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Current Practice in Reverse Logistics: Findings from Three Case Studies

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Abstract

Reverse Logistics (RL) manages materials from a use point to a recovery or disposal point. This article reports a pilot case study involving three companies with a focus on establishing their thinking on current practices in RL. The research involves mainly interviews and plant visits to these companies, which have some reverse logistics activities. The aim was to examine various issues relating to their practices in returns processing, information sharing, collaboration, and performance metrics. Results yield the typical return process and present patterns in RL that will be used to design a larger study.

1. Introduction

Most of the supply chain management (SCM) research focuses on the forward flow that transforms raw materials to final products, from suppliers to end customers (Prahinski and Kocabasoglu 2006). The reverse material movement from end customers to suppliers has received much less attention (Rogers and Tibben-Lembke 2001; Stock, Speh et al. 2002).

According to the Reverse Logistics Executive Council (http://www.rlec.org), reverse logistics (RL) is "the process of planning, implementing, and controlling the efficient, 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." It is now believed that, given the definition stated above, RL as a field is "unique enough to undergo specialized research" (Tibben-Lembke and Rogers 2002).

The market for RL in the United States (US) was approximately $58 billion in 2004, comprising 0.5% of the US Gross Domestic Product (http://www.rlec.org), and the reverse flow is increasing (Dekker, Fleischmann et al. 2004). RL covers a wide range of industries, including

automobile, chemical, electronics and PC, food, pharmaceutical, publishing, and so on. For instance, the automobile companies are quite busy dealing with the recovery of end-of-life auto parts and many vehicles recalls. According to International Association of Electronics Recyclers (http://www.iaer.org), hundreds of millions of electronics products that contain various hazardous materials (e.g., lead and mercury) are scrapped in US every year, and industry leaders (e.g., Apple, Dell, and Sony) just voluntarily begin take-back programs. E-tailers are dissatisfied with higher returns from customers scattered around the country or even the world. Returns rates are ranging from 5% to 50% in many industries (Rogers and Tibben-Lembke 1999). The cost of these returns was averaging twice the value of the product itself in 2001 (Guide and Van Wassenhove 2003). To make situations worse, retailers have to set very liberal return policies due to fierce competition in the market (Rogers and Tibben-Lembke 1999). US companies are losing billions of dollars due to ill preparation in RL (Dekker, Fleischmann et al. 2004). RL is also becoming more economically attractive due to commodity price hikes in recent years (e.g., oil, iron ore, steel, copper, etc.).

It has also been recommended that, in the modern workplace, effective RL management should be used as a competitive advantage, a positive profit center, a tool to cut costs and a tool to improve customer satisfaction (Guide and Van Wassenhove 2003; Dekker, Fleischmann et al. 2004; Richey, Genchey et al. 2005). Many service providers are providing avenues for growth in the RL market.

RL also has broad impacts on environment and human health (Rogers and Tibben-Lembke 1999). Regarding environmental laws and government environmental initiatives, Canada and Western Europe have been more proactive than US (Murphy and Poist 2003). Companies in these countries are also more progressive in managing environmental issues in

logistics (Murphy and Poist 2003). Landfill capacity in US has become more limited and expensive, and more restrictions are imposed to protect human health (Rogers and Tibben-Lembke 1999; Prahinski and Kocabasoglu 2006). However, some companies still abandon end-of-life products with hazardous materials into land directly. For example, International Association of Electronics Recyclers in its newsletter of July 2006 reported that a former electronics waster broker dump thousands of computers and monitors to private land in Missouri (http://www.iaer.org).

In the literature, Rogers and Tibben-Lembke (1999) explored overview of RL activities in the early stage, and concluded that RL would play a more important role and information systems need to be improved. Tibben-Lembke (2002) found "many companies are just beginning to understand the importance of RL." Afterward, researchers studied various aspects of RL including resources (Richey, Daugherty et al. 2004; Richey, Genchey et al. 2005), information systems (Daugherty and Myers 2002), financial impact (Mollenkopf and Closs 2005), process industries (French and LaForge 2006), and environmental issues (Murphy and Poist 2003). By surveying members of the Automobile Aftermarket Industry Association, Richey et al. discovered that resources could make RL more effective and efficient through developing innovative approaches and could help overcome challenges for early entrants and achieve high quality for late entrants. Surveying US catalog sales electronics companies, Daugherty and Mayers concluded no relationship between information systems capabilities and operational/financial performance, due to erratic and unpredictable nature of RL. Mollenkopf and Closs illustrated many potential financial impacts from RL: revenue, expenses, and assets. French and LaForge probed re-use practices in process industry companies, contrasting current primary research on discrete industries. Murphy and Poist's paper added to "relatively limited

empirical literature involving green logistics" and concluded "green concerns will broaden the scope of logistics as well as influence the way logistics managers do their jobs."

It is worth mentioning a European research project, REVerse LOGistics and its effects on industry (REVLOG), sponsored by the European Union from December 1997 to December 2002. Researchers in the project define RL fundamentals and boundaries, present quantitative models in distribution, production planning, inventory control, and supply chain coordination, and describe many case studies (Dekker, Fleischmann et al. 2004; Flapper, van Nunen et al. 2005). However, most results are based on European experience.

This research is a part of larger, exploratory study comprehensively investigating current practices in RL in US. The focus of this paper is to capture a broad and general view with the goal to identify the RL process and critical success factors of RL process. Our research questions examine current practices with emphases on strategies, management commitment, returns processing, information technology and information sharing, collaboration mechanisms, and performance metrics. We also examine what constitutes the major drivers of RL as well as how companies plan and fulfill RL activities.

2. Methods

We visited each of the three companies in this pilot study. During each visit, six sources of evidence were obtained: documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts (Yin 2002).

In particular, for each establishment (facility), we studied its background including locations, industry, products, sales and employees. Our visits sought information on general practice in RL including strategies, competitive priorities, roles, external sources (reasons),

internal sources, re-use options, factors affecting re-use options, facility layout, handling, and automation. Next, we examined use of information technology and information sharing in detail. We investigated the type of information technology deployed and how such is shared with other facilities in the company, and with customers, suppliers, and secondary markets. We scrutinized which kind of information the establishment shares, such as planning, forecast, finance, demand, supply, scheduling, shipping and transportation. We studied its information systems, connections among information systems, hardware, software, and investment. Then, we looked at issues relating to collaborations in various aspects: relationships with partners, customers, suppliers, secondary markets, forecasts, planning, fulfillment and joint performance measurements. Finally, we checked a variety of performance metrics, including profit, sales, cost, customer satisfaction, delivery, forecast accuracy, returns percentage, defectives, order management, product variety and offering, inventory turns, feedback, etc.

3. Results

During summer 2006, we interviewed managers in three US companies and visited their facilities. All three companies employ thousands of employees. The first company is a leading third-party logistics provider (3PL) in RL with several facilities located throughout US and Canada, providing various logistics services to manufacturers, retailers, and government agencies in its one-century-long corporation history. The second company is a leading 3PL largely providing diverse forward logistics solutions with some RL elements. It has emphasized flexibility and scalability for more than fifty years. The third company is a manufacturer in consumer electronics with over twenty years of experience. Its advantages over industry competitors emerge from integrated information systems that guide and support responsive logistics.

The two 3PLs cover services in various industries including Catalog Retailers, Consumer Electronics, Auto Industry, Pharmaceuticals, Books/Magazine, Household Chemicals, Computers/Printers, and General Merchandisers. Their responses indicated that the reasons why their clients use 3PL services include:

- To concentrate on core businesses
- To avoid huge capital expenditures in facilities
- Not having strong geographic distribution network
- Reaping benefits of excellent operations and flexibility that 3PLs provide
- Relying on 3PL's expertise, technology, and information systems and being attracted by 3PL's reputation

3.1. Overview

At each facility, typically a handful of employees (generally less than thirty) handle RL. All three companies use services such as transportation from other 3PLs. Other features of RL practices reported by the three companies are as follows:

- The most common reasons for returns are that customers change minds and companies overstock. Due to fierce competition and current marketing practice, companies use liberal return policies. Many stores' return restrictions are not enforced for fear of losing customers.
- Reasons stated for customer returns include
    - Wrong products ordered
    - Products shipped to wrong destination
    - Missing parts

    - Shipping damage
    - Quality complaints
    - Unclear ‘use’ information
- Returns logistics activities that the companies have include
    - Returns flow
    - Remanufacturing
    - Remarketing
    - Recycling
    - Land-filling
- Two companies employ same employees to handle both Forward and RL. One company employs different employees to hand forward and RL separately.
- RL can vary from a small portion (5%) to a major part of all logistics.
- Companies sometimes operate same distribution-center (DC) facilities for both forward and reverse flows, and sometimes different DC facilities are used. They are marginally satisfied with how current facilities handle returns flows.
- Most returned products are processed to put back to stock shelf without or with a little re-kit, re-package, repair, or refurbish. Others are to sell to secondary market, dismantle to harvest components, recycle, or landfill.
- The turn around (cycle) time to process returns physically is typically a couple of days, while financial credit to customers is within hours.

3.2. Returns Process

The returns process begins when the manufacturers or retailers accept products back from their customers after issuing a Return Merchandise Authorization or Return Material Authorization (RMA) based on the return policy. After reviewing the trade literature and visiting the three companies, we conclude that a typical returns process at a manufacturing facility looks like in Figure 1. The generalized process covers various broad factors: demand, package and product conditions, test and repair, secondary market, vendor, charity organization, recycle, and disposal.

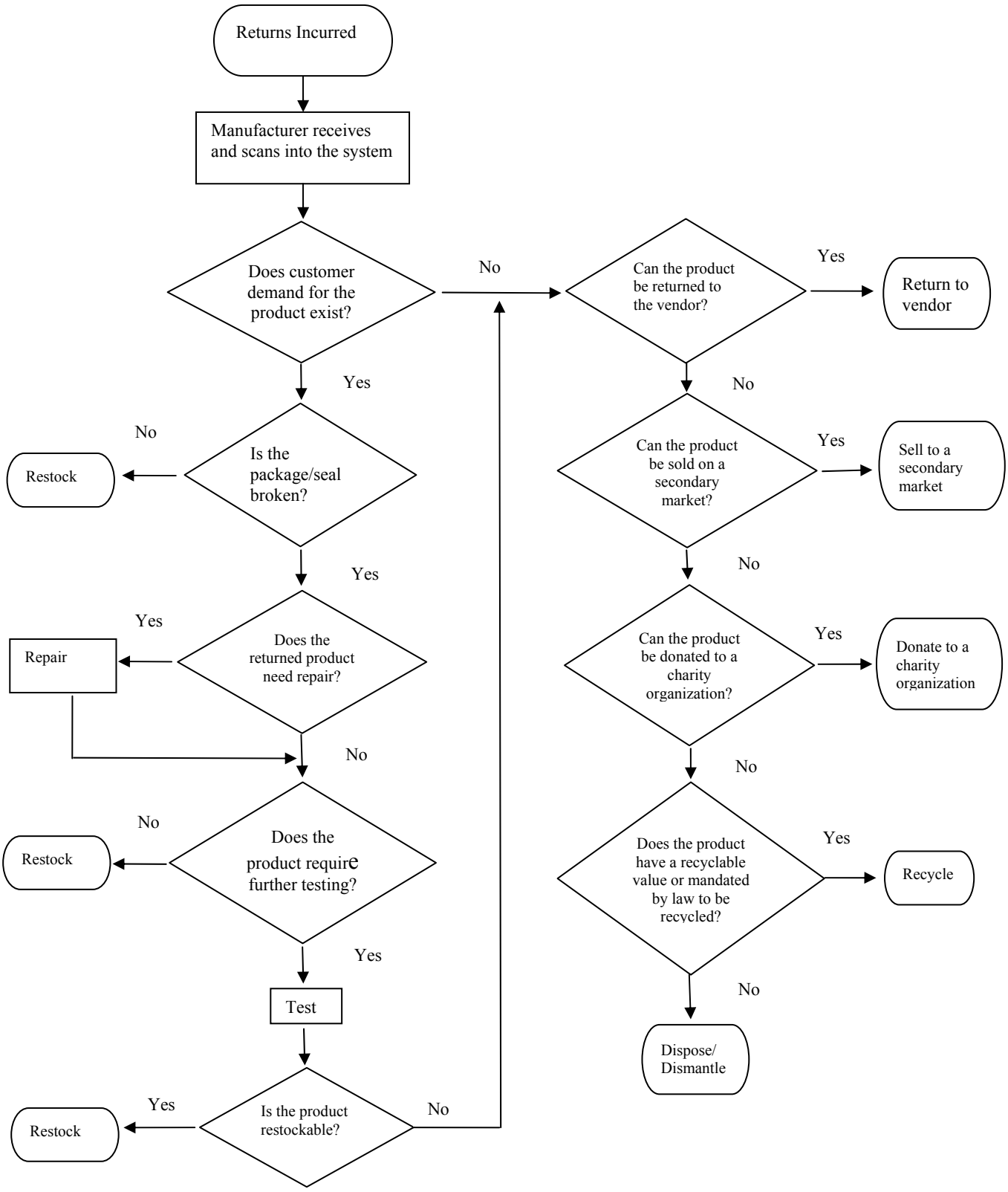

Figure 1. A Typical Returns Process at a Manufacturing Facility

3.3. Information Systems and Sharing

Each of the three companies stated that it uses stand-alone customized solution and database solution with own decision rules, with communications through Internet and/or Electronic Data Interchange (EDI). Two firms use customized solution integrating with Enterprise Resource Planning (ERP) and Radio Frequency Identification (RFID). In addition, each company was asked to evaluate its IT system as it affects its returns processing operation. Some of the findings are as follows:

- All the three companies agree with the statements that information systems allow effective information sharing with customers/suppliers, enable RMA to be obtained speedily, and enable making correct decisions consistently in real-time.
- Companies differ on their agreements to the role of the firm's information systems. The responses are that their information systems-
    - Enable a firm to efficiently track products- (2 agree, 1 neutral).
    - Enable information sharing with all facilities in supply chain - (2 agree, 1 partially disagree).
    - Effectively integrate with company's whole supply chain system (2 agree, 1 disagree), and enable RMA check quality system before issuing validation (1 agree, 1 neutral, 1 N/A to its operation).
    - Add flexibility to handle changing customer needs (2 disagree, 1 agree).
- Information shared with partners is considered accurate. The quality and effectiveness of following information sharing arrangements with partners were rated good or very good. Included in the consideration are- the amount of data, real-time information, the

use of web-enabled inventory data, warehouse information, and transportation/scheduling data. Mutual access to databases among partners is just fair.

3.4. Collaboration

The three companies expressed having very good or excellent trust and having long term-term alliance with partners. Other responses to collaboration issues are as follows:

- Each rated the quality and effectiveness of following collaboration arrangements with partners as very good: joint forecast arrangements, joint planning arrangements, jointly established performance measures, sharing processes and process information, and reviewing and revising collaboration periodically.
- Defined collaborative objectives, scope, responsibilities, sharing of risk, and reward are good.
- Use of Vendor-Managed Inventory arrangements is only fair.

3.5. Values of RL

The managers interviewed in each company were asked to evaluate the financial and other values of the company's RL operation or that of the client if the company is a 3PL. Responses from two of the three companies are as follows (the third company did not respond):

- Managers strongly agree that effective returns management helps brand equity, environmentally responsible activities enhance brand equity, and shorter cycle time helps bottom lines.

- Managers partially agree that reclaiming useable parts reduces cost of goods sold (COGS), disposal compliance reduces operating cost, and RMA with cost/benefits analysis helps decide whether to repair products.
- The managers' reactions are neutral on whether recycling materials that are un-useable generate good revenues, if channel clearing reduces obsolete items inventory, and if repaired items yield reasonable profits in secondary markets.
- Manager partially disagree that restocked/repaired items lower inventory need of new products.

3.6. Management vision, leadership and commitment

The managers were asked to evaluate the level of the company's or its upper management's commitment to the RL operation through its vision, leadership activities, and resource commitment. Two of the three companies responded as follows:

- Managers strongly agree with statements: RL is viewed as a 'necessary evil', RL activities should be assigned as full time job for staff, and firm supports continuous improvement in RL processes.
- Managers partially agree that there is effective executive overseer that champions RL activities and proactively invests in technology for RL operations.
- Managers are neutral that there is good company-wide communication on RL activities and RL strategic plans are as good as for Forward Logistics (FL) plans.
- Managers partially disagree that IT innovation that provides flexibility be supported by the firm, and a firm's responsibility ends once product is delivered.

- Managers strongly disagree that Reverse Logistic activities are only for "cost avoidance." However, RL receives much less attention than Forward Logistics.

3.7. Performance Indicators

All companies have no visibility on return-on-investment or profit from RL. Their customers evaluate them in on-time ship, dock-to-stock speed, and inventory accuracy, outbound shipping quality (errors and customer complaints, cost, and productivity).

4. Discussion

The paper reports a small pilot study looking at a broad view of current practices in RL. All companies in our study value the importance of RL. They have various information systems to support information sharing and collaborations, and outcomes are generally positive with the need to better integrate with forward logistics and support flexibility. However, RL lacks adequate management commitment and performance evaluation.

If these results are upheld in a larger survey, which is under way by the authors, they may indicate that companies need make more commitment to RL and build a better control system, particularly in measuring system performance. The surprise may be that companies have a practice not to establish performance indicators in RL.

It is hoped that the full-blown (larger) study may address some important extensions: (1) identify future trends and key factors in RL, such as consolidation, intermediate elimination, and competitive differentiators; and (2) build theoretical frameworks in RL and provide coherent guidelines and recommendations to industry

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