PRODUCT RETURNS PROCESSING: AN EXAMINATION OF PRACTICES OF MANUFACTURERS, WHOLESALERS/DISTRIBUTORS, AND RETAILERS

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INTRODUCTION

Processing product returns has become a critical activity for organizations in the as the volume of goods flowing back through the supply chain rapidly increases (Guide et al. 2006). It has been reported that the value of products being returned exceeds an estimated $100 billion per year and averages about 6 percent of sales (Guide et al. 2006; Stock 2001). It is estimated that product returns could range from 15% for mass merchandisers to 35% for e-commerce retailers (Gentry 1999). Product returns are part of reverse logistics which includes a combination of other activities such as recycling, refurbishing, and repair, as well as waste disposal (Stock 2001). It is believed that while product returns are known to account for a large proportion of reverse logistics activities, manufactures are able to recover only a portion of the value of the returned products because of processing delays (Guide et al. 2006).

For more than two decades, practitioners and researchers have been concerned with issues relating to "product returns" and "reverse logistics." They have repeatedly advocated the need for more specific data, that is, empirical research on the topics (e.g., product remanufacturing and refurbishing, product returns, environmental aspects of packaging, product disposal, recycling, reusable containers, source reduction, life cycle analysis, product stewardship, green marketing, sustainability). Organizations have also realized that a better understanding of product returns and efficient management of reverse logistics can provide them with a competitive advantage. Sound practices in product returns and reverse logistics can be a "win-win" situation benefiting both customers and the firm (Stock 2004). When effectively handled, product return processes can help firms recover value. Furthermore, they can aid in the development of customer return policies that can increase customer loyalty (Rogers et al. 2002) and improve product sales (Mukhopadhyay and Setoputro 2005). Better understanding of issues related to product returns can also help identify areas in manufacturing or marketing where corrective actions might be necessary. In addition, with growing environmental concerns and legal regulations associated with green marketing and sustainability, activities related to product disposal in reverse logistics can provide insights into strategies for sustainable development (Srivastava and Srivastava 2006).

However, it is possible that some organizations still do not realize the critical nature of product returns as it relates to profitability and customer service, nor the benefits associated with efficient product returns. Organizations are more likely to perceive the product returns function as an additional cost to be incurred in their normal business practices (Stock 2004). In view of this, there is a need to understand the place of product returns and reverse logistics in an organization's marketing mix strategy, and the level of importance they would assign to reverse logistics as compared to traditional forward logistics.

Product return policies and processes differ by type of business. For example, manufacturers may want to define return policies in stricter and narrower terms and may be concerned about the more liberal return policies of retailers

(Gentry 1999). Firms also vary in whether or not they perform product returns processing in-house or outsource it to a third-party. Outsourcing or partnering with others can be an attractive option to exploit benefits of economies of scale if the firm's product return volumes are low (Stock 1998). Often, firms specializing in handling product returns are able to achieve economies of scale by combining volumes from multiple companies. Small individual firms see outsourcing to these firms as an attractive option to lower costs associated with processing product returns.

An important component of the reverse logistics process is to accurately evaluate each product returned in order to determine the most optimal disposition option. Typically, stations or physical locations are set up in the facility handling the product returns where personnel evaluate each item being returned. Personnel are trained to make determinations whether items should be discarded, repackaged, repaired, refurbished, remanufactured, or a myriad of other possible options (Rogers and Tibben-Lembke 1999; Stock 2004).

Product disposition is another area where further studies can help the process. Retailers may decide to return the product to the supplier due to defects, obsolescence or overstocks (Rogers and Tibben-Lembke 1999). Options for disposal processes of product returns can vary with firms and can range from refurbishing, reselling, recycling, or destroying the returned products (UK Department of Transport 2004). While some returned products can be repackaged and sold as new, due to legal or other restrictions some products can not be resold as new once the product has been returned by customers. For example, while an electronic part could be refurbished and sold, 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 land fills, 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. In view of this, manufacturers' desire to maximize profits often dictates the proportion of product that gets refurbished (Vorasayan and Ryan 2006).

Stock, Speh, and Shear (2002) state that in the U.S. consumers return products valued at more than $100 billion each year, which is more than the GDP of 66% of the countries in the world. As firms begin to grasp the cost implications of product returns, "return avoidance" is being considered as a desired alternative. The Reverse Logistics Executive Council (RLEC) states that return avoidance entails examining ways to minimize the number of products entering the return stream. Return avoidance, which can be acomplished by ensuring higher quality products, increasing user friendliness of product, and managing promotional programs aimed at unloading the products to the retailers, could be a critical part of a reverse logistics program.

This article uses the empirical data collected from manufacturers, wholesalers/distributors and retailers on product returns processing to achieve the following major objectives. First, results should facilitate a better understanding of what takes place in these business sectors and provide some benchmarks regarding reverse logistics practices. Second, it will examine several hypotheses that have been suggested in various published articles, but never tested. It is expected that testing of these hypotheses will help provide answers to questions such as the level of importance of product returns, whether recovered value is high enough to justify product recovery efforts, and the resources expended in various stages of the product return process.

SELECTED LITERATURE REVIEW

During the last decade, much has been published in terms of case studies and anecdotal information regarding product returns. However, there are relatively few research studies that have examined empirical data (Srivastava and Srivastava 2006). Stock (1992) was one of the earliest writers to call for more research in the area, although his White Paper on reverse logistics was primarily a literature review of the topic. Much of his research dealt with environmental aspects of reverse logistics, specifically source reduction, recycling, substitution and waste disposal. He developed five major findings: (1) logistics executives needed to anticipate future environmental regulatory changes; (2) logistics executives needed to be aware of the "green marketing revolution," (3) procurement should be aware of the need to acquire secondary raw materials, (4) logistics executives should implement efficient and effective reverse logistics systems, and (5) some management persons should be assigned reverse logistics and environmental responsibilities (Stock 1992, p. vi).

Sarkis (1995) addressed the reverse logistics chain and its role in product development, the product life cycle, and recycling. He provided examples for each item, and discussed and posited several issues that needed to be

addressed through further research. Later, Stock (1998) and Rogers and Tibben-Lembke (1999) expanded the view 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. These researchers included some empirical data about reverse logistics, but each employed different research designs in collecting their data.

Stock (1998) utilized qualitative methods to analyze published and proprietary company reports and other materials relating to reverse logistics and product returns. He then conducted in-depth case studies of several companies located in North America and Europe. His findings were based on a qualitative analysis of published documents and personal interviews with multiple executives in a number of companies. While he developed a large number of findings from his research, some of the most significant included the potential cost savings and customer service improvements that can result from implementing good reverse logistics practices, identifying the importance of process mapping of the reverse logistics process, highlighting the need for specific cost information regarding reverse logistics activities, recognizing that reverse logistics strategies and tactics require the multi-functional approach of many areas within and between firms, and good reverse logistics processes usually have positive environmental impacts (Stock 1998, pp. 7-8).

Rogers and Tibben-Lembke (1999) utilized a combination approach, i.e., company interviews and a mail survey of reverse logistics executives. Based on the findings, Rogers and Tibben-Lembke (1999) recommended that firms could improve the economics of reverse logistics by focusing on improving gate keeping technology, making disposition decisions earlier, decreasing cycle times by speeding up the pace of returns processing, and better data management. Both publications, while examining different industries and companies, highlighted the need for more empirical research on the topics of reverse logistics and product returns. Prior to these studies, most published material was anecdotal, that is, overviews of what individual companies were doing to handle product returns, reuse packaging, remanufacture or refurbish products, and other reverse logistics practices.

Much of the research on product returns and reverse logistics has been specific to an industry or product category. For example, Autry, Daugherty, and Richey (2001) reported on the predictors of reverse logistics performance and satisfaction for firms selling electronic goods through catalogues. They found that performance measured by indicators such as satisfaction and profitability was influenced by size of the firm, sales volume, and whether the company had an internal or external arrangement for disposition.

Other researchers such as Meade and Sarkis (2002) focused on the critical determinants in firm's selection of a third-party logistics provider. Their model suggested that product position in its life cycle, organizational strategic performance requirements, and the role played by reverse logistics in meeting firms environmental and customer needs, were important.

De Koster, de Brito, and Van de Vendel (2001) outlined the factors that contributed to combining or separating inbound and outbound flows during the handling of product returns for food stores, department stores, and mail order companies. Their findings suggested that retailers were not as good in performing reverse logistics compared to their ability in handling forward flows.

Richey, Genchev, and Daugherty (2005) examined automobile after-market firms and showed that reverse logistics program efficiency and effectiveness could be increased by innovation and properly allocating resources. Tan and Kumar (2006) compared the economics of refurbished parts versus part replacements for the computer industry. The findings of their study stated that delay in transportation associated with processing returns negatively impacts the economic viability of reverse logistics. Wu and Cheng (2006) looked at the supply chains in China, Taiwan and Hong Kong to identify problems and developed a common model of reverse logistics for the industries and companies examined. Their research led them to suggest that processing of product returns was not economically viable due to lower values of recovered products since the cost of recovery exceeded the recovered value.

Mukhopadhyay and Setoputro (2004) examined reverse logistics in an e-business context, specifically looking at pricing and return policies of Internet businesses. This study linked the e-tailer return policy to customer sensitivity to the rate of return parameter. Findings of this study suggested that sellers' return policies were more restrictive if customers were sensitive to the rate of return parameter and were more likely to abuse the seller's return policies. The same authors (Mukhopadhyay and Setoputro 2006) examined the role of 4-PL's in the

outsourcing of reverse logistics activities and identified situations where optimal "win-win" results could be obtained by all parties.

While each of the research studies examined a variety of reverse logistics issues, they were all in agreement that more empirical research needed to be done on the topic. As evidenced in the overview of logistics and supply chain management doctoral dissertations (Stock and Broadus 2006), more researchers have begun to examine reverse logistics/product returns. The authors identified 13 dissertations completed between 1999 and 2004 dealing with some aspect of reverse logistics/product returns. While 13 dissertations is not a large number, the number of dissertations increased twofold from the 6 dissertations published on the subject between 1992 and 1998. Only 12 were published in the twenty years between 1970 and 1991 in the U.S. As a result of the continuing calls for more empirical research on reverse logistics and product returns, this present research study was initiated to examine what reverse logistics activities were being undertaken within three major industry sectors—manufacturing, wholesaler/distributor, and retailing—and to identify some benchmarks for evaluating company practices. The focus of this research was only on product returns and not packaging materials or waste disposal.

HYPOTHESES

Until recently, the majority of published articles on reverse logistics and product returns provided anecdotal evidence of the rising importance of these issues. While the assertions and recommendations were intuitively appealing and straightforward, most research studies have not specifically developed and tested hypotheses related to product returns processing. While this research was primarily descriptive in nature, some of the previously published literature suggested that certain hypotheses could be developed and tested. In those instances, this research study examined several previously untested hypotheses and they are discussed in the following paragraphs.

Academics and practitioners agree that there is a growing focus on reverse logistics and product returns as firms are beginning to take a strategic perspective of the process (Wu and Cheng 2006). Managers state that a well administered reverse logistics program can reduce costs, improve customer service, and project an environmentally friendly image, thus providing the firm with a competitive edge in the current market (Rogers et al. 2002; Srivastava and Srivastava 2006). Stockholders, on their part, place a lot of emphasis on effective reverse logistics and product returns partly prompted by the need to comply with legislative and legal obligations (Alvarez-Gil et al. 2007). The increased strategic importance and the realization of the competitive edge offered by effectively managed reverse logistics processes should make product returns a critical function.

One issue that has not yet been resolved is that of whether organizations should establish separate supply chain channels for forward and reverse logistics. Rogers and Tibben-Lembke (2001) stated: "for returns to be proceeded effectively and efficiently, they should usually be separated from the forward channel" (p. 141). Chopra and Meindl (2007) argued that because customer priorities and supply chain strategy for the distribution of products are different than for product returns, different supply chains should be established. Speh (2007) also seemed to infer that multiple supply chains are needed to handle forward versus reverse logistics when he stated: "reversing the flow of product in the supply chain… is a valuable service because reverse processes are outside the normal supply chain process and often require significant time and attention" (pp. 235-236). Finally, Wisner, Leong, and Tan (2005) seemed to take the view that reverse logistics could be accomplished in the same supply chain as forward logistics when they stated: "Extending integration can also include reverse logistics, or integrating the process of product returns back up the supply chain" (p. 458). The authors then went on to suggest that a separate reverse logistics channel could be established: "Competitive pressures, increased legislation, and the desire to better utilize resources are forcing many firms to design an effective reverse flow system" (p. 458).

None of these authors cited any specific research to support their positions, so it is possible that reverse logistics could be accomplished in the same or different supply chain channels, although most authors appear to support separate channels being established. Irrespective of whether an organization utilizes the same or different supply chains however, there is general agreement that some specific person, group or department should be directly responsible for reverse logistics.

Relating to the notion that a specific person should be directly responsible for reverse logistics, Stock, Speh, and Shear (2002) recommended that if the firm intends to make a profit on the product returns activity, then this

responsibility should be assigned to senior managers with good business acumen. Many of the firms surveyed in this research believed that the effectiveness of reverse logistics could be improved by making it a separate function in the organization instead of having it attached to the forward distribution network (Rogers and Tibben-Lembke 2001). Based on these previously published articles, the following hypothesis is presented:

> **H_1: Product returns are primarily handled by a management-level person in manufacturing, retailing or wholesale/distributor firms.**

Utilizing articles authored by House (1971) and Autry (2005), elevating reverse logistics and product return as a separate function at a management level would imply that reverse logistics and product returns processing should enjoy a similar status as that of forward distribution. Having reverse logistics as a separate function would also reduce or eliminate its subordinate status to forward distribution, thus minimizing chances of multiple reporting and role conflicts.

In organizations, managers are tasked with providing structure and specific directions in allocating tasks, establishing procedures, setting expectations and rewards, thus reducing ambiguity and conflicts regarding functions and goals (House 1971). Organizational behavior theories suggest that growth in organizations results in greater differentiation in structure (Blau 1970). When faced with handling (i.e., processing) multiple functions and different specialties, managers realize that they end up spending more time supervising these functions compared to managing a homogenous function (Blau and Schoenherr 1971). Research also indicates that formalization of rules, processes and procedures to guide operations increase efficiency (Autry 2005). Sub-division of responsibilities and creating a functional group is likely to improve performance (Blau 1970). Studies propose that functional differentiation and professionalization are known to infuse commitment to move beyond the current status towards greater acceptance of technological innovations and provide motivation to be recognized within the organization (Damanpour 1987). Having executives higher in the organizational hierarchy provides *weight* or importance to the function as these executives can act as champions for improvements and improve communication and coordination throughout the firm (Sinha and Van de Ven 2005). This would suggest that as the importance of the product return function increases, this function would require management by a senior executive in the firm. Based on this, the following hypothesis is presented:

> **H_2: A majority of manufacturing, retailing or wholesale/distributor firms are likely to have a single person responsible for product returns processing.**

Meade and Sakris (2002) found that selection of third-party options are often guided by a firm's strategic performance requirements. Businesses recognize the need to focus on core competencies and view third-party sources as a logical choice for handling reverse logistics activities in the absence of a separate function within the organization for product returns. Researchers also believe that firms should give serious consideration to third-party processing, if the current product return function is a part-time operation handled by more than one employee along with other functions (Stock, Speh, and Shear 2006). This is because third-parties with reverse logistics as a core competency have efficiencies of operation and are able to combine volumes from multiple companies for economies of scale (UK Department of Transport 2004). In addition, third-parties specializing in product returns have unique channels for product disposition in addition to providing a single central place for potential buyers of returned goods due to the large volumes they process (Rogers and Tibben-Lembke 2001). Thus, outsourcing is a viable option for firms without a dedicated returns process and for those that are unable to realize costs savings due to lower volumes of product returns (*Discount Store News* 1999; Gorick 2005). Based on these articles, the following hypothesis is presented:

> **H_3: When reverse logistics or product returns is not a single person responsibility, the product returns function is most often outsourced to third-parties.**

Another reverse logistics matter that has been examined by a number of writers has been the education and training of employees. Trade reports indicate that product returns may cost as much as three to four times the cost of outbound shipments (Andel and Aichlmayr 2002). Return product handling costs can be as high as $35-$42 billion per year or about 3-4 % of the $1.1 trillion 2005 logistics costs (Cooke 2006). This implies that there is an urgent need to improve the product return process to make it more effective and thus enhance competitiveness in the marketplace (Rogers and Tibben-Lembke 2001; Stuart et al. 2005). As the profile and visibility of reverse logistics

rises in the organization, processes and strategies for reverse logistics are also attracting greater interest and scrutiny (Rao, Stenger, and Wu 1994). In addition, since the returned product goes through various stages in the process, potentials for errors increase. To counter this, experts have recommended better training of employees in the product returns process as part of best practice (Stock 1996). Industry reports suggest that this training can be both formal and informal and can range from overseeing how returns are processed to teaching how to repackage items (Kuzeljevich 2004). Current training methods involve providing employees with operating procedures manuals, mentoring of workers by other more experienced employees, or more informal methods (Stock, Speh, and Shear 2006). Thus most of the training could be on-the-job training and may consist of looking over employee's shoulders. Based on these published articles, the following hypothesis is presented:

H_4: A minority (less than 50%) of firms use formal methods involving written materials, Internet, etc. to train employees involved in product returns processing.

Firms are motivated to recover as much value as possible from returned products. However, there is not enough published information about the recovered values of returned products in relation to the costs incurred in processing them. In fact, Wu and Cheng (2006) suggested that publishers are better off discarding the returns rather than processing them. Further, it is also believed that if the returned products remain longer in reverse channels, they can negatively impact profitability. This could be due to higher inventory levels, transportation and warehousing costs, as well as deterioration and product obsolescence with the passage of time (Blackburn et al. 2004; Stock 2001). On the other hand, if returned products are processed at points closer to the customer, the time lag is shorter as products avoid traveling up the distribution channel to the manufacturer and then back down to the wholesaler and retailer. Quicker processing and turn-around help recover greater value from the returned products (Rogers and Tibben-Lembke 2001). In view of this, it is likely that retailers who are closest to the consumer in the distribution chain should be able to get higher product recovery rates compared to wholesalers/distributors or manufacturers. Based on these articles, the following hypothesis is presented:

H_5: Recovery rates (as % of cost) are higher for retailers when compared to manufacturers or wholesalers/distributors.

Multiple authors have indicated that firms often utilize return authorizations (RA's) for accepting returns. Much of the published information on the use of RA's has been anecdotal, that is, viewpoints of practitioners working in the field of product returns, qualitative interviews of reverse logistics practitioners, and case studies of companies involved in various aspects of product returns processing (Guide and Van Wassenhove 2002; Mukhopadhyay and Setoputro 2004; Richey et al. 2005; Rogers and Tibben-Lembke 2001; Stock 1998, 2004). While the benefits of RA's seem apparent, there have not been any published studies that specifically demonstrate that a majority of firms utilize these documents as a means of processing product returns. In this research study, this specific issue is addressed, leading to the following hypothesis:

H_6: A majority of firms (more than 50%) use return authorizations (RA's) for accepting product returns.

Product disposition refers to the different ways business organizations try to recover the costs of the products that were returned. The following examples illustrate the multiple ways that returned items are processed. For items with product dating that are nearing their expiration dates, they can be maintained in temporary storage and picked and shipped to customers first. Thus, they are not "mixed" with other items with longer expiration dates (Stock 2004). If the products being returned are in damaged boxes, yet are in otherwise perfect condition, repackaging of the items can take place immediately if packaging supplies are maintained at the returns processing facility. While this is not a common occurrence, some computer and electronic components are processed in this way, resulting in the items being returned to inventory much more quickly (Stock 2004).

Another example in the electronic components industry occurs when returned items may only have small cosmetic imperfections that do not impact usability, or they may have a defective part that has been replaced and are now in working order, but not in "as new" condition. These items can be used as warranty replacements and/or resold with appropriate indication that they are not "brand new."

As per industry sources, often the returned items are in fact not defective but have entered the return stream because the customers changed their mind or did not understand how to operate the product (Rogers and Tibben-Lembke 2001). A recent study reported that retailers most often send back the non-defective customer returns to the

manufacturers without even testing them. This results in manufacturers returning these non-defective items directly back-to-stock or into inventory after a cursory examination (Rogers and Tibben-Lembke 2001). Studies indicate that between 17-20% of the product returns went directly back-to-stock to be sold as new (Blackburn et al. 2004; Rogers and Tibben-Lembke 2001). Based on these published articles, the following hypotheses are presented:

H_7: Manufacturers will have more product returns placed directly back-in-stock or inventory than retailers or wholesalers/distributors.

H_8: Manufacturers will have more products repackaged and returned to stock than retailers or wholesalers/distributors.

Often the manufacturers are concerned about selling the returned products to brokers. This is because, in addition to lower prices, manufacturers are concerned about the loss of "brand equity." Once the product is sold to the broker, manufacturers do not control how these products are sold. Firms fear the impact on brand image if these products end up in bargain outlets or sold in flea markets (Rogers and Tibben-Lembke 2001). Thus the final option for manufacturers, when the product can not be sold as is or can not be refurbished, is selling it as scrap or destroying it to recover primary materials. Thus, the following hypothesis is presented:

H_9: Manufacturers will have more returned products sold as scrap or destroyed than retailers or wholesalers/distributors.

The largest category of customer product returns is attributed to buyer's remorse, usage problems or defects (UK Department of Transport 2004). Retailers and wholesalers are at the front line and are closer to the customer and generally faced with more returns. Rogers and Tibben-Lembke (2001) showed that, in spite of the overall desire to tighten return policies, retailer return policies were still considered liberal. This liberal policy could have been based on the retailers' wish that manufacturers bear the cost of generous return policies (Tsay 2001). However, this seems to be changing. There are indications that the retailers are beginning to focus on individual customer profitability , minimization of unprofitable customer transactions, and getting rid of 'bad' customers (Triest 2005; Zeithaml, Bitner, and Gremler 2006). This would suggest an increased tightening of product return policies to discourage customers who indulge in too many returns. Several of the respondents in Rogers and Tibben-Lembke's (2001) study felt that the liberal return days are going to be a thing of the past – "it was mentioned in a number of interviews that the days of 'no questions asked' returns are ending" (p. 136). Based on these published articles, the following hypothesis is presented:

H_{10}: More product returns are refused by retailers than by manufacturers or wholesalers/distributors.

To test these hypotheses, a research design involving a mail survey of practitioners involved in reverse logistics/product returns was utilized.

METHODOLOGY

Practitioners involved in some aspect of product returns processing were the subjects of the data collection effort. Personal interviews were conducted with executives who had reverse logistics responsibilities at more than 20 manufacturers, retailers, and wholesalers/distributors. The firms interviewed were approximately equally distributed between the three groups. The interviews helped refine the questions being asked of survey respondents and also helped to supplement the data obtained via a mail survey of the Warehousing Education and Research Council (WERC) membership. The majority of survey questions were developed from the literature and/or the personal experiences of the authors from previous reverse logistics research. The interviews provided insights into the wording of the survey questions to maximize understandability and response rate. Respondents are more likely to answer surveys that they perceive to be relevant to them and what they do. The actual site visits required 4-6 hours of time and involved tours of the product returns processing facility.

An interview guide was used for all site visits, although a few questions varied between firms because they were partially dependent on the specific products, customers, and markets of each firm. In about 75 % of the firms

who agreed to participate in the site visit phase of the research, confidentiality or non-disclosure agreements were used. As a result of the site visits, a review of secondary source materials and the researchers' experience in the field, a 4-page mail survey was developed and pre-tested with more than two dozen practitioners directly involved in reverse logistics activities (Note: a copy of the survey instrument can be found in the Appendix).

With the development of the finalized instrument, three mailings of the survey were sent to manufacturer, retailer, and wholesaler/distributor members of WERC. Potential respondents to the survey were selected from a review of the WERC membership list. First, the list was reviewed and only manufacturing, wholesale/distributor and retailing firms were included. If only one person was shown for a particular company, they were selected if they held some type of management position. If more than one individual was a WERC member from a specific company, the titles of the persons were examined. If one of the members had specific reverse logistics or product returns in their job title, they were selected. If not, and this was typically the case, the highest ranking person in the company was selected. It was believed that the senior person would have the most knowledge about their firm's product returns processing.

The survey questionnaire indicated that this was a WERC-sponsored research project. Respondents were asked to indicate the type of business organization at which they were employed from the choices provided (manufacturing, retailing, wholesaler/distributor, government, or other). Survey questions also required them to choose the industry category from the seventeen sectors (categories) provided. (e.g., pharmaceutical, appliances, electronics). In addition, they were asked to indicate their job title from the list of job titles (corporate officer, manager, director, supervisor, staff specialist or other). Finally respondents were asked to indicate their primary job responsibility; the one responsibility that required most of their time (general management, logistics, marketing, reverse logistics, warehouse operations or other).

Respondents could request a summary of the survey findings by sending their business card with their returned survey, by indicating their name and address on the survey, or by requesting the survey results in a separate letter. An e-mail pre-contact from WERC was sent to all potential respondents approximately 7-10 days prior to mailing of the survey, encouraging their response to the survey they would be receiving. As a result of these efforts, the total response rate for the survey prior to the removal of some responses that failed to provide necessary information for analysis was 242 (22.1 % of 1095).

Tests for Non-response Bias

The four-page surveys were color coded for each mailing and as responses were returned, they were date stamped so that early versus late respondents could be compared and thus test for non-response bias (Armstrong and Overton 1977). Responses were received over an eight-week period. Differences between early and late respondents were checked using the 145 responses received during the first two weeks versus 45 responses received during the last three weeks. ANOVA models and t-tests did not show any statistically significant differences in responses between the early responses versus late responses.

As an additional test for non-response bias, a single mailing of a one-page survey to non-respondents was done two weeks after the third mailing of the four-page survey. A total of 103 one-page surveys were returned, which were used as a second measure to test for non-response bias. Such tests for non-response bias are important in that the results of the survey could not be generalized to the population-at-large if bias existed.

After analysis of the early versus late respondents and a comparison of the non-respondents to those completing the full survey, it was determined that there were no statistically significant differences that existed and results obtained could be generalized to the entire WERC member population of manufacturers, retailers, and wholesalers/distributors.

Sample Summary Statistics

The survey responses represented a total of 16 industry sectors plus "other." Of the 230 responses, 23 did not indicate any industry category, and 55 responses stated their industry as "other." Six industry sectors, namely, Automotive (11), Chemicals & Plastics (10), Clothing & Textiles (12), Department Stores (14), Food & Beverage

(42) and Paper and related (17) sectors accounted for most of the (106 out of 230) responses. The remaining 58 responses were distributed among the 10 other industry categories named in the survey.

Respondents included Corporate Officers (N = 40), Directors (N = 60), Managers (N = 108), and Supervisors (N = 7). Fifteen indicated "Other" and 12 respondents did not indicate their position. Of the business groups, responses were provided by manufacturing firms (N = 92), retailing (N = 23) and wholesalers/distributors (N = 115). There was only one (1) response from government, seven (7) indicated "other" and four (4) did not indicate any business group. In sum, the majority of the respondent population consisted of approximately equal proportions of manufacturers and wholesalers/distributors, with a small number of retailers included. In view of this, all the analyses were conducted by using the 230 responses from three business groups: manufacturers, retailers, and wholesalers/distributors.

FINDINGS

SPSS 14 for windows was used for conducting the analysis. Descriptive statistical analysis and ANOVA comparisons were used to test the various hypotheses. Contingency table analysis utilizing the Chi-square statistic was used for the nominal-scaled data. When the overall Chi-square was significant, the various pairs of attributes were examined to determine which relationships were statistically significant. The findings of the study are presented in two parts. In the first part we describe the details of the product return process based on the study data. In the second part we provide results from testing the stated hypotheses.

Section I: The Product Returns Process

Steps in Product Returns Processing

In general, product return process activities can be grouped into four steps or stages: (1) Receiving—includes unloading, distribution of product returns to processing centers; (2) Processing—consists of activities such as data entry and issuing customer credits; (3) Sortation—inspection and routing of returns to disposition point; and (4) Disposition—putting the product back into inventory or temporary storage, repackaging, repair, refurbishing or remanufacturing. It could be argued that there is a step that precedes these four which might be labeled "pre-receipt." This would include activities such as shipping the product returns to the processing facility, getting authorization and completing the return authorization forms, and preparing the returned item for processing. In this research, we specifically examined the process once the items reached the product returns processing facility.

Survey results indicate that the last three (2, 3, and 4) steps consume a large percentage of the time spent in product return process. Results indicate that on average, respondents in the three business groups spent about 31% of the time on processing, about 26% on sortation, 26% on disposition and about 17% on receiving.

Use of Warehouse Space

Almost all respondents in the three business types (>90%) indicated that they used their regular warehouses/distribution centers to process product returns as opposed to having a dedicated returns processing facility. Most manufacturers and wholesalers use less than 25 % of their existing warehouse space for processing returns. Interestingly, about 19 % (4/23) of the retailers indicated that they used more than 75 % of their warehouse space for returns processing, suggesting that they combined forward and reverse logistics in the same area. Of course, this would apply to retailers that have dedicated product returns processing facilities. Facilities performing both forward and reverse logistics activities would only utilize a small portion of their buildings for processing product returns. Compared to this, 1.3 % (1/78) of manufacturers and 2.9 % (3/103) of wholesalers indicated use of more than 75 % of warehouse space for product return processing. This finding is consistent with the researcher's experience that retailers utilize dedicated product returns facilities to a larger degree than do manufacturers and wholesalers/distributors. Typically, retailers will see more returns than other supply chain members who are further away from the final customer.

When return rates and/or volumes are low, a combined facility is usually optimal. A combined facility is defined as a warehouse or DC where both forward and reverse logistics activities occur in the same location. When

return volumes are low, they can typically be handled in a portion of the warehouse or DC where forward logistics takes place. When return volumes are high, or when significant processing of the returns is necessary, such as refurbishing or remanufacturing of the items, a dedicated facility makes more sense.

Warehouse Operations

Respondents indicated that a total of 1725 full time employees (FTE) were involved in warehouse operations. Of these, 1217 (71 %) were classified as operations (those people that actually handle the returns), 238 (14 %) administrative/clerical, 157 (9 %) supervisory, and 113 (7 %) managerial employees. On average, there were 6.6 FTE operations workers, 1.6 FTE administrative positions, 1.1 FTE supervisory positions, and 1.2 FTE managerial positions in the warehouse processing product returns.

Product Disposition

Product disposition refers to the ways business organizations deployed to recover the costs of the products that were returned. Products that went through the return process were generally dispositioned as follows:

1. returned directly to inventory
2. repackaged and returned to inventory
3. repaired or refurbished
4. destroyed or sold as scrap
5. turned over to a third-party/secondary market
6. donated to charity

Often, product disposition is handled in multiple ways as opposed to a single approach. As shown in Table 1, responses suggest that 88.3 % of them send a portion of their products directly to inventory, 81.8 % destroy or sell portions as scrap, 61.4 % repackage items and return some portion to inventory, 4.1 % refurbish, and 37 % indicate they donate some product returns to charity. This indicates that the returning to stock either directly or by repackaging and selling as scrap are the two major disposition methods. The survey did not specifically examine what recovery percentage was obtained from each disposition option nor was data collected regarding the actual amounts of returned products placed back into inventory, and these questions will have to be answered with additional future research. For example, even though a large percentage of survey respondents (88.3 %) return items directly to inventory, we do not know how many products that represents. It is also possible that a product category or SKU is returned to inventory, but only a small percentage of all of the products or SKU's received.

TABLE 1

PROCESSED PRODUCT DISPOSITION
(% responding that they utilize the method of disposition)

Method of Disposition	Percent Response	Recovery Rate
Returned directly to inventory	88.3 %	High
Repackaged and retuned to inventory	61.4	High
Repaired or refurbished	4.1	High
Destroyed or sold as scrap	81.8	Low
Third-party/secondary market	19.0	Medium
Donated to charity	37.2	Low-Medium
Other	19.9	Low

Existence of Published Standards

Respondents were asked about the existence of published standards for each step of the product returns process. For the receiving activity, manufacturers and retailers indicated that they used standards about one-half of the time. Wholesalers/distributors did not use standards for receiving as often (42 % of the time). In the processing activity, results were similar. Manufacturers and retailers utilized standards about two-thirds of the time, while wholesalers/distributors used them about one-half of the time. For sortation, only retailers used standards frequently (64 % of the time), while manufacturers and wholesalers/distributors employed standards 46 % and 39 % respectively. Finally, for disposition, all respondent categories utilized standards about one-half of the time. However, these differences among the components of the product return process were not statistically significant.

With reverse logistics and product returns programs still not fully developed in some firms, it was not surprising that a larger number of companies did not have standards in the product return process. On the other hand, a reasonable number had standards, so there is progress taking place regarding firm's awareness that reverse logistics is an important aspect of the business. As more firms place additional emphasis on managing product returns more effectively and efficiently, the use of standards will no doubt increase.

Type of Standards Used

Respondents were asked to indicate the type of standards used by them for the eight activities commonly used by firms in evaluating product returns processing efficiency and effectiveness (see Table 2). Responses suggested that a majority of the respondents in all three business groups did not use standards for these activities. When the business groups did use standards, the extent of the use of standards varied. This reflects the general condition relative to the use of standards and metrics within many companies and industries and has been identified as an area of "need" in supply chain performance standards.

For example, the Council of Supply Chain Management Professionals has published a series of S*upply Chain Management Process Standards* that includes the returns process. Supply Chain Visions, the author of the series, identified five process areas where standards were required: (1) Receiving and warehousing; (2) Transport; (3) Repair and Refurbishment; (4) Communicate; and (5) Manage Customer Expectations. They also identified typical best-practice processes. To illustrate, as part of receiving and warehousing, the sub-process of "systems integration" was identified. A suggested minimum process standard was the following: Order management and returns processes are integrated using common systems to capture orders, shipments, and return authorizations/information. The authors identified the following as a best practice: Returns are matched against original orders by item and quantity (Supply Chain Visions 2004).

Table 2 shows the percent of respondents in each group indicating that they use standards for the above eight activities. It appears that use of standards seems to be higher for activities 1, 3, 4 and 6 for retailers and 1-3, 6, and 7 for wholesalers. Part of the reason for this is that retailers and wholesalers/distributors are positioned closer to the final customer and are expected to be more responsive to customer returns. Thus, they would be more likely to have standards for product returns processing. The results in Table 2 indicate that a higher percent of retailers use standards for pieces/returns handled by employee per hour (activity 1) compared to wholesalers and manufacturers.

A higher number of retailers also used standards for total pieces/returns processed per day and error rates for items scanned (activity 3 & 4). A higher percent of wholesalers used standards for time from receipt to crediting customer's account (activity 2) as well as for assessing total returns processing time (activity 6). There were no significant differences in the respondents regarding the use of standards for time to receipt to initial returns processing (activity 7) step and for assessing the number of pieces returned to stock per day (activity 8). Almost none of the manufacturers used standards for assessing error rates for items scanned (activity 4), perhaps assuming that such errors would be minimal since all of the returns they receive should be theirs and not some other manufacturers.

In general, successful management of reverse logistics/product returns requires the use of productivity, utilization and performance metrics. For each category, the following definitions are offered (A. T. Kearney 1991).

Productivity = Output produced ÷ Input consumed
Utilization = Capacity or resources used ÷ Capacity or resources available
Performance = Actual output produced ÷ Standard output produced

TABLE 2

USE OF STANDARDS IN THE PRODUCT RETURN PROCESS
(% responding that they utilize standards)

	Type of Business Organization			
Activity	Manufacturing	Retailing	Wholesaler	χ^2
1. Pieces/returns handled by employee per hour	10 %	52 %	23 %	0.00
2. Time from receipt to crediting of customer account	16	14	30	0.04
3. Total pieces/returns processed per day	19	48	26	0.02
4. Error rates for items scanned	1	33	11	0.00
5. Error rates for incorrect disposition	1	20	7	0.00
6. Total returns processing time	13	23	28	0.03
7. Time from receipt to initial returns processing	17	19	26	0.27
8. Number of pieces/items returned to stock per day	11	23	20	0.26

Table 3 identifies some selected metrics used by companies to more efficiently and effectively manage the reverse logistics/product returns process. The metrics should be useful for companies seeking to measure and evaluate various aspects of their product returns/reverse logistics process. Not every metric will be useful for every firm but they do provide a good starting point for companies.

Section II: Results of Hypotheses Testing

A total of ten (10) hypotheses were tested for this study using survey responses from 230 respondents. Results showed support for all of the hypotheses ($\alpha<0.05$) except for H_2, H_3 and H_7. H_1 was supported as the results show that return processing was generally assigned to middle or senior management positions in the organization. As shown in Table 4, out of the 230 total responses, 208 (90 %) held managerial or higher positions. On a percentage basis, 47 % (108/230) of the respondents were managers followed by directors (60/230 = 26 %) and corporate officers (40/230 = 17 %). Chi-square ($\chi 2$) was 11.02, degrees of freedom (df) = 3, and p = 0.00. An analysis of the three combinations of business organizations (mfg.-retail; mfg.-wholesale; retail-wholesale) revealed that only the manufacturers and retailers were significantly different statistically (p = .02). Retailers were much more likely than manufacturers to have more senior management personnel responsible for reverse logistics.

TABLE 3

PRODUCTIVITY, UTILIZATION AND PERFORMANCE METRICS

Productivity Metrics

- Number of Employees (regular full time, regular part time, flex/temporary) per month (average of all days in the month, total at end or beginning of the month, or measured on a specific day during each month)
- Units processed per hour, day, month and/or week (overall, receipt, initial sort, refurbishing, return to vendor, charity/donation, destroy)
- Cost per unit returned for: labor (returns processing labor, contracted labor, other), supplies, packaging, administrative
- Number of units/pieces processed per hour (overall and for each employee) for each stage of the product returns process
- Labor cost per piece received
- Percentage of total units/pieces bar-coded
- Units/pieces received divided by units/pieces salvaged on a daily, weekly, or year-to-date (YTD) basis
- Number of pallets received versus number of pallets processed
- Total number of product scans at initial processing per hour, day, week or YTD
- Number of returned pieces/items still not processed after 48 hours (time will vary by company and individual standards)
- Total units/pieces received versus RA units/pieces authorized
- Percentage of items authorized for return but not received
- Percentage of items received and authorized
- Package condition of returns that are received

Utilization Metrics

- Amount of temporary storage space utilized at end of day, week or month
- Employees (regular full time, regular part time, flexible) used in returns processing versus employees available
- Number of totes/containers used versus number of totes/containers available
- Receiving and/or shipping doors used versus doors available
- Units/pieces received for each inbound transportation carrier (overall, daily, weekly, monthly, YTD)

Performance Metrics

- Sortation accuracy (total unit errors inventories that are inaccurately sorted as compared to total locations checked)
- Over/short accuracy (total items inventoried as compared to total items shipped)
- Salvage percentage for each product class/category
- Hours required to complete each stage of the returns process and hours overall (broken down by employee, product category/class, time period)
- Units/pieces processed per hour, day, week and YTD
- Salvage value per unit/piece
- Accuracy level for each employee in terms of number of items handled, number of errors, and percentage correct decisions
- Damage amounts (in units, percent of the total) by type of damage

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Source: Stock, J. R. (2004), *Product Returns/Reverse Logistics in Warehousing: Strategies, Policies and Programs*, Oak Brook, IL: Warehousing Education & Research Council, pp. 53-55.

TABLE 4

JOB TITLE
(Number of Responses)

	Type of Business Organization				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
Corporate Officer	3	5	32	40	0.00
Director	24	3	33	60	
Manager	57	12	39	108	
Other/Supervisor	8	3	11	22	
Total Number of Responses	92	23	115	230	

Note: Cramer's V = 0.2506.

Hypotheses H_2 which stated that majority of manufacturing, retailing or wholesale/distributor firms are likely to have a single person who is responsible for product returns processing was not supported. Results show that except for retailer sector, product handling was a multiple person responsibility. As shown in Table 5, 65 % (58/89) of manufacturers and 55 % (63/114) of wholesalers indicated that product handling was a multiple person responsibility while 65 % (15/23) of the retailers indicated it was a single person responsibility. Chi-square (χ2) was 7.2, degrees of freedom (df) = 2, and p = 0.03. An analysis of the three combinations of business organizations (mfg.-retail; mfg.-wholesale; retail-wholesale) revealed that only the manufacturers and retailers were significantly different statistically (p = .02). Retailers typically had a single person responsible for product handling, while manufacturers had several people responsible.

H_3 was also not supported as results showed that majority of the firms have reverse logistics/product return function done in-house. About 75 % (72/97) of the respondents who had indicated single person responsibility for reverse logistics conduct product returns in-house. A majority of the respondents indicated in-house processing irrespective of whether a single or multiple persons were responsible for reverse logistics/product return functions. In fact, manufacturers' utilized 3-PL's only 25 % of the time, retailers only 18 % of the time, and wholesalers/distributors only 12 % of the time. The differences were not statistically significant, but it does show that most companies still perform product returns processing in-house.

TABLE 5

PRODUCT HANDLING RESPONSIBILITY
(Number of Responses)

	Type of Business Organization				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
Single Person	31	15	51	97	0.03
Several People (more than one)	58	8	63	129	
Total Number of Responses	89	23	114	226	

Note: Cramer's V = 0.1785.

TABLE 6

PRODUCT HANDLING RESPONSIBILITY—IN-HOUSE VS. THIRD-PARTY
(Number of Responses)

Single Person Responsibility	*Type of Business Organization*				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
Firm	23	11	38	72	0.07
Third-party	3	3	7	13	
Combination	5	1	6	12	
Total Number of Responses	31	15	51	97	

Further analysis showed that a small portion of the respondents indicated reverse logistics as their primary responsibility. Table 7 shows the breakdown for primary job responsibility. It appears that in spite of the growing importance of reverse product flows, few executives (6/227 = 2.6 %) in the industry have reverse logistics as their primary job responsibility. On the other hand, about 50 % (116/227) of all the respondents indicated that their primary job responsibility was Warehouse Operations and Management followed by General Management (50/227 = 22 %) and Logistics Planning (49/227 = 22 %). Thus, more often, the reverse logistics function is assigned as a part of some other organizational function such as Warehouse Operations, General Management or Logistics Planning. Chi-square (χ2) was 12.55, degrees of freedom (df) = 4, and p = 0.02.

An analysis of the three combinations of business organizations (mfg.-retail; mfg.-wholesale; retail-wholesale) revealed that manufacturers and wholesalers and retailers were significantly different statistically (p = .02). Wholesalers were significantly different than both manufacturers and retailers, in that they were much more likely to have general management responsible for reverse logistics activities. Wholesalers often have to balance the conflicting demands of manufacturers to overstock versus retailer's concern about finite selling seasons and uncertain demand (Tsay 2001). They also may have to consolidate returns from multiple retailers for economic processing of returned products. This would require that this function be handled by employees with good management skills.

TABLE 7

PRIMARY JOB RESPONSIBILITY
(Number of Responses)

	Type of Business Organization				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
General Management	13	2	35	50	0.02
Logistics Planning	23	8	18	49	
Reverse Logistics	2	2	2	6	
Operations/Management	47	10	59	116	
Other	5	0	1	6	
Total Number of Responses	90	22	115	227	

Note: Cramer's V = 0.1708.

In view of the above, handling of product returns is likely to be a multiple person responsibility in most organizations. These findings would support the conclusion that product returns processing is managed usually on a part-time basis by more than one employee in combination with other forward logistics activities. In addition, the study results show that over 80 % of the three business groups reported that they had less than five full time employees under managerial, administrative and supervisory category. H_4 stated that only a minority of firms use formal methods of training. Results support the hypothesis. Only 89 out of 228 (39 %) respondents indicated they had a formal method involving written training methods.

Recovery rate was defined as the monetary value recovered from the item being returned as a percentage of original cost after processing the returned product item. Overall results indicate a high rate of recovery. More than one-half of all the respondents (97/184) indicated that product recovery rate as a percentage of original cost was above 75 %. For this analysis, recovery rates as percent of costs were divided into four quartiles: small, medium, large and very large. Recovery rate was termed as "very large" for recoveries over 75 %, "large" for 51-75 %, "medium" for 26-50 %, and "small" for less than 25 % recovery. Again however, as in other product return activities, there was variability between the three business groups.

H_5 stated that recovery rates (as % of cost) for returned products are higher for retailers compared to manufacturers or wholesale/distributors. Study results supported this as 69 % (11 of 16) retailers reported recovery rates in the top quartile, followed by 61 % (58 of 95) of wholesalers and 38 % (28 of 73) of manufacturers. As we had hypothesized, closer proximity to the customers allows the retailers, and to some extent wholesalers, to put the returned product back to the stock to be sold thus avoiding potential for devaluing the product due obsolescence. Table 8 shows the quartile breakdown of responses for recovery rates by business group. Chi-square ($\chi 2$) was 12.74, degrees of freedom (df) = 6, and p = 0.05. An analysis of the three combinations of business organizations (mfg.-retail; mfg.-wholesale; retail-wholesale) revealed that only the manufacturers and wholesalers were significantly different statistically (p = .02). Wholesalers tended to recover greater amounts of the original cost of returned products than manufacturers. As stated before, wholesalers are much closer to customers in the logistics chain and thus are able to turn around the returned product quicker and realize higher returns.

TABLE 8

RECOVERY RATE AS A PERCENTAGE OF ORIGINAL COST
(Number of Responses)

	Type of Business Organization				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
Quartile 1 –Small (0- 25%)	15	2	9	26	0.05
Quartile 2 -Medium (26- 50%)	12	2	15	29	
Quartile 3 –Large (51- 75%)	18	1	13	32	
Quartile 4-Very Large (76% and above)	28	11	58	97	
Total Number of Responses	73	16	95	184	

Note: Cramer's V = 0.1861.

Being close to the point-of-sale, retailers have more disposition options as well as shorter processing time. These factors seem to result in retailers reporting high recovery rates while manufacturers who have fewer disposition options report lower percentage recovery rates. Clothing, textiles and general merchandise were in the high recovery category for retailers while it was automotive parts, paper and related products, food and beverages for wholesalers. For example, a large Internet and mail order catalogue retailer experienced 80-90 % recovery rates for its returned products. If the return requires minimal cleaning or replacement of missing or damaged buttons or clasps, and the garments only need pressing to remove wrinkles, in most instances, the item can be resold. Many of the items returned to the company were still in their original, unopened packaging and thus could be placed directly

back into inventory. On occasion, customers are known to order more than one size, color or style of an item to compare them with the intention of returning the ones they do not want.

Another clothing retailer, with both direct marketing and "brick and mortar" stores located in shopping malls, experienced similar recovery rates for returned products due to their thorough and detailed processing procedures. Employees tasked with processing returns are provided detailed instructions about steaming, cleaning, repairing and refurbishing items. The detailed instructions are provided so that employees fully understand the process and can accomplish their tasks in the shortest possible time period, with the results being lower costs and higher productivity levels (Stock 2004).

Additional analyses indicated that about 26 % of the retailing, 7 % of manufacturing and 9 % of wholesalers had more than 5 processing stations. Stations are physical locations where each product return is evaluated by a person and usually includes scanners and computers that allow personnel to input information about the product being returned. In essence, a higher percentage of multiple product return stations suggest that retailers handle significantly more returns than manufacturers or wholesales/distributors. Second, it would mean that retailers want returns handled more expeditiously compared to manufacturers and wholesalers. Third, retailers have the most complex returns processing since there could be multiple reasons for product returns. Table 9 provides details of product handling by the three business groups.

TABLE 9

NUMBER OF PRODUCT RETURN PROCESSING STATIONS (Percent Responses)

		Type of Business Organization			
		Manufacturers	Retailers	Wholesalers	χ^2
Number of Product Stations	0	8 %	4 %	3 %	.08
	1	67	48	62	
	2	13	9	15	
	3-5	6	13	12	
	>5	7	26	9	

Results support the hypothesis H_6 that majority of firms use "return authorizations" (85.4 %) for product returns and require a pre-approval (71.8 %) of the return authorizations for accepting product returns. We had hypothesized (H_7) that manufacturers will place a greater portion of products directly in stock compared to retailers or wholesalers. However, results of the analyses showed that the wholesale segment had the highest percentage of recovered product returned directly to stock (μ = 55.5, Std. Dev. = 32.3) followed by manufacturers (μ = 37.8, Std. Dev. = 30.8) and retailers (μ = 32.7, Std. Dev. = 34.4). The differences between wholesalers and the two segments were statistically significant (α = 0.05). There were no statistically significant differences in the mean percent of products returned directly to stock between manufacturers and retailers.

Hypothesis H_8 stated that manufacturers will have more product packaged and returned to stock compared to wholesalers/distributors. Results support this hypothesis as manufacturers had the highest percent (μ = 22.2, Std. Dev. = 25.2) while wholesalers had the lowest percent of returns being repackaged (μ = 12.3, Std. Dev. = 18.7) before returning to stock. We believe that food industry product returns to stock were primarily at the wholesale level and reflect the lower percentages of products being repackaged and returned to stock. Finally, in the product disposition area, H_9 was supported as wholesalers reported lower percent (μ = 14.4, Std. Dev. = 18.7) of product returns destroyed or sold as scrap compared to manufacturers who reported the highest percent (μ = 23.7, Std. Dev. = 26.7). The key factor of any product returns processing strategy is to identify the various options for the disposition of items and to select the option(s) that maximize recovery rate(s).

Hypothesis H_{10} stated that more product returns are refused by retailers than wholesalers/distributors or manufacturers. Results show that overall 51.3 % (118/230) of all the respondents refused to accept some of the product returns. Refusal to accept product return was highest for retailers at 65 % (15/23), followed by wholesalers

57 % (66/115) and lowest for manufacturers 40 % (37/92) thus supporting H_{10}. Chi-square ($\chi 2$) was 8.01, degrees of freedom (df) = 2, and p = 0.02. An analysis of the three combinations of business organizations (mfg.-retail; mfg.-wholesale; retail-wholesale) revealed that only manufacturers and wholesalers were significantly different statistically (p = .02). Wholesalers were significantly more likely to refuse product returns from customers (who would be retailers) than manufacturers (whose customers would be some combination of wholesalers and/or retailers).

TABLE 10

PRODUCT RETURNS REFUSED
(Number of Responses)

	Type of Business Organization				
	Manufacturers	Retailers	Wholesalers	Total	χ^2
Not refused	55	8	49	112	0.02
Refused	37	15	66	118	
Total Number of Responses	92	23	115	230	

Note: Cramer's V = 0.1866.

SUMMARY AND CONCLUDING REMARKS[1]

In this empirical examination of product returns processing in the manufacturing, wholesale/distributor and retailing sectors, it was found that in spite of the growing importance of reverse logistics and product returns processing in the business and academic literature, these activities have still not assumed a widespread high level of importance within organizations. While senior executives are often given the responsibility of overseeing the process, it is not their main function. It appears these executives generally handle this function along with other responsibilities, so in essence, product returns processing is still a "part-time" activity in most organizations.

As previously discussed in the Introduction and Selected Literature Review, others have commented on the potential benefits associated with having dedicated product returns personnel. There is no substitute for full-time effort being devoted to a process such as product returns. Part-time effort does not allow sufficient time to fully evaluate and investigate potential improvements in the process nor provide the day-to-day oversight needed to ensure the process runs smoothly. Also, by having a full-time manager in charge of product returns, better coordination of forward and reverse logistics can occur.

Regarding all of the hypotheses being examined, Table 11 provides a summary of the hypotheses that were tested.

We found that business types typically use a single labor shift operation for the product returns process. This was not unexpected inasmuch as the vast majority of organizations have a relatively small to moderate amount of products being returned, thus requiring less time and fewer employees to handle returns. On average, organizations employ 6.6 FTE (full time equivalent) production workers, 1.6 FTE administrative persons, 1.1 FTE supervisory persons, and 1.2 FTE managers in the facility that processes product returns. Additionally, the majority of the facilities operate with only a single product returns processing station.

As seen from the on-site visits, firms utilize a fairly consistent process for handling product returns; that is, the steps or stages employed for processing product returns does not significantly vary from firm to firm. Once products are received and the processing of the returns begins, the three most common methods of product disposal were

[1] Material presented in this section are based exclusively on the mail survey, company interviews and on-site visits, and/or previously published research that was cited earlier in the paper.

returning the product directly to stock, selling the items as scrap, and returning items to stock after repackaging (although repackaging was less common in the food and beverage industry). In some instances, the percentage of returns that go back into inventory for resale was much higher than has been previously reported in the literature. Obviously, the recovery rates for items that go back into stock for resale are much higher than most other disposition options, which accounts for the higher than expected recovery rates measured in this research study.

TABLE 11

HYPOTHESES TESTING

	Hypothesis	
H_1	Product returns are primarily handled by a management-level person in manufacturing, retailing or wholesale/distributor firms.	Supported
H_2	A majority of manufacturing, retailing or wholesale/distributor firms are likely to have a single person who is responsible for product returns processing.	Not supported
H_3	When reverse logistics or product returns is not a single person responsibility, the product returns function is most often outsourced to third-parties.	Not supported
H_4	A minority (less than 50 %) of firms use formal methods involving written materials, Internet, etc. to train employees involved in product returns processing	Supported
H_5	Recovery rates (as % of cost) are higher for retailers when compared to manufacturers or wholesalers/distributors.	Supported
H_6	A majority of firms (more than 50 %) use return authorizations (RA's) for accepting product returns.	Supported
H_7	Manufacturers will have more product returns placed directly back-to-stock or inventory than retailers or wholesalers/distributors.	Not supported
H_8	Manufacturers will have more products repackaged and returned to stock than retailers or wholesalers/distributors.	Supported
H_9	Manufacturers will have more returned products sold as scrap or destroyed than retailers or wholesalers/distributors.	Supported
H_{10}	More product returns are refused by retailers than by manufacturers or wholesalers/distributors.	Supported

A surprising finding that has not been discussed widely in the literature previously was the recovery rates for various return disposition options. In this study, product returns processing enabled many organizations to recover a high percent of the original cost of the products. In some instances the recovery rates exceeded 80 %. Such levels of recovery have not been widely reported previously. In fact, the typical level of 60-65 % recovery rate is higher than expected given previously published data. This validates the importance of efficient and effective product returns processing for improving profitability within organizations.

Studies have indicated the need to decrease the processing time and speed up the turn-around to maintain value of the returned and reprocessed goods (Blackburn et al. 2004; Stock 2001). Results show that retailers are able to recover a higher percentage of product value compared to wholesalers and manufacturers. This emphasizes the need for the retailers and wholesalers, who are located closer to customers in the supply chain, to process the customer returns instead of sending all or most product returns to suppliers. This will help not only to recover higher value for the returned product but also helps to maintain the price levels for products in the distribution chain.

The use of outsourcing, or third-parties, for product returns processing has been widely discussed in the business press. Many case studies have been presented about companies who successfully outsourced product returns processing to various reverse logistics third-parties. While some organizations do outsource these activities, results of this study suggest that the vast majority do not. Outsourcing of reverse logistics functions are partly driven by the firm's desire to redistribute the products quickly and thus recover value (Meade and Sarkis 2002).

As determined in the site visits to companies, many of the large mass merchandisers such as Kmart, Sears, and Target outsource at least a portion of their product returns to a third-party. In the manufacturing sector, electronics and computer companies such as HP/Compaq outsource product returns, while firms such as CDW and Tech Data handle returns internally. In the book publishing industry, most firms such as Harcourt and others perform product returns processing internally. And so it goes; there is a great deal of variability in whether firms utilize third-parties for processing returns, but in most cases, firms typically perform those activities themselves. As stated before, firms base their outsourcing decisions on whether reverse logistics functions fit with the core competence of the firm and based on the potential savings by eliminating expenses associated with activities such as evaluating returns and repackaging them (Cottrill 2003; Gorick 2005). Lack of critical mass and economies of scale can also be a reason to look for outside firms to handle product return functions (*Discount Store News* 1999; Gorick 2005). Thus, the market potential for product returns outsourcing is likely greater than is presently thought, if, organizations can be convinced that outsourcing is a viable alternative to doing it themselves. Most firms use existing facilities to handle both forward and reverse logistics, so the market potential for outsourcing is significant.

This study found that retailers refuse a greater percent of returns compared to wholesalers and manufacturers. Wholesalers reported refusing a higher amount from their customers (retailers) compared to manufacturer's refusal from wholesalers and retailers. As stated before, being close to the point of sale, retailers are often faced with more customer returns and sales associates are reluctant to restrict returns because it might hurt sales. However, this appears to be changing. Results show increased refusal from retailers pointing to a tightening of restrictions such as time periods for return, receipt requirements, etc.

At the manufacturer level, product return transactions are primarily between them and wholesalers or retailers. The transactions between manufacturers and retailers/wholesalers are generally more formalized with manufacturers setting somewhat liberal policies of accepting all unsold products returned within prescribed periods of time. Retailers have to consider manufacturer's sentiments about costs and the margin impact of product returns (Rogers and Tibben-Lembke 2001). There is an understanding on both sides about the need to reduce product return volumes to maintain profitability. Manufacturers also realize that effectively designed vendor friendly return policies help increase loyalty from some wholesalers or retailers (Rogers et al. 2002).

Very surprising was the fact that with so much academic and practitioner attention being given to benchmarks, measurement and metrics relating to all aspects of supply chain management, so few organizations use published standards for processing returns and evaluating elements or components of the process. The apparent lack of interest in published standards needs to be explored to see whether productivity improvements could be possible with the use of standards as might be expected intuitively. One would believe that with the higher level of manual operations in product returns processing, significant improvements might be possible if organizations were measuring the cost and service elements of the product returns process.

In sum, we posit that good product returns processing can result in improvements in profitability through cost reductions and higher product recovery rates. It can also mean higher customer service levels as products being returned are credited to customers sooner and more accurately (with fewer discrepancies). Organizations with excellent product returns processing capabilities (defined as those having processes that are both efficient and effective) can have a potential competitive advantage, which gets larger as the magnitude of product returns increases. Through higher recovery rates of returned products and lower costs resulting from more efficient returns processing, the "excellent" firms are able to maximize revenues and minimize costs, thus contributing more to the firm's bottom line.

As much of the literature on product returns has pointed out, many firms still do not place adequate emphasis on the product returns process. They handle the product returns they receive, but they typically take longer to process. Actual processing costs are higher and discrepancies and reconciliations are greater, and cause more customer dissatisfaction. These firms are more likely to have part-time management personnel responsible for product returns processing which is unlikely to provide the necessary oversight of the process to ensure optimal efficiency and effectiveness.

Of course, the best way of optimizing the product returns process is to not have returns at all—referred to as returns avoidance. Return avoidance policies aimed at minimizing product returns are becoming popular. These strategies use customer education programs that focus on training the customer in the proper operation and use of

the product. This is critical since about 50 % of the product returns in consumer electronics are not due to product defect, but due to customer difficulty in properly operating the product (Rogers et al. 2002). Retailer emphasis on training customers in the proper use of their products can help in improving customer relations as well as decreasing costs of product returns. Retailers can help a great deal by initial sorting and by making decisions on processing versus returning to manufacturer. This could reduce the uncertainty in the timing and quality of returns that has been blamed for the unpredictability of reconditioning and refurbishing returned products (Guide and Van Wassenhove 2002). The use of various return programs in retail stores that either encourage or discourage customers from returning products are also important. The store policies on returns can have significant impact on the volume and type of products being returned.

FUTURE RESEARCH

While the survey results revealed that firms are using metrics to measure and evaluate the product returns process, much more needs to be done. Future research needs to be directed at establishing the specific criteria that could be used to evaluate existing product returns metrics and to classify existing metrics from a process, rather than functional, perspective (Caplice and Sheffi 1994). The metrics evaluated in this research study were identified in the literature and by persons interviewed in the on-site visits, but that does not necessarily mean that they are the correct metrics that should be used. Future research should evaluate these metrics using the eight evaluative criteria—namely, validity, robustness, usefulness, integration, economy, compatibility, level of detail, behavioral soundness—identified by Caplice and Sheffi (1994). This does not suggest that existing metrics being used are insufficient, but the metrics were likely not developed with the eight criteria in mind and therefore may, or may not, be the right measures.

Additional research on the standards being employed by companies processing product returns based on the metrics selected could potentially reap significant rewards for companies. Historically, published standards have not been researched by scholars, often because that information is proprietary. While proprietary issues are important, data can be masked and the identification of key standards does not necessarily "give away" trade secrets or competitive advantage. It is one thing to know what standards are being used by industry leaders; it is quite another to have the right systems, policies and procedures in place and to implement these standards effectively and efficiently. Such data will have to be obtained using qualitative research methods such as case studies. Companies will typically not be willing to share such information in research that utilizes survey methods.

Additionally, more research utilizing hypotheses testing could be conducted. As indicated in the introduction to this paper, many published studies, especially those in the trade or professional press, present anecdotal information. While such information can be useful in aiding companies in pursuing better policies, procedures and programs, they do not add a great deal to the "body of knowledge" relating to product returns specifically, and reverse logistics generally. Specific research is needed on many aspects of product returns including such issues as cost recovery in product returns disposition, optimal layouts of warehouses/DC's when both forward and reverse logistics operations are carried out in the same facility, acceptable return rates for various industries, companies and products, and examination of the best methods of training and development of product returns employees.

While product returns processing is becoming more important, it is also vital that issues relating to eliminating product returns be examined. For example, the return policies of retail stores impact whether or not customers return items. Stock rotation and replenishment policies impact the number of items returned to vendors for credits as well as product disposed of at the retail location. In the electronics industry, with some products being returned fraudulently, research into the costs and benefits to retailers performing on-site inspections of returns could be evaluated. Finally, the product returns process, which has been modeled descriptively by Stock (2004) and others, could be more rigorously tested, with detailed flow charts of each stage of the process being developed. Stock (2004) presented flow charts modeling each component of the five-stage process he identified, but these were only examples used by companies in various industries. While they provide guidance to firms and researchers examining product returns processing, generic process maps or flow charts need to be developed. This would provide a basis for developing optimal product returns processing systems.

In sum, product returns will continue to be a part of business operations. In some fashion all members of the supply chain are involved in the process. With increasing competition and higher customer demands, it is important

that all facets of the supply chain operate at peak efficiency and effectiveness. As a part of the process, products returns are no exception.

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APPENDIX

SURVEY INSTRUMENT

Survey on the Role of Warehousing in Product Returns

Instructions: We would like to get information on how your firm processes and dispositions product returns. If specific data are not available to answer some items, please provide your best "guesstimate." Please fill in each blank with the appropriate information. For responses requiring a YES or NO response, just circle the appropriate answer.

Part I. The Product Returns Process

1. Is there one person in your company who has primary responsibility for reverse logistics/product returns?

NO YES If YES, what is their job title? _____

2. Of all product returns received by your firm, what percentage is handled by:

_____ % Your firm

_____ % Third party _____ % at a dedicated returns facility

_____ % Combination _____ % in our regular warehouse/DC

100 % 100 %

3. For all product returns combined, what is the mixture of those returns?

_____ % planned (e.g., repair, end-of-lease)

_____ % excess/not planned

100 %

4. What is the size of your warehouse/DC where product returns are processed? _____ sq. ft.

5. What portion of the warehouse/DC is devoted specifically to product returns operations? _____ %

6. How many FTE employees do you have in your warehouse/DC that are involved in product returns?

_____ Production _____ Supervisory

_____ Administrative/clerical _____ Managerial

7. The wages (including benefits) of your full time non-management personnel that process product returns in the warehouse/DC are:
(√ only one)

_____ Higher than other warehouse/DC personnel

_____ Same as other warehouse/DC personnel

_____ Lower than other warehouse/DC personnel

8. How many labor shifts are used to process returns? (√ only one) _____ one _____ two _____ three

9. What type of training does your firm provide for product returns employees? (√ only one)

_____ Formal methods involving written training manuals

_____ Informal methods such as mentoring programs, but not including written training manuals

_____ No formal or informal training of product returns employees occurs at our facility

10. What percentage of your products are included in vendor/supplier "zero returns" programs? _____ %

APPENDIX (cont.)

RECEIVING:

11. How are product returns received by the warehouse/DC?

_____ % Gaylord's containing multiple items

_____ % Individual items (loose packages, boxes, totes &/or cartons)

_____ % Pallets of the same or mixed items

100 %

12. Do you use "return authorizations" (RA's) for product returns? YES NO

13. Do you require pre-approval of "return authorizations" prior to accepting product returns? YES NO

14. Are customers issued return authorization numbers before returning items? YES NO

15. How many product returns receiving stations do you have in your warehouse/DC? _____

MATERIAL HANDLING:

16. What equipment do you use in your warehouse/DC to handle product returns? Indicate how many of each item you use. If you do not use an item, place a zero (0) in the blank next to that item.

Number	Equipment Type	Number	Equipment Type
_____	Forklifts	_____	Product containers (totes)
_____	Pallet jacks (electric & manual)	_____	Label printers
_____	Workstations	_____	Carts
_____	Hand scanners	_____	Hand held tape machines
_____	Table scanners	_____	Automatic product sorters
_____	Belt conveyors	_____	Box building machines
_____	Gravity conveyors	_____	Other: _____

PROCESSING:

17. Are return authorizations computerized (e.g., available from the Internet or in other electronic form) or completed manually?

_____ % Computerized

_____ % Manual

100 %

18. For processing most returns, are receiving and customer crediting combined into one operation? YES NO

19. Do you utilize RETURN LABELS in the product returns process? YES NO

19a. If so, please identify the information contained on the returns labels:

YES NO SKU number

YES NO Customer name

YES NO Item description

YES NO Reason for return (reason code)

YES NO Date

YES NO Stocking location

YES NO Return authorization number

YES NO User ID of employee that processed the item

YES NO Other (please specify) _____

APPENDIX (cont.)

SORTATION:

20. How are final sorted items assembled or accumulated (circle all that apply)?

UPC/SKU vendor customer disposition option product type Other: _____

DISPOSITION:

21. Overall, what recovery rate do you get from returned products (respond for your most typical product return):

_____ % (as % of original cost) _____ % (as % of units returned)

22. Does your firm do any product refurbishing, reconditioning and/or remanufacturing at your warehouse/DC where returns are processed, or are they performed at another location?

_____ % On-site

_____ % At another location

100 %

23. Please indicate for all of your products that go through the returns process, how they are dispositioned:

_____ % Returned directly to stock

_____ % Repackaged and returned to stock

_____ % Repaired or refurbished

_____ % Destroyed or sold for scrap/salvage

_____ % Third party/secondary market

_____ % Donated to charity

_____ % Other: _____

100 %

Part II. Product Returns Metrics

24. Are there published standards for each component of the product returns process?

YES NO Receiving (including unloading, distribution to processing stations)

YES NO Processing (including data entry, customer credit)

YES NO Sortation (including inspection, routing to disposition point)

YES NO Disposition (including put-away, repackaging, refurbishing)

25. For each of the following activities, please indicate the standards (they may or may not be engineered standards) that you utilize:

	We use this metric?		If used, w**hat is the standard?**
Pieces/returns handled by employee per hour	YES	NO	_____
Time from receipt to initial returns processing	YES	NO	_____
Number of pieces/items returned to stock per day	YES	NO	_____
Time from receipt to crediting of customer's account	YES	NO	_____
Total pieces/unit/returns processed per day	YES	NO	_____
Error rates for items scanned (# or % of total)	YES	NO	_____
Error rates for incorrect disposition (# or % of total)	YES	NO	_____
Total returns processing time (from receipt to final disposition)	YES	NO	_____

APPENDIX (cont.)

26. How much time (in hours) are spent on each of the following product returns activities?

Hours	Task/Activity
_____	Receiving (including unloading, distribution to processing stations)
_____	Processing (including data entry, customer credit)
_____	Sortation (including inspection, routing to disposition point)
_____	Disposition (including put-away, repackaging, refurbishing)
_____	Total of all product returns activities

27. What is the warehouse/DC throughput time of returned products (total warehouse hours divided by # of units processed)?

_____ hours per unit processed

28. On average, what is the total labor cost per unit to process a typical product return? $ _____ labor cost per piece received

29. On average, what is the cost per unit/piece salvaged? $ _____ cost per piece salvaged

30. In a typical month, what is the discrepancy rate of returned products received versus returned products that you were expecting (e.g., items returned did not match return authorization data, fewer or more items than indicated were returned)? _____ %

31. What percentage of returned products received are returned to the sender because they did not meet the return criteria for the product?

_____ %

Part III. Demographic Data

This information is required in order to identify major market segments and to provide more meaningful analysis of the previous sections. Please use approximate figures in the event that exact data are not readily available.

32. Although your firm may be a multi-product company, can you provide an overall estimate of the value of product returns (in dollars or # of units) as a percentage of the total products your firm ships to customers?

_____ % based on dollars _____ % based on # of units

33. On average, at our returns processing warehouse/DC, we receive _____ (estimated number) returned products/items/pieces each _____ (per day, week, or month).

34. Type of Business or Organization (√ the one most like your organization):

_____ Manufacturing firm
_____ Retailing firm
_____ Government/military
_____ Wholesaler/distributor
_____ Other: _____

35. Industry Category (√ one category only if you indicated manufacturing or retailing firm in the previous question):

_____ Appliances
_____ Automotive & transport equipment (including parts and aftermarket)
_____ Building materials/lumber products
_____ Chemicals & plastics
_____ Clothing & textiles
_____ Computer hardware/peripheral equipment
_____ Department store/general merchandise
_____ Electronics & related instruments
_____ Food & beverage
_____ Furniture
_____ Hardware
_____ Metal products (fabricated)
_____ Office equipment & supplies (excluding paper)
_____ Paper & related products
_____ Petroleum & petrochemicals
_____ Pharmaceuticals, drug & toilet preparations
_____ Tobacco products
_____ Other: _____

APPENDIX (cont.)

36. What is your job title?

_____ Corporate officer
_____ Director
_____ Manager
_____ Supervisor
_____ Staff specialist
_____ Other: _____

37. What is your primary job responsibility (the one responsibility that requires most your time)? (√ only one)

_____ General management
_____ Logistics planning/management
_____ Marketing/sales
_____ Reverse logistics/product returns
_____ Warehouse operations/management
_____ Other: _____

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