firms that specialize in buying close-outs, surplus, and salvage items, at prices as low as ten cents on the dollar. For retail goods, the average recovery rate is approximately 17 percent of the retail price (Shear, 1997). The secondary market firms then sell the product through their own stores or to other markdown retailers, such as dollar stores.

The secondary market is fueled by the reverse logistics processes in a supply chain. Mutha and Pokharel (2009) tracked returned computer parts which once returned, feed remanufacturing or are sent to the secondary market as spare parts. Anel (2004) noted that “eBay is the biggest secondary market” and that many of the items for sale there are company returns. Stock *et al.* (2002) found that in Sweden, returned Volvo parts could be remanufactured or offered for sale, and then resold in the secondary market. Central Return Centers are distribution centers that accept and process returns and get them ready for the secondary market (Tibben-Lembke, 2002). In some cases, these Central Return Centers will deface the item by marking the package or the product so that the items are not be sold through a primary channel.

How should products and materials be recovered? Who should recover them? Where in the supply chain should they be processed? How should they be designed to optimize recovery and processing? Dekker *et al.* (2004) propose using quantitative models to answer these questions. The number of manufactured items that are recovered and recycled or reused is growing substantially and presenting new challenges for supply chain managers.

As concern about the environment has increased, more attention has been paid to end-of-life products. Demirel and Gökçen (2003) suggest that reverse logistics will play

an increasingly larger role in end-of-life disposal as more governments regulate waste and available landfill space dwindles. Ferguson and Brown (2001) have analyzed the shift in responsibility from consumers to the manufacturer. They echo the belief that more companies are turning to reverse logistics channels to fulfill their responsibilities.

While many of the activities that take place in a reverse logistics process are similar to forward logistics activities which supply new unused product to a channel, there are significant differences (Rogers and Tibben-Lembke, 1999). For example, planning and forecasting for reverse logistics is much more difficult than it is for forward logistics because individual customers initiate reverse logistics activities and the signals that set in motion planning maybe more difficult for a firm to process (Tibben-Lembke and Rogers, 2002). Further complicating the forecasting of reverse logistics is the fact that different products have very different returns rates. Consumer decisions to return product will be influenced by factors such as the ease of operating the product, the clarity of the instructions, and buyer's regret; factors which may vary significantly from one product to the next within one manufacturer (Rogers *et al.*, 2002).

Additionally, when deciding how to dispose of product or select the appropriate secondary market, the options are not necessarily clear. Unlike forward distribution, reverse logistics managers may need to spend significant time determining where a particular item will be shipped because the condition of the item must be considered, as well as any agreements with the manufacturer regarding disposition (Vorasayan and Ryan, 2006; Stock and Mulki, 2009). Items entering the secondary market can vary substantially in quality. Some products returned maybe as good as new, while others are defective and have little value. Given the range in returned product quality, variations in pricing are to be expected. While the prices of products in the forward channel can vary due to factors such as value-added services or total quantity purchased, the pricing variability of returned products can be even more complex.

Matching the returned product to the correct marketplace is not easy. Making quick disposition decisions into a particular secondary market can improve the profitability of selling into that secondary market (Rogers and Tibben-Lembke, 1999). Blackburn *et al.* (2004) suggest that managers responsible for disposition into the secondary market should make a decision as early as possible to avoid processing returns with little recoverable value. They called this concept "preponement" which is the converse of "postponement." They posited that preponement can substantially "benefit the profitability of a firm by avoiding unnecessary processing expenses, while at the same time providing faster recovery of products with significant value."

By volume, one of the most remanufactured products in the USA is cell phones. They can be cosmetically repaired and resold, or stripped for parts to make new phones and electronic devices (Professional Safety, 2004). This closed loop style of manufacturing has grown among manufacturers who are affected by end-of-life legislation.

The secondary market has grown in importance over the last five years. One of the major reasons so much more attention has been paid to it is that governments in the USA, Europe, and Japan have increased regulation mandating manufacturer responsibility for end-of-life product. It is likely that more of these types of regulations will be implemented in the near future. More companies will have to salvage or dispose of their returned or unused products through reverse channels. These reverse channels could be treated as an emerging market.

This paper estimates the size of the secondary market to be approximately \$329 billion. To put this in perspective, a country with a gross domestic product (GDP) of this size would have had the 29th largest GDP in the world in 2008, placing it just behind Denmark and ahead of Argentina (Central Intelligence Agency, 2009). The sheer size of the secondary market demands attention and study.

The reverse logistics flow is very different from the forward flow (Tibben-Lembke and Rogers, 2002). Reverse flows are more reactive, with much less visibility. Since any supply chain may have product flowing in the reverse channel, the range of reverse logistics and secondary market development issues facing a particular supply chain will be as diverse as the number of supply chains.

The secondary market is a tremendously important part of both the US and world economies. The secondary market gives both consumers and sellers opportunities that they would not otherwise have. Consumers typically have more purchasing power in the secondary market and sellers have access to product that could be inaccessible if those products were new instead of used. The secondary market has both a social benefit due in part to increased buyer and seller access, and an environmental benefit derived from extended product life.

In this paper, the authors describe the magnitude and value of the US secondary market across several market categories and how it positively impacts the environmental, social responsibility and profit goals of members of a supply chain. Drawing on several industry sources, the size and growth of secondary markets are analyzed. Given the large volume of product that moves through the secondary market an analysis such as this one is overdue. Papers in the past have described the secondary market but have not described the paths through this complex market in detail, nor estimated its size. In contrast, the present study integrates prior research into an overriding framework, providing structure and orientation in addition to size and flow.

Understanding the secondary market and its structures and size impacts product stewardship. Knowledge of the secondary market, its structure and size can enable managers to make better disposition decisions and save product from ending up in a landfill if there is a better alternative. Being aware of the large size of the secondary market and how it works will make it more likely that managers consider it seriously as a market option. Measuring and monitoring the size and economic impact of the secondary market will help policymakers to craft better laws governing it, and encourage researchers to study it in more detail. Having insight into the size and structure of the secondary market will enhance managerial practice and policy decisions concerning the interactions between social and environmental sustainability, accounting, management, and policy.

The analysis presented in this paper offers a starting point for any researcher, graduate student, faculty member or practitioner wanting to explore the size and structure of the US domestic secondary market. The relationship between the secondary market and environmental and social initiatives as part of a sustainability program is also important. Academics and practitioners wanting to delve deeper into how the salvage supply chain can impact the sustainability of a firm can utilize this paper as a starting point for further research. While this paper provides a comprehensive exploration of the reverse supply chain that supplies the secondary market, it is also intended to convey the importance of reverse logistics and the secondary market. It is clear that this portion of the economy has become significant. Also, a typical path through the reverse supply chain is described.

2. Previous research

There has been a dramatic increase in the amount of research related to reverse logistics over the last 15 years. A search of the EBSCO Host Business Premier database returns only a single reverse logistics paper prior to 1993, but 581 papers relating to this topic since then. The vast majority of these papers are concerned with optimal operation of various portions of a reverse logistics system (Chu *et al.*, 2010; Dowlatshahi, 2010; El-Sayed *et al.*, 2010; Jack *et al.*, 2010; Konstantaras and Skouri, 2010; Pishavee *et al.*, 2010; Qin and Ji, 2010).

Of this literature, only a very small amount is concerned with estimating industry size. Dowlatshahi (2010) cites Robbins-Gentry (1999) as a source for the return percentages faced by retailer, but in the article, Robbins-Gentry identifies Rogers (1999) as the source of the information.

Stock (1992) developed one of the earliest studies in reverse logistics and said that it would be a topic that would require much further study. At that time, most of the research into reverse logistics dealt primarily with environmental aspects of reverse logistics, specifically source reduction, recycling, substitution and waste disposal (Stock, 1992; Carter and Ellram, 1998). Stock and Mulki (2009) called for further research into reverse logistics and the secondary market. Srivastava and Srivastava (2006) wrote that there are still relatively few research studies that have examined empirical data.

Another issue in examining reverse logistics practices is that the accounting statements that most firms use to manage their business are designed to manage the business in normal forward distribution (Goldsby and Closs, 2000). The costs and processes related to managing product that is moving backwards through the supply chain and being dispositioned to a secondary market typically do not show up neatly in an easily understood package in a firm's balance sheet or income statement. In forward logistics, costs are well defined and well known (Tibben-Lembke and Rogers, 2002). Accounting systems are built to handle the comprehensive cost development for a product as it moves through the forward channel. Firms specializing in forward logistics are usually not very effective at managing the amount of detail derived from a product's non-standardized journey backwards through the firm and the channel. For example, transportation costs on a firm's income statement maybe derived from both forward distribution and reverse logistics.

Andel (2004) wrote that the secondary market could be quite profitable. Buyers can often purchase returned products or used materials at a low price and sell them at a higher price (Rogers and Tibben-Lembke, 2006). The existence of a secondary market can increase the value of new products, which in turn can lead to higher profits (Ghose *et al.*, 2005). An extreme example of product reclamation for resale is greeting card makers sending their products to a return center in Mexico to be refurbished. At the return center, workers match envelopes, smooth out the edges and corners and get the greeting cards ready for the same holiday the next year.

The decision to put additional effort into reclaiming the product depends on the cost of refurbishing versus the cost of throwing it away (Twaalfhoven, 2010). The financial and environmental costs of putting product in a landfill combine to encourage managers to improve reverse logistics management. Disposition options can vary with firms and can range from refurbishing, reselling, recycling, or destroying the returned products.

In contrast to forward distribution where pricing is predetermined, it is difficult in the reverse process to determine what the true value of used or returned product is in the marketplace, creating pricing variability and difficulty. Additionally, secondary markets are ignored in most financial reporting. Hansen (2000) found that it is very difficult to examine the global used clothing secondary market because of the "lack of contemporary scholarly interest in considering secondhand clothing consumption."

Rogers and Tibben-Lembke (1999) wrote that reasons retailers return products to the supplier are because of defects, obsolescence and overstocks. Returned product such as apparel can typically be repackaged and sold as new. However, due to legal or other restrictions, some products cannot be resold as new if the product has been returned by a customer. For example, while many electronic parts can be refurbished and resold, items such as a circuit breaker may have to be disposed of differently (Rogers and Tibben-Lembke, 1999). If a firm is not able to resell the items, they often end up in landfills, or perhaps recycled. Also, the profit margins could be lower for the manufacturer because in addition to the refurbishing cost, the product often must be sold at a lower price. Vorasayan and Ryan (2006) wrote that manufacturers' desire to maximize profits often dictates the proportion of product that gets refurbished. Twaalfhoven (2010) said that the amount of cost that a firm is willing to devote to remanufacturing a product is determined by the yield rate in the secondary market. He posited that moving remanufacturing and refurbishment to low-cost countries will result in more product being fixed and resold. Sciarrotta (2003) described how one consumer electronics manufacturer reduced reverse logistics costs by utilizing the secondary market and establishing a dynamic asset recovery network.

Stock *et al.* (2002) estimated that US consumer returns exceed \$100 billion per year. This estimate is larger than two-thirds of countries total GDP (Stock and Mulki, 2009). Johnston (2010) estimated that Wal-mart in the USA processed over \$12 billion in consumer returns in the USA during 2009.

Mollenkopf and Closs (2005) found that reverse logistics and the secondary market provided multiple values to the firm and the supply chain. Sarkis (1995) wrote that reverse logistics plays a role in improving product development, managing the product life cycle, and recycling. He called for further research into returns and end-of-life issues and how they impact the rest of the supply chain. Later, Stock (1992) and Rogers and Tibben-Lembke (1999) expanded the definition of reverse logistics to include additional activities such as processing product returns, disposition of physical goods to obtain maximum recovery value, and the remanufacturing/refurbishing of items. Rogers and Tibben-Lembke (1999) recommended that firms could improve the economic benefit from reverse logistics by focusing on improving gatekeeping technology, increasing the speed of disposition decisions, and decreasing cycle times by developing firm returns and disposition processes. Hendel and Lizzeri (1999), Anderson and Ginsburgh (1994) and Waldman (1997) posited that the secondary market creates a substitution effect that creates problems for sellers of new products. This substitution effect happens as new goods face competition from used goods. So, some consumers will shift their purchases to the secondary market because of this substitution effect.

Much of the research on reverse logistics and the secondary market has focused on a single industry or product category. Autry *et al.* (2001) wrote that reverse logistics performance measurements in mail-order electronics companies were typically influenced by firm size, sales volume, and existing disposition processes. Tan and

Kumar (2006) examined refurbished parts versus new computer parts in the computer industry. They found that delays in processing returns reduces the economic viability of reverse logistics. DeKoster *et al.* (2001) suggested that retailers were not as good at running reverse logistics operations in comparison to handling forward distribution. Richey *et al.* (2005) examined the automobile after-market and found that reverse logistics programs could be improved through innovation.

The secondary market is a relatively new focus of research in the last 20 years. There has been very little research estimating industry size. Accounting systems are designed to manage forward flow better than reverse flow, and it is very important to understand costs. The secondary market can be profitable but there has not been much scholarly work estimating its size.

3. Asset recovery

Asset recovery is the reverse logistics process that directly feeds the secondary market. Asset recovery is the classification and disposition of returned goods, surplus, obsolete, scrap, waste and excess material products, and other assets, that maximizes returns to the owner, while minimizing costs and liabilities associated with the dispositions. The objective of asset recovery is to recover as much of the economic (and ecological) value as is reasonably possible, thereby reducing the ultimate quantities of waste. It can generate a lot of cash for companies who sell products that would otherwise end up in landfills.

Asset recovery has become an important business activity for many companies. The level of profitability of asset recovery to a company depends on the ability of that company to recover as much economic value as possible from used products, while minimizing negative impacts such as environmental problems.

The traditional attitude of many firms towards used products has been to ignore them, and avoid dealing with them after they are originally sold. Manufacturers in the USA are not typically responsible for products after customer use. Most products are designed to minimize materials, assembly, and distribution costs, and ignore the repair, reuse, and disposal requirements. Manufacturers have generally believed that the costs of incorporating these requirements would outweigh the benefits.

4. Types of returns

There are many types of returns that feed the secondary market, each of which poses unique challenges. We group returns into five categories: consumer returns, marketing returns, asset returns, product recalls and environmental returns.

4.1 Consumer returns

Consumer returns due to buyers' remorse or defects are generally the largest category of returns (Rogers *et al.*, 2008). Retailers in the USA typically have liberal return policies, which makes it easy for consumers to return products. Retailers maintain liberal return policies because they believe doing so increases revenues. Some manufacturers have lifetime warranties that allow consumers to return a product after years of ownership.

4.2 Marketing returns

Marketing returns are product sent back from a position forward in the supply chain, due to slow sales or the need to reposition inventory. Other examples of marketing

returns include: close-out returns, which are first-quality products that the retailer or distributor has decided to no longer carry; buy-outs or “lifts”, where one manufacturer purchases a retailer’s supply of a competitor’s product to get access to shelf space; job-outs, where seasonal merchandise is returned after the season’s end; and surplus and overruns (Rogers and Tibben-Lembke, 1999).

In addition to returns driven by market issues, some marketing returns are internally driven by management practices. End-of-quarter sales into the channel to fulfill sales goals can produce high-return rates when the product does not sell. Sales force bonuses are typically linked to revenues. Returns that subtract from revenues are often not taken into consideration when calculating sales force bonuses. Instead, the sales force is incented to sell as much product as possible regardless of the rate of returns. This practice often results in high-return rates.

4.3 Asset returns

Asset returns are the repositioning of assets such as expensive equipment, oil-drilling machinery, and reusable containers. For example, the Ford Customer Service Division of the Ford Motor Company uses a closed-loop reusable collapsible rack system to deliver automobile parts to their dealerships. A truck driver delivers the order in a wheeled cage that collapses to facilitate shipping the cage back to the Ford Customer Service Division distribution center. The driver makes the delivery of the parts and picks up the collapsed cages from the previous order (Rogers *et al.*, 2008). This racking system has reduced the overall delivery cost and is environmentally friendly. Reusable totes are another example of a desirable return that has become a standard in many industries. At Jefferson North, the Chrysler assembly plant where the Jeep Grand Cherokee is made, reusable plastic totes are used to move parts between suppliers and Jefferson North. These totes are stackable, protect the product better than corrugated cardboard, and are less expensive on a per movement basis.

4.4 Product recalls

Product recalls are a form of return that are usually initiated because of a safety or quality issue. They require more up-front planning than most other return types, and this planning is central to managing recalls effectively (Smith *et al.*, 1997). Information technology and effective communications play a central role in the management of product recalls. Recalls can be voluntary or mandated by a government agency. For example, in December 2009 the US Consumer Product Safety Commission called for a recall of 50 million Roman roll-up venetian blinds (Costello, 2009). For many industries that are susceptible to recalls, like the automotive or food industries, part of designing an effective returns management process is developing procedures for informing customers of a recall and efficiently handling the return.

4.5 Environmental returns

Environmental returns include the disposal of hazardous materials or compliance to environmental regulations. Because of regulatory compliance requirements, this type of return may have limited options for processing and disposition. Additionally, there can be stringent documentation and audit requirements. For example, the Environmental Protection Agency has banned computer monitors that use cathode ray tubes from landfills since 1992 because of the lead content in the components

(Raymond Communications, 1997). Owing to this regulation, the firms responsible for the cathode ray tubes need to have a process in place to manage the unusable computer monitors.

E-Waste, where electronics equipment such as computers or mp3 players are put into landfills have become a serious concern (Ursery, 2009). Compliance with environmental laws is a primary reason for this concern, but a minority of firms have an individual or team chiefly responsible for the dispositioning of electronic hardware at its end of life (*Industry Week*, 2010). Governments have enacted regulations such as the Disposal of Waste Electrical and Electronic Equipment Act (WEEE). WEEE regulations in the European Union force manufacturers to be responsible for the collection and disposition of their products at end of life. While these laws seem to be most common and most stringent in Europe, US regulations are beginning to emerge (Presley and Sarkis, 2007).

5. Research methodology

The methodology utilized for this research was a Delphi panel of reverse logistics managers and industry association executive directors to estimate research parameters which were then applied to government and industry data. The Delphi technique utilizes a panel of experts to develop a consensus by being involved in independent and anonymous interviews over a number of iterations (Shunk *et al.*, 2007; McDermott and Stock, 1980). The Delphi methodology is best used when elements of the analysis need to be estimated because of lack of data or inability to directly measure the constructs in question. Delphi panels can be considered to be a type of iterative focus group aimed at achieving consensus among panel members (Frankel *et al.*, 2005). This Delphi exercise convened experts in the reverse logistics and the secondary market for a distillation of the size, direction and structure of the secondary market.

The Delphi method is often used to try to develop an understanding of complex situations or systems, where no one person is knowledgeable about the entire system. It is often presented as a method for creating a forecast (Jacobs *et al.*, 2009), but it can also be a powerful method for developing a consensus view of a complex situation. By drawing together a well-rounded collection of experts, all with knowledge of various aspects of the system, the researcher can develop propositions about the system and collect feedback anonymously from the experts. Nielsen and Thangadurai (2007) argue that the Delphi method is a powerful tool for international business research.

For a few recent examples of Delphi used in a similar way to the one described in this paper, Hameri and Hintsa (2009) used the Delphi method to develop an understanding of the important factors affecting cross-border supply chains. Rajat and Hansen (2009) used it to develop an understanding of the forest products industry. Similarly, the Delphi method has been used to develop an understanding of the structure and key drivers related to: the role of consumers in global marketing (Czinkota and Skuba, 2009), effective use of radio frequency identification (Lin, 2009), marketing relationships (Ribiero *et al.*, 2009), and risk in outsourcing software development (Nakatsu and Iacovou, 2009).

The Delphi panel for this research consisted of senior managers responsible for reverse logistics and returns at four larger mass merchandisers, four third-party logistics company executives specializing in reverse logistics, five reverse logistics managers for electronics manufacturers, two contract manufacturing company

managers, and the executive directors of three industry associations that are associated with reverse logistics and secondary markets. Three people on the Delphi panel were from a single third-party logistics company that specializes in reverse logistics and the secondary market. All of the rest of the panel were from different companies or associations.

For this research, volume percentages of each relevant portion of the reverse logistics flows and secondary markets were estimated. These estimates were then applied to markets of the forward flow as percentages using various measures. Delphi estimates were used together with industry trade publications to project the total size of the factory outlet mall industry. The size of the auction, pawn-shop, dollar store, and charity industries were estimated using financial reports from industry leaders with a known market share. These statements were then extended out to estimate the total size of the market. Value retailers and salvage dealer markets were estimated using Delphi estimates combined with US Department of Commerce data in relevant North American Industry Classification System (NAICS) codes.

6. Secondary market flow

In this section, the reverse flows that feed various secondary markets are described. Meaningful secondary market segments were selected based on opinions of the Delphi panel. They selected the major defined secondary market segments to which manufacturers and retailers send returned products. The appropriate secondary market and disposition route depends on the type of product, its desirability in the marketplace, condition, and demand levels. As shown in Figure 1, there are several definable secondary markets for returned materials. Figure 1 is a generalized depiction based on interviews with several managers and field research.

Figure 1 shows the complexity of the secondary market. The journey from asset recovery to its final destination is often filled with many twists and turns. The route to the consumer is not necessarily an efficient one. It is likely that profitability is managed

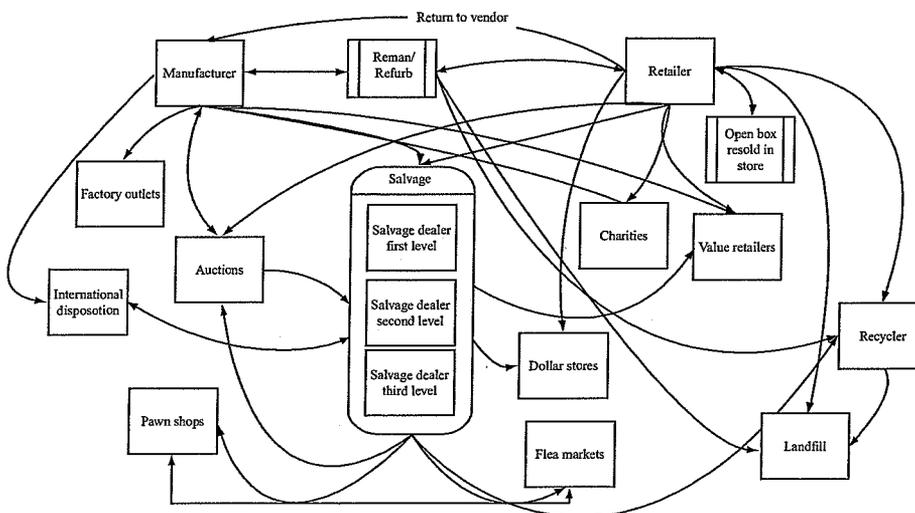


Figure 1.
Returns to secondary
market flow

at each step along a circuitous route as opposed to a total cost management concept that would be more likely for forward-flowing products (Bowersox *et al.*, 2010).

There are no pre-established methods used to calculate the size of the secondary market. This is because much of the necessary data is not collected or placed into a database. Because of this, the actual size of the secondary market is unknown. The researchers divided the secondary market into meaningful segments. These segments are representative of the critical secondary market.

6.1 Retailer

The retailer is typically where the return is initiated. Consumer returns are often initiated by a customer at the retail service desk. In the case of a marketing return where the store is an overstock position, the retailer may initiate the return. Inventory can often be the largest asset for many retailers, and to keep faster moving items on the shelf, it is sometimes necessary to begin moving product backwards. Dispositioning inventory that the retailer has decided to eliminate from inventory through an alternative return channel is usually a more profitable and environmentally responsible disposition than throwing these items away in a dumpster.

The retailer typically has several possible dispositions for returned or unwanted product. The first and most desirable option for the firms included in the research is to send the product back to the manufacturer. The retailer typically establishes an agreement or contract with the manufacturer to take back all or a predetermined allotment of the product. In some cases, the manufacturer will insist on only taking back defective product, but it is difficult for them to enforce this rule because US retailers tend to take the word of the consumer on whether or not the product is defective and pass that product back to the retailer without examining it carefully. It is typically not in the retailer's best interests to argue with the consumer. Instead, it makes much more sense for the retailer to pass the returned product back to the manufacturer.

A marketing return maybe best for the retailer; however, it is not necessarily efficient for the entire supply chain. The retailer might have a better chance to sell the items in their store, or in a designated store that sells open box or reboxed product. These open box sales are a return disposition activity but are not counted in the estimate of the secondary market in this research. Also, if the retailer sells the product in the store, they do not incur additional transportation cost, and the supply chain saves fuel by avoiding transportation miles. If the retailer sends the product back to the manufacturer then they will typically get full credit unless the agreement between the manufacturer and the retailer specify otherwise. If the manufacturer examines their total profitability from product returned from the retailer, they may discover that the costs derived from managing returned product from the retailer are greater than the residual value of the returned product. In this case, the manufacturer may want to implement a zero-return program. These zero-return programs are described below.

6.2 Manufacturer

The manufacturer is often ultimately responsible for returned product. As mentioned above, the retailer typically has more power in the supply chain than do most manufacturers. Because of this imbalance of power the manufacturer has the responsibility, and often the cost, of managing the bulk of returned product. The manufacturer will receive product back from the retailer and select the disposition that will

result in the lowest total cost and highest potential profit. Manufacturers need to examine the profitability of each disposition carefully to optimize the end result of their decisions. Dispositions for the manufacturer include international dispositions, auctions, factory outlets, salvage dealers, charities, low-price value retailers, and as a last resort, landfills. This goal of avoiding landfills is due to both economic considerations and environmental responsibility. The economic consideration includes increasing landfill fees, and the realization that the manufacturer will not receive any revenue for a product in which they have invested in manufacturing, packaging and shipping.

If the item has potential asset recovery if refurbished, then the manufacturer will often move the product out to a facility that handles remanufacturing and refurbishing. Most manufacturers will outsource these duties. In some cases, the manufacturer will choose to remanufacture and refurbish themselves. An example of this remanufacturing in-house was the National Disposition Center in Nashville, Tennessee owned and operated by Black and Decker. Black and Decker is a small appliance manufacturer that has a broad product line. Consumer returns from the retailer were moved down to the Nashville Disposition Center for triage and refurbishment. For example, Black and Decker manufactures the Dustbuster product and they learned that if a Dustbuster is defective the source of those defects is typically one of the three problems. To reduce costs, they quickly fixed each of those potential three problems, tested the unit, and if the Dustbuster functioned as it was supposed to function, they would move the product through a secondary market such as a low-price value retailer or the Black and Decker employee store.

While the example of the National Disposition Center worked well for Black and Decker, managers responsible for the reverse logistics process decided it would be less expensive to outsource remanufacturing and refurbishment of Black and Decker product and so they closed the Nashville facility. A manufacturer should carefully examine how much it will cost to remanufacture and refurbish the product. The manufacturer will set a target percentage of the product value as an investment ceiling to fix the item. For example, for electronic product such as a phone or mp3 player, one particular manufacturer limits the investment in remanufacturing the product to 30 percent of the item's original wholesale price. They target the asset recovery price to be approximately 70 percent of the original retail price point if the item is sold through an auction or storefront. A lower target asset recovery price will be received if the item goes through a salvage network or is sold in bulk.

Another example is an electronics manufacturer who has all of their factories offshore, but for brand protection reasons, and to help recover the relatively significant value of their product when returned, has set up a returns facility to handle all electronic returns in the USA. Returned product is received back from retailers and is sorted into high- and low-value items. Each category is tested and then sorted based on those test results. For low-value items, products that fail the tests are dismantled and the parts are harvested. Products that passed the diagnostics are repackaged and sold on the secondary market with a limited warranty. The second category, higher value electronics, are tested as well. However, due to the resale value of the item compared to the incremental cost of repair it typically makes financial sense to set up a repair area within the receiving distribution center for trained technicians to diagnose and fix defects. In the case of higher value electronics, approximately 75-90 percent of the items are sold as repaired/refurbished/like new for substantially more than a typical "As-Is" sale.

Industrial returns processors typically have a large repair component and repackaging component. Similarly, industrial return centers often have highly specialized parts harvesting processes that add value over simply recycling the items. The manufacturer has several other potential dispositions in addition to remanufacturing or refurbishing. These potential dispositions shown in Figure 1 are described below.

6.3 International disposition

If the manufacturer is worried about market cannibalization they may choose to disposition product internationally outside of their primary market reach. The manufacturer can sell directly to an international outlet, or move the product through a salvage dealer with the stipulation that the product may not be dispositioned domestically, but must be shipped overseas. The difficulty with this process is that quite often the firm that has been selected to sell the product outside the country either moves it back to the domestic market themselves, or sells it to another entity that will move it back to the domestic market. There is much leakage in a typical international disposition. If the manufacturer or brand owning company does not pay careful attention to where excess product flows, they are likely to find large portions of the product being sold through an alternative graymarket channel in their primary market. For example, the largest GAP stores in Korea utilize last year's styles in the USA as their primary supply.

6.4 Auctions

Since the development of the web, the number of auctions has dramatically increased. eBay, Amazon, Alibris, NoBetterDeal.com and several others have pioneered what has become a very large marketplace. The auction is a place for buyers and sellers to come together and trade almost anything. In the auction, the seller of the returned product lists the product and then accepts bids for the item. In an online auction, the bidding opens at a price the seller specifies. Buyers then place bids on the item. When the listing ends, the buyer with the highest bid wins.

The limitation on auctions is that it is difficult to move large volumes of products through the auction continuously. To some extent, item scarcity leads to a higher auction price. The items put through an auction tend to work best when they are low volume. To move a large volume of product quickly, the manufacturer or primary market typically sells to a salvage dealer in bulk instead of moving the product through an auction. One option is to move some product to salvage dealers and hold the most valuable portions of it to sell via an auction.

The auctions portion of this secondary market size estimate only takes into account online auctions. This is because auction houses such as Sotheby's are geared more toward high-end merchandise and not toward asset-recovery items. It is unlikely that companies will attempt to shed excess inventory through one of these oldest auction houses. Online auctions such as eBay or Amazon are more likely to be utilized for items in the reverse logistics stream. To estimate total online auctions, the gross merchandise volume (GMV) for eBay, the market leader, was used. GMV is the total value of all successfully closed items between users on eBay's Marketplaces trading platform web sites during a specified period (*eBay 2008 Annual Report* (eBay, 2009)). eBay's (2009) GMV was reported as \$59.7 billion (*eBay 2008 Annual Report*). Sales of vehicles were not counted to avoid artificially inflating the researcher's estimate of the market.

In 2001, it was estimated that eBay's GMV accounted for 64 percent of the online auction market (Saliba, 2001). eBay does not have the same dominance over the online auction market that it did in 2001. The emergence of other online auction sites, particularly Amazon, along with problems from eBay's site have prompted some online auction business to move elsewhere. Also, it is natural that as the industry develops more competitors will emerge and decrease eBay's market share further. In 2008, Amazon was the second largest online auction house with a GMV of \$7.5 billion (Wingo, 2009). However, eBay's GMV was still approximately eight times greater than Amazon's. The researchers estimate that eBay still constitutes at least 60 percent of the online auction market. Using eBay's, 2009 GMV of \$59.7 billion and their estimated market share of 60 percent, the total GMV for the online auction market was estimated to be \$99.4 billion.

6.5 Salvage dealers

The name "salvage dealers" implies a lack of sophistication that does not adequately reflect the nature of some of the businesses in this sector. These businesses perform a very important sustainable function in the reverse logistics flow. Salvage dealers can often be very profitable businesses, managing to optimize revenues for items that became unprofitable for entities forward in the supply chain. The first level of salvage dealers in the returns supply chain are typically bulk buyers that purchase large amounts such as truckload quantities and then break them down to smaller amounts such as pallets or individual units. Salvage dealers in the USA include firms such as Jacobs Trading, Gordon Brothers, Genco Marketplace and GAT Trading.

In Figure 1, three levels of salvage dealers are shown. In any reverse supply chain where a salvage dealer is involved, there is often more than one salvage dealer in the channel. The depiction of three levels of salvage dealers is a generalization. In many cases, there maybe less than three, and in a few cases there maybe more than three. Salvage dealers are the critical enablers of the secondary market and the reverse logistics stream. They perform a crucial role that is similar to wholesaling in the forward channel. They buy in bulk and develop an assortment of product that maybe specialized or organized in a fashion to optimize revenue and profit. The reverse channel would not work nearly as well without salvage dealers. They also are an important part of slowing down the number of items that end up in a landfill.

Blumberg (2009) completed an econometric forecast in September 2009 and estimated the size of the salvage inventory market for 2009 at \$4.17 billion. This is substantially smaller than the estimate developed in this paper. Blumberg anticipates that the salvage dealer market will grow at a compounded average growth rate of 6.1 percent between 2009 and 2015.

The salvage market is made up of hundreds of salvage dealers that operate independently, and there are no trade associations to provide any estimates of the sizes of the market. To estimate the size of the salvage dealer segment, our estimate is based on data from the 2007 Economic Census. NAICS code 443 is electronics and appliance stores, and we subtracted 44311 household appliances and 44313 camera and photographic supplies, to arrive at the total sales volume for all computers and consumer electronics, of nearly \$88 billion. We also included 4,481 clothing stores (\$158 billion), 4,521 department stores (e.g. Macy's, Sears, \$210 billion), 4,529 general

merchandise stores (e.g. Target, Wal-Mart, \$368 billion), and 4,541 electronic shopping and mail-order houses (\$216 billion). Together these sectors represent over \$1 trillion in consumer spending.

For each sector, we estimated the percentage of sales returned by customers, based on previous estimates in the literature (Rogers and Tibben-Lembke, 1999), and interviews with returns experts (Greve, 2009; Shear, 2009; Valstad, 2009). From these sources, we also estimated the percentage of these returns that would be sold on the secondary market. Some of these items will be resold at the primary sales outlet, and some maybe sent for materials reclamation and parts harvesting. Certain items will be returned by the retailer to the vendor for credit, but in the end those items may still end up on the secondary market.

As described earlier, marketing returns are items that are removed from retail stores or distribution centers because they did not sell. According to a former executive for a major national retailer, marketing returns across all of these categories can be conservatively estimated at 7 percent (Valstad, 2009). Applying this percentage to the total sales, \$73 billion in product enters the secondary market from marketing returns.

These estimates are summarized in Table I, where a total of \$54 billion in consumer returns and \$73 billion in marketing returns is introduced to the secondary market. In total, this means \$127 billion worth of retail product enters the secondary market from all levels of the salvage dealer network.

Because of a lack of rigorous estimates of returns rates, numerous categories have not been included, such as health and beauty aids, home furnishings, home improvement, lawn and garden, and grocery products. By not including these categories that have total sales in the hundreds of billions, this estimate is decidedly conservative. This estimate is further shown to be conservative, because it does not include any consideration of new product that comes directly from manufacturers. Manufacturers frequently have excess product due to canceled orders or large lot sizes. They routinely sell off this excess product into the secondary market (Rogers and Tibben-Lembke, 1999; Tibben-Lembke, 2004), and this estimate does not include these volumes.

Figure 2 shows the flow of product between secondary market salvage dealers. Typically, retailers will sell to salvage dealers. These dealers have the ability to take all of the retailer's product in one transaction, and the retailer does not have to deal with several transactions to dispose of the unwanted merchandise (Tibben-Lembke, 2004). These large dealers, represented by the Level 1 Salvage Dealer in Figure 2, account for approximately 70 percent of the volume entering the salvage market (Shear, 2009; Valstad, 2009). The bulk buyer salvage dealers will then divide the truckloads into smaller lots that are sold to smaller dealers (Level 2 Salvage Dealer), who may then sort the items by style, type, etc. and sell these to dealers (Level 3 Salvage Dealer) who will sell the products directly to customers, either via online auctions or through some form of retail. Some secondary market retailers who sell larger volumes may buy directly from the Level 1 Salvage Dealer, and very large value retailers will typically buy directly from retailers (Shear, 2009; Valstad, 2009).

As the product flows from one level of the secondary market to the next, the dealers incur shipping and handling costs at each level of roughly 8 percent, and receive a profit margin of roughly 10 percent (Valstad, 2009). The dealers purchasing directly from retailers typically purchase at a cost of approximately 15 percent of the original wholesale cost of the item (Rogers and Tibben-Lembke, 1999; Valstad, 2009).

Table I.
Salvage dealer segment
development

	Retail sales (\$)	Average consumer returns percentage	Percentage of consumer returns that flow to secondary market	Consumer returns secondary market (\$)	Marketing returns (%)	Marketing returns secondary market (\$)
Computers and consumer electronics	87,664	6	75	3,945	7	6,136
Clothing stores	157,715	10	75	11,829	7	11,040
Department stores	210,142	6	75	9,456	7	14,710
General merchandise stores	367,865	6	75	16,554	7	25,751
Electronic shopping and mail-order houses	215,963	8	75	12,958	7	15,117
Total	1,039,349			54,742		72,754

Note: All values in millions

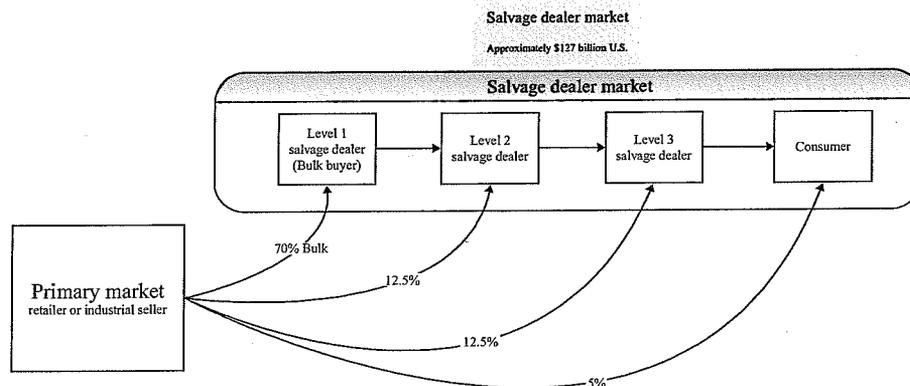


Figure 2.
Salvage dealer market flow

The price increases to approximately 18 percent for the Level 2 Salvage Dealers and 21 percent for Level 3 Salvage Dealers.

6.6 Factory outlets

A factory outlet store is a retail operation where manufacturers sell directly to the public through their own branded stores. These retailers can be actual physical stores or online destinations. In the beginning, a factory outlet was a store attached to a factory or warehouse. These factory outlets tend to be grouped together in a factory outlet mall. Factory outlet malls have become destination shopping locations in the USA, giving the manufacturer the ability to liquidate their excess and returned product at fairly high-price points. A traditional goal of the manufacturer is to recover 70 percent of the original retail price in a factory outlet store. In some cases, factory outlet stores such as Bose are able to recover more than 70 percent of the original retail price.

These factory outlets can be more profitable to the manufacturer than their primary markets. This is because the manufacturer gets to pocket all of the consumer's purchase and not just receive a wholesale price. If the price at the factory outlet is higher than the manufacturer's wholesale price plus expenses such as transportation and other costs related to operating and supplying the factory outlet store, it is likely that store will be more profitable than the manufacturer's primary market.

Since it is one of the most profitable dispositions, factory outlet malls are often the first place inventory is sent when it cannot be moved in a traditional retail store. Many of the largest retailers in the USA operate outlet stores where their goods can be sold at a discount. For example, Phillips Van-Heusen operates 642 such stores. The GAP also has a significant presence in the outlet market, operating 370 stores (*Value Retail News*, 2009a). In 2008, 316 outlet chains were operating nearly 13,000 stores (*Value Retail News*, 2009b).

It is estimated that the total leasable space available for all factory outlet malls in the USA in 2008 was 58,579,379 square feet, with the top three factory outlet mall chains having a 98 percent occupancy rate (*Value Retail News*, 2009b). The factory outlet mall industry reported an average revenue per square foot of \$301 for 2008 with a typical 95 percent occupancy rate (*Value Retail News*, 2009a). However, not all sales are of goods that can be strictly defined as secondary market products. A conservative estimate of the ratio of secondary market items to non-secondary

market items sold at factory outlets is 80 percent (Greve, 2009). To estimate the size of factory outlet mall revenues, 95 percent of the available square footage was multiplied by 80 percent of the average revenue per square foot. The product of these numbers, and the estimated size of the factory outlet mall reverse channel, is \$13,400 million.

6.7 Pawn-shops

A pawn-shop is a store that exchanges money for used items. Along with flea markets, this is a very low level of retailing and is typically a last stop for secondary market goods. It is a secondary market but is not nearly as important as most of the dispositions shown in Figure 1.

Typically, a pawn-shop offers far below market rates for any item that is traded for dollars. This is because many people who must pawn something cannot wait to sell it at market value and are in desperate need of cash. The pawn-shop might end up with an item they cannot sell for a desired price. In the USA, there are strict rules regarding the pawn-shop operation, including the length of time a pawn broker must wait to sell an item, and sometimes even the percentage of the market value at which an item can be pawned. These rules vary from state to state. Some of the rules are built to protect the potential, pawn-shop customer, and others are designed to make sure that any goods that are stolen and might be unknowingly purchased by a pawn-shop, can be traced back to the seller and possible thief.

The pawn-shop secondary market size was estimated by finding the cost of goods sold by the top three publicly traded US pawn corporations. These chains are EZPawn, Cash America International, and First Cash Financial Services. (Yahoo Finance, 2009c, d) The pawn market is heavily fragmented and it is estimated that the three biggest chains make up approximately 10 percent of the stores (Alexander *et al.*, 2004). The cost of goods sold for these three chains were added together and then multiplied by ten to estimate the total size of the US pawn industry. The pawn-shop secondary market segment is estimated to be \$5,655 million.

6.8 Dollar stores

Dollar stores are retailers that typically sell most of their items for very low prices. All of the items contained in the store are inexpensive, and the store often has a single price point for all of the items in the store. Merchandise in the stores include items such as health and beauty aids, cleaning supplies, toys, and food items. The concept of the dollar store originated with five and dime stores such as Woolworth's in the nineteenth century. This type of retailer disappeared in the mid-twentieth century, but with growth in the supply and access to excess inventory, they made a comeback beginning in the late 1980s. Dollar stores buy both new product and product derived from excess inventories. They purchase on the secondary market from manufacturers, retailers and salvage dealers. Salvage dealers tend to be the most consistent volume supplier of secondary market product to dollar stores.

The dollar store industry has grown by leaps and bounds in the last decade, with a 34 percent increase in locations since 2001 (Pinchevsky, 2009). About 23 percent of products in a Dollar store sells for or below one dollar. Paper products and cleaning supplies have been the most commonly purchased products. An estimated 65 million customers shopped at US dollar stores in 2008 (Nielsen, 2009).

The major obstacle in estimating the size of the dollar store industry is that there are many independent stores and small regional chains. Many of these independent stores and small chains are privately held, making it difficult to collect financial information. However, the three largest dollar store chains are publicly traded and their financial statements are available. These financial statements were used to find the cost of goods sold for Dollar General, Dollar Tree, and Family Dollar. These companies are the three largest dollar store chains by a wide margin. Dollar General is the largest chain and operates over 40 percent of the dollar stores in the USA (Zimmerman, 2005). Dollar General opened 400 new stores in 2009; and Dollar Tree and Family Dollar opened approximately 200 each (Jones, 2009). These are much larger expansions than any other dollar store retail chains made in the same period. The authors believe that this market dominance, combined with a research goal of developing a conservative estimate of the secondary market, allow for these three chains to be used as a proxy for the entire market.

It is estimated that 80 percent of the goods sold in dollar stores were supplied through an asset-recovery process (Greve, 2009). The size of the dollar store secondary market was estimated by adding the revenues of the three largest publicly traded US dollar store chains, and multiplying that number by 80 percent. The estimated size of the dollar store secondary market segment is \$17,669 million (Yahoo Finance, 2009a; Bloomberg *Businessweek*, 2009a, b).

6.9 Flea markets

A flea market is a throwback to the Roman forum or the Middle Eastern bazaar. They typically consist of many individual sellers operating in close quarters. These flea markets can be either held in a building, or more commonly, outdoors in a venue such as a old drive-in movie theater or a large parking lot. Entrepreneurs that operate fleamarket stalls typically source product from many different suppliers. Some of these operators manufacture their own crafts, but the majority purchase from salvage dealers or auctions. Since there are several levels of salvage dealers, a flea market entrepreneur may purchase items to sell from any of the different levels. A recent trend in southern California flea markets has seen retailers buying stalls in order to liquidate their inventory (Chang, 2009).

Flea Markets were included in our estimate because they represent an important part of the secondary market. In 2006, the GMV of US flea markets was estimated at \$30 billion (Barron, 2006). Since 2006, flea market sales are up 10-15 percent (Blakewood, 2009). A conservative estimate then would be that the flea market revenues are approximately \$33 billion in the USA.

6.10 Charities

Charities such as Goodwill and the Salvation Army purchase product from retailers and salvage dealers to put in their stores. The mission of these charities is to provide an inexpensive outlet for clothing and other needed supplies for very low-income consumers. In addition to purchasing items, these charities receive donations from businesses, groups, and individuals. They also purchase product from retailers and salvage dealers. For example, Goodwill purchases clothing and other product from Target Stores when Target is unable or unwilling to liquidate those items through other channels. There is also a sustainable reason for Target and other retailers to send product to charities.

Companies can receive significant financial benefit from donating product to charities. The corporate marginal tax rate for incomes above \$18 million is 35 percent (Internal Revenue Service, 2009). So, if a company donates product valued on its books at \$100 to a charity, its taxable income is reduced by \$100, saving it \$35 in taxes. If the other disposition opportunities would yield less than 35 percent of the item's cost, the firm is better off financially to donate the product, instead of selling it.

The estimate for the charity segment was calculated by adding up the sales revenues from the two biggest US charities, the Salvation Army and Goodwill. The combined sales revenue for these two chains in 2008 was \$2.7 billion (Goodwill Industries Inc., 2009; Salvation Army, 2009). This is a conservative estimate of charity secondary market.

6.11 Value retailers

Value retailers are a growing segment of the secondary market. Retailers in this sector include stores such as Big Lots, TJ Maxx, Marshall's and Ross. These stores often sell excess product that has been returned from the retailer to the manufacturer or sold to a salvage dealer. A primary product is an item that was for sale at a department store or specialty retailer one or two seasons previously.

The value retailer segment was estimated by calculating the combined revenues of the largest publicly traded value retail chains. This number underestimates the total size of the value retailer secondary market, because estimated revenues of privately held firms in this segment were not included. The value added to the secondary market by value retailers in in 2008 was \$30,013 million (Yahoo Finance, 2009b; Big Lots, 2009; Ross, 2009).

7. Total US secondary market

Summing the totals from each secondary market segment examined in this paper gives a conservative estimate of over \$329 billion in the USA for 2008. Without the secondary market to efficiently wick away product that cannot be sold through a primary market, many of these goods would be thrown away. It is useful to understand the size and structure of this market because of its environmental, social and economic impact. As has been explained through out the paper, the secondary market provides environmental and social benefit, and is a significant portion of the US economy. In Table II, the various segments are compared.

7.1 Secondary market relative to GDP

As is clearly understood from the previous sections of this paper, the secondary market is a large portion of the US economy. The methodology utilized here to estimate the size of the secondary market is deliberately conservative. The researchers estimate that the secondary market in the USA totals \$329,458 million and is approximately 2.28 percent of 2008 GDP (Bureau of Economic Analysis, 2009). The estimated values of each sector of the secondary market is listed in Table II.

The concept of GDP has been defined to be "The market value of final goods and services newly produced within a country's borders within a fixed time period" (Abel *et al.*, 2008). This means that much of the value of the secondary market as defined here does not show up as a final good or service and is not included in GDP.

		Product stewardship
Auctions	99,416	
Outlets	14,105	
Dollar stores	17,669	
Flea markets	33,000	
Pawn-shops	565	
Charity	2,691	
Value retailers	30,031	
Retail salvage goods	127,496	
Total size of secondary market	329,458	
2008 US GDP	14,440,000	
Secondary market as a percentage of GDP	2.28	153
Note: In millions dollars		Table II. Secondary market relative to US GDP

Items that are not part of retail sales or the final step of a supply chain in an alternate channel are not included in US GDP calculations.

8. Sustainable impact of asset recovery and the secondary market

Product stewardship that includes asset recovery and the secondary market can be a critical part of a firm's sustainability strategy. It is environmentally positive to find additional use for an item or asset. The reuse of an item, or new utilization of a product that did not sell through at its primary market avoids the landfill until much later in the product life cycle. It could be argued that a robust secondary market does not avoid the ultimate disposition of a landfill, but merely postpones it. That postponement will mean that purchasers of the item from a secondary market are not buying new product fabricated from new resources. In addition to avoiding landfills, there is an avoidance of unnecessary resource usage. Even if moving product through a secondary market is only postponing the ultimate destination of a landfill, it is still worth doing. Stretching the product life as long as possible is environmentally responsible. The more times a product is refurbished and appears in the stream of commerce, the longer new product manufactured from virgin resources can be postponed. Sustainable supply management can be thought of as operating "dirt-to-dirt" where products start as base raw materials and eventually end up as the same thing much later.

With the environmental value of getting additional use from an asset and landfill avoidance, selling through alternative channels into a secondary market is generally socially responsible. Buyers that purchase from secondary markets may not be able to afford new product. For example, buyers do not necessarily choose a used car over a new car randomly. A large percentage of used car buyers could not afford a similar new vehicle. The secondary market provides buyers with options that would be inaccessible to them otherwise. In Zambia, the Salaula market consists of secondhand clothing that is sourced primarily from North America and Europe. In the Bembian language, *Salaula* means "to select from a pile in the manner of rummaging" (Hansen, 2000). This used clothing market is where much of the population shops for apparel. In rural or economically challenged areas, secondary market outlets make up a large percentage of shopping options. In the USA, the market power of those that live below the poverty line have the purchasing power of \$100 billion per year (Auray, 2009). This product stewardship and access is one of the important social benefits of having a vibrant secondary market.

The secondary market can be an important part of a sustainability program throughout the supply chain. There should be more work in linking the secondary market to sustainable practices. The secondary market provides an important social benefit by giving people opportunities to buy product and participate in businesses that they would be cost prohibitive in more expensive retail markets. Low-income shoppers are still the primary secondary market customer (Nielsen, 2009). For example, 45 percent of dollar store sales are from customers that have household incomes below \$30,000 annually. The secondary market also keeps product that has value out of landfills. This is a significant environmental benefit. One of the most important benefits of the secondary market is recapture of value. Another advantage is product reuse. These benefits can be socially and environmentally responsible and economically profitable. Expanding the secondary market and increasing the supply into those markets is sustainable.

There are risks with secondary markets in that some firms may take advantage of these markets and dump their unwanted product there. However, secondary markets can enhance product stewardship whether or not the firms that utilize them are well intentioned. Since they reduce the amount of product that is being thrown into landfills or disposed of improperly, and they also give people access to markets that they would not otherwise have, secondary markets can be viewed in a sustainability context regardless of the intentions of members of the reverse supply chain.

In addition to environmental and social responsibility concerns, the triple-bottom line includes economic performance. In many cases, the secondary market can be more profitable than the first-quality primary market. For example, a university bookstore will receive more profit from a used textbook that they purchase at a very low cost and resell for a price close to original retail than they will make on a new textbook purchase from the publisher. As mentioned previously, factory outlets can often be more profitable for the manufacturer than their normal wholesale channels. In the secondary market, the supply price is often flexible downward, and this gives secondary market sellers the ability to make a large margin between the price they paid for the product and the sales price.

9. Implications for research

The authors hope that this paper will encourage researchers to examine the secondary market and reverse supply chains in more detail. While the amount of research investigating sustainability and reverse logistics has grown substantially in the last few years, it is clear that there has not been adequate research into the size and other characteristics of secondary markets. Understanding the size and structure of the secondary market is an important step in product stewardship. Where products end up and how they get there can reveal much about designing, manufacturing and distributing sustainable products and processes.

In addition to further research needed in the USA, there should be work completed examining global secondary markets. In many countries around the world, the secondary market is the primary shopping option for the majority of people. There should be more research to study how people around the globe source product, manage return flows, and utilize the secondary market to meet their everyday needs.

As mentioned previously in this paper, electronic auctions are a fairly new phenomenon. Further research should be completed into how supply chains that feed the electronic auctions function. These electronic auction supply chains are not

well understood. To assess long-term economic performance, a longitudinal analysis over time examining changes in the secondary market would be useful. Such an analysis might measure the changes in dispositions, the impact on the environment, social responsibility, and financial performance.

Our analysis leads us to believe that this area of research has been unfortunately neglected. This neglect is probably partially due to the difficulty in finding data related to reverse logistics and the secondary market, and the fact that the secondary market helps manage what some would perceive to be a "waste flow." Costs and volumes related to the secondary market are not easily found. Firms do not typically have accounting systems that make it easy to differentiate between reverse and forward logistics. It is clear that there is great value in the secondary market for both buyers and sellers, and that utilizing this market properly can make a firm, its suppliers, and customers more sustainable.

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Further reading

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