

**A Study on the Activities and Decision Factors
between In-house vs. Outsourcing Reverse Logistics Processes**

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ABSTRACT

Reverse logistics (RL) covering the flow of products/parts in a reverse direction from product returns to product disposal. Companies are faced with a decision on whether to manage RL in house or to outsource it to a RL third party service provider (3PSP). A survey was conducted in 2004 to study RL outsourcing practices. Through the survey, various RL functions outsourced in industry are identified, and the factors considered to decide between in-house vs. outsourcing RL management are studied along with their importance. In addition, this research presents the performance measures of a 3PSP and problems faced by companies while managing RL in-house and outsourcing.

I. INTRODUCTION

A supply chain is perceived as a network of all functions and their activities involved in purchasing raw materials, processing them into products, and delivering the products to customers through a distribution system to fulfill customers' orders. Recently, firm's attention has been extended to activities associated with a product after the point of sale, which is called "reverse logistics," an aftermarket supply chain, or aftermarket logistics. RL activities cover (1) processing returned merchandise, (2) recycling packaging materials and reusing containers/pallets, (3) reconditioning, remanufacturing, and refurbishing products, (4) disposing obsolete parts/products/equipment, and (5) recovering assets (e.g. remarketing/resale).

A study conducted by D.F. Blumberg Associates (2004) showed that the RL market by year 2005 would grow to more than 60,000 million dollars in the U.S. only and more than 110,000 million dollars for the rest of the world. Returns ranged from 3% to as high as 50% of total shipments across all industries (Rogers and Tibben-Lembke, 1999), and more surprisingly

returns in the women's apparel catalog at a major catalog retailer exceeded 60% (Richey et al., 2005). Given economic and environmental contexts, recycling and disposal of products may no longer be the consumer's responsibility as products need to be recycled or remanufactured by the original manufacturer (Dowlatshahi, 2005) This trend has already been realized by the European environmental initiatives of WEEE (Waste from Electrical and Electronic Equipment) and RoHS (Restriction of Hazardous Substances) which will be effective in 2006. Thus, RL is rapidly becoming a strategic and important business operation because product returns and asset management are an inevitable part of today's business environment.

Rogers and Tibben-Lembke (2001) who studied RL trends and practices by conducting survey and interviews with RL managers in 1997 stated that nearly 40% of companies said that the RL didn't seem as important as other issues in a company, and 35% said that company policies did not allow them to manage RL successfully, and they did not have proper systems in place to manage returns. However, due to increasing competition in market share, profitability, and customer satisfaction, companies are realizing needs for an effective RL management system to bring scale and focus to the return-handling problems. So, many companies have chosen an outsourcing option instead of in-house RL management to focus on their core competence of forward supply chain functions, such as design, manufacturing, and marketing. There are numerous research studies done on the outsourcing of forward supply chain activities. (See Kakabadse and Kakabadse (2005), Fortune (2005), Kakabadse and Kakabadse (2002), Lankford and Parsa (1999), Brandes et al. (1997)) However, there is not enough research done specifically focusing on the RL outsourcing activities. (Serrato et al., 2004)

This research conducted a survey of various companies to study the RL management practices, focusing on the outsourcing of RL activities. The survey questionnaire consisting of 20 questions was designed and e-mailed to 7500 people in 2004. The data collected from the survey shows RL outsourcing practices and trends including factors considered by companies to decide on the outsourcing of RL, matrices to measure the performance of 3PSPs, and problems faced by companies to perform RL in house and to outsource it to 3PSPs.

II. REVERSE LOGISTICS AND ITS PROCESSES

RL constitutes all the supply chain activities performed in the reverse direction.

RL is referred by several ways such as returns management, reverse supply chain, reverse logistics, and reverse logistics system, and there are several definitions of RL in the literature. Weaser (2003) says, "Reverse logistics is the process of identifying, returning and reworking products in the supply chain that cannot be used for the intended consumer." Roggers and Tibben-Lembke (1999) define reverse logistics as "The process of planning, implementing, and controlling the efficient and cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal."

The return flow of products usually follows a predefined processing procedure in which the returned products are transformed into secondary products, components, and materials by remanufacturing, reusing, and disposing. An RL process can be categorized into the following three stages:

- (1) Collection: Returns are collected, sorted, selected, tested, and stored.
- (2) Process recovery: The returned products are refurbished, remanufactured, repaired, or disposed.
- (3) Redistribution: The refurbished/remanufactured/repared products are redistributed into the market for reselling into a secondary market, reselling as-is, reusing, or replacing the products to customers.

Following are the RL activities performed at the aforementioned stages: (1) processing returned merchandise for reasons such as damage, seasonal, restock, salvage, recall, or excess inventory, (2) Recycling packaging materials and reusing containers/pallets, (3) Reusing, reconditioning, remanufacturing and refurbishing products and product parts/components, (4) Obsolete equipment disposition, (5) Disposal for landfill, (6) Hazardous material programs, and (7) Asset recovery.

III. IMPORTANCE OF REVERSE LOGISTICS

RL has not been considered in most companies as a profit-generating function in their supply chain. So, their systems and resources are mainly designed to perform their core business functions in the forward supply chain to get quality products out in the competitive market on

time at a right price. Thus, returns processing was not on the “to do” list of companies. In their efforts to reduce cost, improve processes, reduce inventory, and better satisfy customers in the forward supply chain, many companies have always overlooked returns. However, companies should focus on efficient returns management because:

(1) Returns impact profitability. Rogers and Tibben-Lembke (1999) reported through their survey that returns from customers reduced the profitability of respondent companies by 4.2% and had an average impact on profits by 3.7 %.

(2) Today’s challenging and competitive business environment is forcing companies to take back the products to gain more market share and to attract more customers. For example, some of the retailers are offering 90 days return period instead of 30 days.

(3) They impact customer satisfaction. Trebilcock (2002) emphasized the importance of RL for better customer service by saying that RL is not about logistics but it is about customer service, and further elaborating that the customer service for RL should be as important as the customer service for forward logistics.

(4) There is a cost associated with each returned product and that needs to be recovered. RL costs in the U.S., according to Stock (2001), were approximately \$35 billion per year, and Langnau (2001) estimated that the average cost per product return would be \$30-\$35 over the next few years. Shear et al. (2003) also argued that handling costs for product returns could reach \$50 items.

(5) Returned products help in product improvement. The returned products and the reasons to return can be studied to improve the quality of future/existing products to become competitive in the market.

(6) Government regulations enforce/demand to manage returns. There are regulations, such as WEEE and ROHS, on waste disposal, landfills, and use of hazardous and toxic material during manufacturing.

Traditionally, RL has been an activity within organizations delegated to the customer service function, where the products are returned to the supplier under warranty or if defective. Given the fact that RL has been often considered as a non-core function of business operations, organizations are not always willing to perform the RL functions by themselves (Serrato, 2004). Furthermore, the RL is usually much more labor-intensive than the forward supply chain logistics so that there are a number of unique challenges to keep the reverse

supply chain running smoothly (Reese, 2005). Thus, a critical decision on RL is to determine which strategy works best for them: in-house return management or outsourcing to a 3PSP. This outsourcing of RL has become a strategic decision, and developing a RL strategy requires significant efforts and expertise for rigorous analysis in the decision making process. Recently, many companies have successfully outsourced fulfillment and logistics functions to 3PSPs for better service, lower costs, and increased flexibility, which helped them focus on their core competencies of new product development, manufacturing, and marketing. K-mart, for example, had about \$800 million in returned and overstocked merchandise each year blocking its supply chain pipeline so that in 1999 the retailer outsourced the management of these unwanted goods to a reverse logistics company in order to concentrate on sales (Roussel-Dupre, 2001). To defend from the increasing cost of returns for Internet sales and climbing return rates, a growing number of e-tailers are choosing to outsource the management of returns to a specialized RL 3PSP.

IV. A SURVEY ON REVERSE LOGISTICS

A survey was conducted to gather information from industry on reverse logistics activity management practices and trends, focusing on the RL outsourcing and RL 3PSP's performance measures. The survey questionnaire with 20 questions was designed and emailed from May 2004 to July 2004 to 7500 members of Reverse Logistics Association at computers and consumer electronics companies. 1459 people viewed the survey email, and there were 55 valid responses.

The companies included in this research played the following roles in a supply chain: suppliers, manufacturers, distributors, wholesalers, retailers, and 3PSP. 19.85% of companies offered computer-related products, and 9.16% of respondents produced the cellular and mobile equipments. Overall, over 52% of respondents were in the industrial and consumer electronics and semiconductor industries. Their annual gross sales are illustrated in Figure 3. The survey result shows that the percentage of product returns was below 5% and 10% for 55.88% and 73.53% of companies, respectively. The most frequently given reasons by customers were not functioning and damaged, as shown in Figure 4. As evident from the survey responses, 37.7% of the returned products had a certain problem, and 20.75% respondents said that more than 60% returned products did not have any problem.

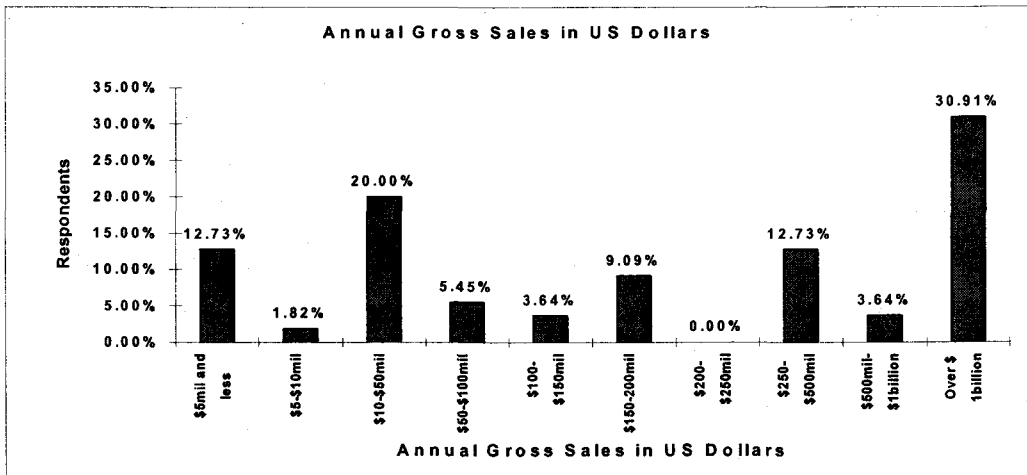


Figure 1. Annual Gross Sales Distribution of Responded Companies.

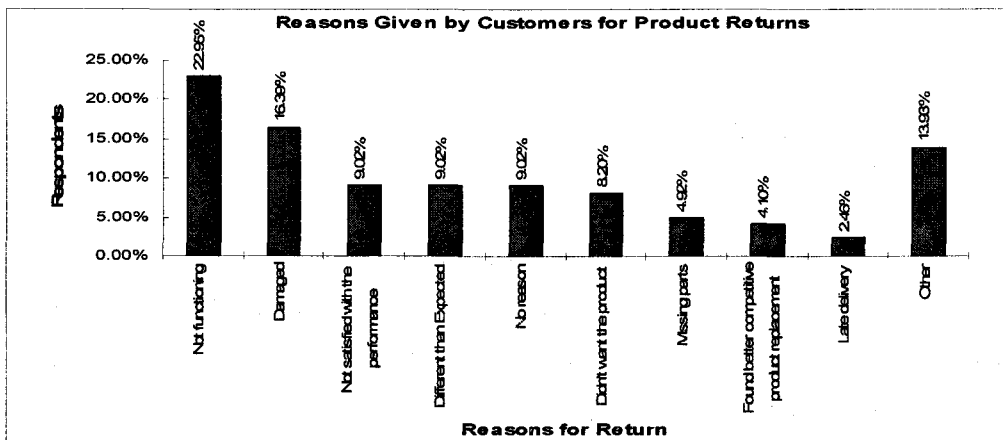


Figure 2. Reasons for Product Returns.

As illustrated in Table 1, the majority of respondent companies preferred outsourcing 9 out of 15 reverse logistics activities than managing them in-house. The activities that had higher percentage in outsourcing compared with in-house were recycling/full disposal, transportation/distribution, warehousing and storage, end-of-life manufacturing, depot repair, redistribution/resell, remanufacture/refurbishment, collection/sorting/testing, and fulfillment and kitting services. Although companies managed the following activities in-house: returns authorization management, asset management/extended service contracts, spare parts management, IT management, helpdesk/call center, and replacement management, they

wanted to increase the outsourcing of those activities in the future except spare parts management. However, companies planned to reduce the outsourcing of recycling/full disposal, depot repair, end-of-life manufacturing, warehousing/storage, fulfillment & kitting services, and spare parts management.

Table 1. Current vs. Future In-house and Outsourcing RL Activities.

RL activities	Current in-house (%)	Future in-house (%)	Difference between the current and future	Currently outsourcing (%)	Future outsourcing (%)	Difference between the current and future
Returns Authorization Management	8.72	8.22	-0.5%	0.98	2.08	1.1%
Asset Management & Extended Service Contracts	8.03	7.55	-0.48%	1.46	3.65	2.19%
Spare Parts Management	7.52	7.55	0.03%	3.41	3.13	-0.28%
IT Management	7.52	7.05	-0.47%	3.90	5.21	1.31%
Helpdesk/Call Center	7.35	7.21	-0.14%	4.88	5.21	0.33%
Replacement Management	7.35	7.21	-0.14%	4.39	5.21	0.82%
Fulfillment & Kitting Services	6.67	6.71	0.04%	6.83	6.25	-0.58%
Collection/sorting/testing	6.50	6.04	-0.46%	7.35	8.33	0.98%
Remanufacture/Refurbishment	6.50	7.05	0.55%	7.80	6.25	1.55%
Redistribution/Resale	6.32	6.38	0.06%	7.80	7.81	0.01%
Depot Repair	6.15	6.38	0.23%	7.80	6.25	-1.55%
Warehousing/Storage	5.98	6.38	-0.4%	9.27	8.33	-0.94%
End-of-life manufacturing	5.98	6.38	0.4%	8.29	7.29	-1%
Transportation and Distribution	4.79	4.70	-0.09%	12.68	13.54	0.86%
Recycling/Full disposal	4.62	5.20	0.58%	13.17	11.46	-1.71%

The cost of reverse logistics was, according to Table 2, the most important factor to all companies when they decided on whether in-house or outsourcing RL management. They also wanted to focus on their core business activities such as new product development and marketing by outsourcing RL to a 3PSP. Once companies decided to outsource their RL function(s) to a 3PSP, the expertise of 3PSP, service charges, and type of service offered

were the most important considerations when they selected a 3PSP for their RL functions (See Table 3).

Table 2. Factors Considered to Decide between In-house vs. Outsourcing RL.
(The factors were ranked as 1-most important, ..., 13-least important)

Rank	Factors	Average Rank
1	Cost of reverse logistics (includes cost of facility, people, infrastructure, processing)	1.96
2	Focus on core business activities	2.47
3	Returns volume (number of products returned)	3.38
4	Return processing time/customer service cycle time	3.38
5	Forward logistics system designed to handle reverse logistics/return process	3.56
6	Sophisticated IT software to process and make rapid decisions on returned products	4.20
7	Criticality of collaboration between parties involved in reverse supply chain	4.35
8	Risk and control over the reverse logistics chain	4.49
9	Characteristics of these products (Sales volume, Product life cycle)	4.6
10	Difficulty in handling returns	4.75
11	Return Policy	4.85
12	Company wants to own forward and reverse supply chain for better control over processes	5.11
13	Number of products offered by the company to customers	5.15

Table 3. Factors Considered to Evaluate RL 3PSP's
(Ranked as 1-most important, ..., 11-least important).

Importance	Factors	Rank
1	Expertise of Third Party Service Provider	2.29
2	Quotation/charges for services	2.44
3	Type of services offered	2.58
4	Business processes, supply chain, logistics	3.00
5	Facility capacity/capability	3.87
6	Global presence for support	4.35
7	Type of repair technology practiced	4.45

8	Packaging and storage	5.18
9	Type of IT software implemented/used	5.60
10	Employee training schedule	5.71
11	Number of employees at facility	6.00

The companies measured the performance of 3PSP's services using turnaround time, quality (service, repacking, product appearance), cost per unit (repair cost), etc. on a daily, weekly, or monthly basis. However, many of them preferred to do it on a monthly basis. Table 4 represents most commonly used RL 3PSP performance measures.

Table 4. Performance Measures of 3PSP's.

Rank	3PSP Performance measuring parameter	Percentage
1	Turnaround time	43.6%
2	Quality level	25.5%
3	Cost per unit (cost for processing each unit)	21.8%
4	Flexibility	7.3%
6	Repeated RMA/30 day repeat repairs/bounce rate	7.3%
5	Real-time information on status of returns/status report	5.5%
5	Response time to issue	5.5%
7	Throughput time for repair/Repair time	5.5%
8	Dead on arrival	5.5%
9	On time delivery	5.5%
10	Scrap rate/Damaged	3.6%

There are different measures used to measure quality, such as quality of disposition, quality of service, refurbishment quality level, quality of appearance of repaired products, and quality of items returned for resale after processing. Turnaround time is time from receipt of item (return) to delivery of the item back to customers. Companies have different measuring parameters for monitoring turnaround time, such as cycle time, repair and delivery time, return cycle time, repair cycle time, processing time, cycle time processing inbound, outbound goods, and defective goods back to suppliers.

Since companies have specific measuring parameters tailored for their requirements, 3PSPs are usually asked to generate performance reports as per the specific measuring parameters.

When companies measure their performance while managing RL in-house, the following approaches to measure their performance are most commonly used: (1) monitoring repeated returns, (2) evaluating employees weekly for speed and accuracy, and (3) measuring the service level with respect to turnaround time, customer satisfaction, volume of returns processed, cost to process return

The major problems faced to manage RL whether in-house or by a 3PSP (refer to complete list in Table 5 and 6).

Table 5. The Problems/Challenges Faced After Outsourcing RL to a 3PSP.

Rank	Problems Faced After Outsourcing
1	IT interface (integration problem)/process interface problem/
2	Quality not up to the standards and lack attention to quality standards/requirements
3	Time schedules are not met/commitment to deadlines are not met/varying process time
4	Cost controlling becomes difficult
5	Finding adequate number of suppliers with global presence
6	Lack in real-time information accuracy on the return process status/lack of communication and information exchange
7	Finding qualified service provider/Lack of expertise in all dimensions of RL process management/Difficulty in finding one-stop solution provider.

Table 6. The Problems Faced While Managing RL Internally/In-house.

Rank	Problems Faced with In-house RL Management
1	RL software application available and support/data management
2	Managing significant volume changes with respect to staff allocation, warehouse storage space
3	Continuous pressure on cost reduction
4	Having problem with turnaround time
5	RL management does not get prioritized
6	Training the staff is challenging and critical on decision-making/training new staff
7	Lack of facility/staff to do the job

V. CONCLUSION

Outsourcing is considered a better option by companies to support their customers worldwide, thereby generating a need to partner with a local 3PSP for better cost management and

improved customer satisfaction. Other driving factors for outsourcing RL are that companies want to focus on their core competency and not commit resources to RL management due to return uncertainty.

This research conducted a survey on RL management industry practices and future trend, focusing on RL outsourcing. The survey results show that remanufacturing/refurbishing and recycling/full disposal will preferably be done in-house whereas outsourcing of the following activities will be increased in next two years: Asset management & extended service contracts, return authorization management, IT management, and collection/testing/sorting.

Performance of 3PSPs is measured based on three major parameters turnaround time, quality of service, and cost for processing each unit. Major problems faced by companies are finding right RL management software and integrating it with their forward logistics system, improving/controlling cost, and maintaining quality standards for returns.

A detail research can be done to study technologies that facilitate reverse logistics management such as RFID, Two-dimensional barcode, reverse logistics management software systems. Currently many companies are handling returns using forward logistics processes and thus it is getting difficult to separate the data and analyze each process separately.

Since the response size is relatively small, companies should be cautious in using the current results of this survey as a sole reference for research or practical applications in industry. Thus, further survey may be necessary to collect a sufficient amount of data.

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