

# **Reverse Logistics**

**A Monograph**

**by**

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The Army has a serious problem with materiel in the supply chain that is moving in the reverse direction. The supply chain is a series of inter-related processes and activities that move supplies and services from the suppliers to the ultimate end users. The reverse supply chain contains items that are either defective, damaged, or otherwise unneeded by the intended user. These items must be returned to the supplier for credit or disposal. The items in the reverse supply chain take longer to identify and process. This delay coupled with a lack of visibility of the items moving backward slows the movement of items into and out of major distribution centers. This delay can have an impact on readiness of combat units and increase the amounts of supplies retained at the unit level. Commercial industry has recognized that managing the items in the reverse supply chain results in better customer service and improved profits. Although the Army is not concerned with profit margins, they are concerned with improving customer service and improving readiness. These concerns lend themselves to the application of reverse supply chain management. After establishing a clear definition of the supply chain and the reverse supply chain, this paper examines the shortfalls in the Army's handling of serviceable excess items in the supply chain and how commercial industry has tackled this problem. The Army has a system in place to track and manage unserviceable major assemblies throughout the maintenance system, but has fallen short in the area of serviceable items. A careful look at commercial practices provides the basis for recommendations on how to improve the Army's reverse supply chain management. The Army is experiencing return rates as high as some Internet retailers. One possible solution to improve the management of these items, as proposed in this paper, is to establish a central returns management center at the Red River Army Depot. This center would be established along the lines of the commercially operated returns centers used by large retailers such as Wal-Mart and K-Mart. The efficiencies realized by the Army from establishing a central returns center can be expanded to the entire Department of Defense to streamline and reduce the Defense Logistics Agency's supply chain management responsibilities.

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## **Abstract**

**Reverse Logistics, a monograph by Colonel Joseph Walden, 40 pages.**

The Army has a serious problem with materiel in the supply chain that is moving in the reverse direction. The supply chain is a series of inter-related processes and activities that move supplies and services from the suppliers to the ultimate end users. The reverse supply chain contains items that are either defective, damaged, or otherwise unneeded by the intended user. These items must be returned to the supplier for credit or disposal. The items in the reverse supply chain take longer to identify and process. This delay coupled with a lack of visibility of the items moving backward slows the movement of items into and out of major distribution centers. This delay can have an impact on readiness of combat units and increase the amounts of supplies retained at the unit level.

Commercial industry has recognized that managing the items in the reverse supply chain results in better customer service and improved profits. Although the Army is not concerned with profit margins, they are concerned with improving customer service and improving readiness. These concerns lend themselves to the application of reverse supply chain management.

After establishing a clear definition of the supply chain and the reverse supply chain, this paper examines the shortfalls in the Army's handling of serviceable excess items in the supply chain and how commercial industry has tackled this problem. The Army has a system in place to track and manage unserviceable major assemblies throughout the maintenance system, but has fallen short in the area of serviceable items. A careful look at commercial practices provides the basis for recommendations on how to improve the Army's reverse supply chain management.

The Army is experiencing return rates as high as some Internet retailers. One possible solution to improve the management of these items, as proposed in this paper, is to establish a central returns management center at the Red River Army Depot. This center would be established along the lines of the commercially operated returns centers used by large retailers such as Wal-Mart and K-Mart. The efficiencies realized by the Army from establishing a central returns center can be expanded to the entire Department of Defense to streamline and reduce the Defense Logistics Agency's supply chain management responsibilities.

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## **Chapter 1**

### **Introduction**

*“In an ideal world, reverse logistics would not exist”<sup>1</sup>*

The problems associated with handling the return of unwanted or defective items by consumers have existed for years and the management and disposition of excess items has been a problem for retailers since the beginning of retail merchandising. Historically, reverse logistics<sup>2</sup> operations were considered the “seedy side of business” according to Michael Runager, Vice President of Business Development for Burnham Service Corporation.<sup>3</sup> According to Buzzy Wyland, the president of manufacturing services for GENCO Distribution Systems, reverse logistics operations was the last thing that companies wanted to focus on.<sup>4</sup> The simple solution to reverse logistics was to pick up the damage or obsolete items from the vendor and discard them into a land fill. Estee Lauder Companies, Inc. dumped as much as \$60 million in inventory into landfills annually prior to adopting a focus on the reverse supply chain.<sup>5</sup> Major corporations are discovering that focusing on reverse supply chain management is critical to profitability, supply availability, and improved customer responsiveness.

Over the past five years the Department of Defense has shifted from a stovepipe approach to logistics functions to a more holistic supply chain management approach.

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<sup>1</sup> Jim Whalen, “In Through the Out Door,” *Warehousing Management*, March 2001, p. 33.

<sup>2</sup> Logistics management gave way to Supply Chain Management in the mid 1990s as companies started realizing that there were more impacts on the overall system than the traditional warehousing, inventory management, and distribution functions associated with logistics management.

<sup>3</sup> Ronald Margulis, “Take it Back!, Reverse Logistics is on the Move” *Supply Chain Watch*, August 17, 1998, <http://www.ideabeat.com/Depts/Tech/Archives/SCW-81798p.html>

<sup>4</sup> Whalen, “In Through the Out Door,” p. 33.

<sup>5</sup> “Reverse Logistics,” *Informationweek.com*, April 12, 1999.

This shift in focus has produced significant improvement in customer support and responsiveness to the needs of the soldiers, sailors, and marines at the end of the supply chain. However, this focus has only been on the forward supply chain – the requisition process and the delivery of supplies from the vendor, wholesale depots, and Supply Support Activities (SSAs) back to the customer. There is another critical supply chain that until recently has been basically ignored by the entire Department of Defense. This other supply chain is the reverse supply chain – the return of supplies that are surplus to the needs of the unit or are unserviceable and in need of rebuild or remanufacturing to return the item to a serviceable status. The Army does maintain a database to track unserviceable repairable assemblies such as tank and helicopter engines from the unit maintenance activity to the maintenance depots.

Ignoring the reverse supply chain is not a problem that is unique to the military. Commercial retailers historically experience a return of goods equivalent to between five and seven percent of total sales.<sup>6</sup> However, depending on the industry, the rate of returns can be as high as fifty percent (magazine publishing) and as low as two percent of sales (mail order computer manufacturers).<sup>7</sup> The rate of returned merchandise for most retailers becomes a bit skewed around the Christmas holiday period. Internet retailers experience return rates as high as twenty to fifty percent of sales.<sup>8</sup> One prominent Internet retailer, Amazon.com, claims to have less than one percent of total sales returned by their customers.<sup>9</sup>

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<sup>6</sup> WERC Conference proceedings, 2000.

<sup>7</sup> Dale Rogers, *Going Backwards: Reverse Logistics Trends and Practices*, University of Nevada, Reno , p. 7.

<sup>8</sup> WERC Conference proceedings, 2000.

<sup>9</sup> Conversation with Director of Logistics, Amazon.com, April 2000.

The US Army is experiencing returned merchandise rates for serviceable supplies in excess of twenty percent of total requisitions.<sup>10</sup> These return rates rival those of some Internet retailers whose return rates also include the return of merchandise that is damaged in shipment. Commercial returns represent lost sales and lost profits. The cost of serviceable returns to the Army and the entire Department of Defense is a potential decrease in operational readiness. For every serviceable part in the reverse supply chain there is a good possibility of another requirement for the same critical part by another unit. A serviceable part going backwards through the supply chain is not available, or visible, to another unit. In addition, if the wholesale depot is out of stock for that particular item, an order must be placed with the manufacturer or a commercial supplier. This increases the customer wait time for the part and results in excess on the shelf when the returned item is finally processed into the depot.

Every part that is ordered as “Non-Mission Capable, Supply” (NMCS) represents a deadlined piece of equipment. Every deadlined piece of equipment represents a decreased capability to perform an assigned mission if the unit is called upon to deploy. Every decrease in readiness represents an increased probability of not being able to successfully accomplish a mission. Consequently, every part that is in the reverse supply chain results in a potential stock out or “zero balance” at the next level of supply. This potential for a stock out results in additional parts on the shelves at each location to prevent a stock out from occurring.

To prevent readiness shortfalls increased quantities of parts are stocked at the unit level and the SSA level to ensure availability when needed. Additional stocks at these

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<sup>10</sup> Presentation to the Velocity Group Board of Directors, September 2000.



levels means an increase in the logistics footprint in theater and also increases the lift requirements to deploy the supporting unit. The number of airframes for deployments are finite, therefore increases to the lift requirements for supplies decreases the available lift for combat units.

Commercial industry is moving towards complete outsourcing of customer returns. K-Mart uses a third party logistics provider<sup>11</sup> to process and prepare for resale all of its customer returned merchandise and the disposition of all excess stocks.<sup>12</sup> Until recently, Wal-Mart processed its own returns through one centralized distribution center solely for processing returned merchandise.<sup>13</sup> Studies of reverse supply chain-processing shows that it takes longer to process and restock returned merchandise than it does to process new material into the distribution center.<sup>14</sup> When electronic items are involved, an additional cost is incurred to test the items before returning them to the shelf. Another cost to processing electronic items in the reverse supply chain is the cost of obsolescence due to technology advancements between the time of the sale of the item, the return date, and the date the item is ready for resale.

Reverse supply chain management in commercial retail industry represents approximately \$62 billion a year. Forrester Research in Cambridge, MA estimates that online purchased merchandise returns will exceed \$11 billion dollars by 2002.<sup>15</sup> This represents a potentially huge problem for the commercial sector. Dr. Richard Dawe of

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<sup>11</sup> A Third Party Logistics provider is a company that specializes solely in logistics or supply chain operations as a core competency and thus provides a more cost efficient operation to its customers and frees the supported company from the burdens of internal logistics support.

<sup>12</sup> Presentation by and discussions with the Ed Winter, Director of Reverse Supply Chain, K-Mart Corporation at the World Logistics Congress, March 16, 2001.

<sup>13</sup> Tour of Wal-Mart facilities 1998.

<sup>14</sup> Rogers, *Going Backwards*, p.39-40.

<sup>15</sup> "Return to Sender," Modern Materials Handling Magazine, May 15, 2000, [www.mmh.com](http://www.mmh.com)

the Fritz Institute of Logistics identifies six symptoms that indicate that there may be problems in the reverse supply chain.<sup>16</sup>

1. Returned merchandise or supplies arrive faster than they are processed or disposed of.
2. There are large amounts of returned inventory held in the distribution center or warehouse.
3. There are unidentified or unauthorized returns.
4. There is a lengthy processing cycle time for returned goods.
5. The total cost of the returns process is unknown.
6. Customers lose confidence in the repair activities.

Each of these symptoms of a reverse supply chain problem represent areas that have the potential to reduce the efficiency of a distribution center or wholesale depot. Reducing the efficiency of the military's wholesale depots results in longer customer wait times for critical repair parts and supplies. Longer wait times result in decreased operational readiness.

Commercial industry has tracking mechanisms in place to track returned merchandise. Wal-Mart and K-Mart have visibility of all returned merchandise and its serviceability as soon as the returned item is received at the store, with the exception of the condition of some electronics. For many years the Army has maintained the Material Returns Database (MRDB), an automated system, to track unserviceable major assemblies that are returned to the National Maintenance Program for rebuild or refurbishment. However, only recently has a system been put in place to track

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<sup>16</sup> Beth Schwartz, "Reverse Logistics Strengthens Supply Chains," Transportation and Distribution Magazine, <http://tdmagazine.com/FrmNewsLoader/index.asp?articleID=22157>

serviceable redistributable assets, less euphemistically called excess, from the customer back to the wholesale supply system.

This paper assesses the utility of implementing a reverse supply chain management system for the Army and the Department of Defense. The first step in this assessment is defining supply chain management and reverse supply chain management. Using these definitions to establish the framework, the applications of reverse supply chain management in commercial industry are identified. These commercial applications then provide the basis for analyzing and comparing military practices that may be impacted by adopting commercial practices.

Chapter 2 provides the background of supply chain management and the evolution of reverse supply chain management in commercial industry. Chapter 3 looks at the way the commercial firms process returns and some of the root causes for the return merchandise, as well, as the impacts these returns cause on the entire supply chain. Chapter 4 provides an analysis and detailed discussion of the procedures used by commercial industry and their applicability to military operations. Chapter 5 provides recommendations on improving the Army's ability to track and have visibility of supplies in the reverse supply chain. These recommendations, based on the best practices identified in Chapter 3, can be exported to cover the entire Department of Defense.

## **Chapter 2**

### **The Supply Chain, Forward and Reverse**

#### **Background**

To properly analyze Defense and commercial industry efforts to manage the reverse supply chain, a basic understanding of a supply chain is necessary. This chapter will establish a common understanding of the development of supply chain management concepts, the definition of a supply chain and the resultant definition of a reverse supply chain.

The concept of the supply chain grew out of logistics management practices. Logistics management is the combination of more than one of the functional components of warehousing, transportation, inventory management, and manufacturing. Logistics management was an evolutionary change in the way corporations looked at managing the functional areas.

In the late 1970's commercial industry started to become aware of the need to move away from stovepipe organizations in order to become more efficient and profitable. By the mid 1990's this realization led to companies viewing the logistics processes of acquisition, distribution, and supply as a continuous chain from the suppliers to the ultimate consumer. Supply chain management has been defined as a "connected series of activities concerned with planning, coordinating, and controlling material parts

and finished goods from the supplier to the customer. The two distinct flows in which the supply chain is concerned are material and information.”<sup>17</sup> Realization began to sink in that profitability comes from synthesizing all of these activities into one holistic management approach resulting in supply chain management.

The Deputy Undersecretary of Defense, Supply Chain Integration (DUSD, SCI) defines the supply chain as depicted in figure 1.<sup>18</sup> This depiction of the supply chain as it stretches from the supplier’s suppliers to the customer’s customer is based on the Supply Chain Council’s Supply Chain Operations Reference Model (SCOR).<sup>19</sup> The DUSD, SCI further defines Supply Chain Management as “The management of all internal and external processes or functions necessary to satisfy a customer’s order (from product acquisition, to the conversion/manufacturing process, through shipment and delivery to the customer).”<sup>20</sup> Notice that there is no mention of the reverse supply chain in this definition.

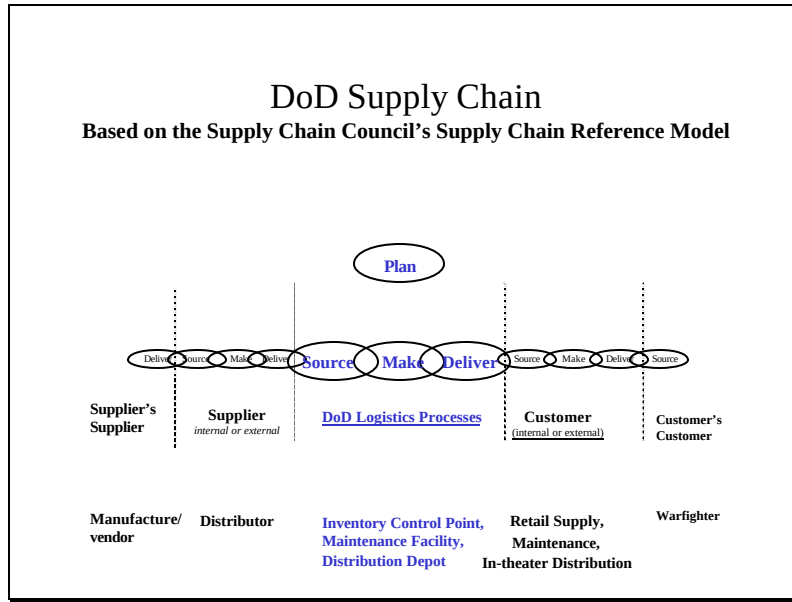
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<sup>17</sup> Graham C. Stevens, “Integrating the Supply Chain,” *International Journal of Physical Distribution*, vol. 19, no. 8, pp. 3-8.

<sup>18</sup> Deputy Undersecretary of Defense, Supply Chain Integration Office FY2001 Business Plan, p.9.

<sup>19</sup> For more on the Supply Chain Council and the SCOR see <http://www.scc.org>

<sup>20</sup> Supply Chain Integration Office FY2001 Business Plan, p.9.



**Figure 1. The DoD Supply Chain according to the Deputy Undersecretary of Defense, Supply Chain Integration**

APICS, The Educational Society for Resource Management, defines the supply chain as: “1. The process from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies; 2. The functions within and outside a company that enable the value chain to make product and provide services to the customer.”<sup>21</sup> Using this definition as a basis, the reverse supply chain is defined by the University of Nevada, Reno Reverse Logistics Council as: “a broad term referring to the logistics management skills and activities included in reverse distribution, which causes goods and information to flow in the opposite direction of normal logistics activities.”<sup>22</sup> Reverse supply chain management “also includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls, and excess

<sup>21</sup> APICS, *APICS Dictionary*, 8<sup>th</sup> Ed., (Falls Church, VA, 1998), p.84.

<sup>22</sup> Dale Rogers presentation to WERC at the 1999 Annual Conference.

inventory. It also includes recycling programs, hazardous materials programs, obsolete equipment disposition, and asset recovery.”<sup>23</sup>

Dr. Dale Rogers in his book on reverse logistics describes the reverse supply chain as: “ the process of moving goods from their typical final destination for the purpose of capturing value or proper disposal.”<sup>24</sup> Initial studies into reverse logistics and reverse supply chain management focused primarily on the proper disposal of hazardous materials. This paper focuses on the return of serviceable assets from the customer (typical final destination) to the wholesale and retail Supply Support Activities (point of origin).

Supply Chain Management has been the vogue buzzword in commercial industry for over ten years. However, the Army and the Department of Defense did not make the paradigm shift from a logistics management approach to a supply chain management approach until 1998. This paradigm shift was prompted by the successes of the Army’s Velocity Management Program in reducing Order Ship Times and Repair Cycle Times and the US Marine Corps’ 1998 Supply Chain Redesign project.<sup>25</sup>

The Velocity Management Program was started by the Army after a study by the RAND Corporation’s Arroyo Center on ways to improve logistics support to the Army. The study results were briefed to the Army’s Deputy Chief of Staff for Logistics (DCSLOG) in early 1995 with the recommendation that a continuous process improvement program be initiated Army wide. The initial focus of the Velocity

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<sup>23</sup> Rogers, *Going Backwards*, p. 3

<sup>24</sup> Rogers, *Going Backwards*, p.1

<sup>25</sup> For more on the USMC Supply Chain Initiative see “Integrated Logistics Capability Initiative Checkpoint Briefing,” December 1998.

Management Program was strictly on the Order Ship Time processes.<sup>26</sup> Within a year of starting the Velocity Management Program it became evident that to reap the desired benefits to the Army required a more multi-functional approach that included financial management interfaces, distribution management, inventory stockage policies, and maintenance repair cycle management. This produced the first supply chain initiative in the military.<sup>27</sup>

Cooperation between the Army's Velocity Management Program Office and the US Marine Corps' Precision Logistics proponents led to a USMC sponsored study, in conjunction with Pennsylvania State University and Dr. John Coyle to redesign the USMC logistics processes. The results of this study led to a Department of Defense initiative to adopt a holistic supply chain approach to support. In 1998 the office of the Undersecretary of Defense, Supply Chain Integration was established to be the Department of Defense focal point for incorporating best commercial practices and supply chain initiatives into the way the Department of Defense provides support to the warfighters.

Further research by the Army and the RAND Corporation into the causes of serviceable returns from the customer units and the retail Supply Support Activities in 1998 led to some concerns about the impact of processing serviceable excess through the

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<sup>26</sup> The Order Ship Time is the time from the establishment of a requirement for a part or supply until the part is filled from the local Supply Support Activity or the wholesale supply system. A recent shift in focus has replaced Order Ship Time with Replenishment Supply Time and Customer Wait Time. Customer Wait Time focuses on the total wait time a customer experiences for a part to include those items that are on a backorder status at the wholesale system. Previous calculations for Order Ship Times excluded those items that were on a backordered status above the installation level. The commercial equivalent of Order Ship Time is Customer Order Cycle Time.

<sup>27</sup> For more on the Velocity Management Program methodology see RAND's "Velocity Management: An Approach for Improving the Responsiveness and Efficiency of Army Logistics Processes."



supply chain. This research revealed that prior to the Velocity Management Program serviceable returns exceeded fifty percent of the total number of requisitions by the Army.<sup>28</sup> By 1999, this return rate was down to *only* twenty percent; however, it represented over fifty percent of the dollar value of the total requisitions. A twenty percent rate of returns, when extrapolated across the entire Department of Defense, represents approximately eleven million requisitions a year that result in serviceable excess items that are candidates for return to the wholesale system.

RAND's research revealed that "controlled, trading or borrowing from another unit, local fabrication, local purchase (outside of the military supply system), or by substituting a higher level assembly filled fifteen percent of all requisitions for deadlined equipment."<sup>29</sup> Controlled substitution is a polite way of saying that the part was taken from another vehicle (usually deadlined for a more serious problem) and placed on the deadlined vehicle. The "work around" identified by RAND of substituting the next higher assembly is equivalent to buying a new engine for your car instead of waiting another week for a new fuel injector. The number of "work arounds" to the system increases as the wait time for a part increases. According to the RAND data, if the wait time for the part is over fifty-one days, the number of needs filled by a "work around" increases from fifteen percent to eighty percent.<sup>30</sup>

Each deadline that is fixed using one of the identified "work arounds" potentially represents another requisition that will be returned through the reverse supply chain to the

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<sup>28</sup> Eric Peltz and Kenneth Girardini, "Using Velocity Management to Improve Logistics Quality: Serviceable returns as a Quality Indicator," RAND Santa Monica, CA, 1999.

<sup>29</sup> Eric Peltz, Presentation to the Velocity Group Board of Directors, September 2000.

<sup>30</sup> Ibid.

wholesale system. However, items that are less than \$50.00 in value are not returned to wholesale because of their low dollar value. These items usually end up either retained at the unit or disposed of through the Defense Reutilization and Marketing Office (DRMO). Approximately three percent of all requisitions qualify for return to the wholesale depots. Extrapolating this data across the entire DoD means that approximately 1,650,000 items are returned through the reverse supply chain.

With such a large amount of items in the reverse supply chain, it is surprising that reverse distribution management does not appear in any of the directives, policies, or information briefings associated with Supply Chain Management within the Department of Defense. The Deputy Undersecretary of Defense, Supply Chain Integration FY2001 Business Plan's actions and milestones are based on eight critical sources:

1. Joint Vision 2010/2020 and the Focused Logistics Initiative;
2. The Defense Reform Initiative;
3. Defense Reform Initiative Directive #54, Logistics Transformation;
4. The FY2000 DoD Logistics Strategic Plan;
5. The DoD Product Support for the 21<sup>st</sup> Century Report;
6. The DoD Logistics Functional Requirements Guide;
7. The DoD Supply Chain Management Implementation Guide;
8. Surveys of key DoD logistics leaders.<sup>31</sup>

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<sup>31</sup> Supply Chain Integration Office, FY2001 Business Plan, ii.

Each of these “key” references addresses supply chain management and the use of total asset visibility. However, reverse supply chain management is not addressed in any of these sources.

While the Army and the Department of Defense basically ignore the problem of reverse supply chain management, commercial industry is working to solve the problem and improve their bottom line profits. The next chapter addresses how commercial industry is addressing problems similar to those identified in this chapter.

## **Chapter 3**

### **Commercial Industry Applications of Reverse Supply Chain**

#### **Management**

*“Now, more than ever, reverse logistics is seen as being important.”*

*-Dale Rogers<sup>32</sup>*

The first study and book dedicated solely to reverse supply chain management was published in 1998. The introduction to *Going Backwards* states, “Reverse logistics is a new and emerging area, and as such, only a limited amount of information has been published to date.”<sup>33</sup> Prior to mid 1990’s, the commercial firms with the most experience in managing returns through a reverse pipeline were catalog retailers. One early example of the importance of an effective reverse supply chain is the expeditious manner that Johnson & Johnson dealt with the Tylenol tampering scare in the early 1980’s. Dealing with returns is not a new phenomenon created by the Internet, but it has received more attention in the last several years as a result of the e-commerce explosion. This new interest has resulted in a comprehensive studies by the Council of Logistics Management and The University of Nevada, Reno and smaller studies by various firms that have been presented at various logistics conferences in the past two years.

The new focus on managing the reverse supply chain has its roots in the European Union, specifically in Germany. Original concerns that prompted concentrating on the reverse logistics processes were environmental. In 1991, Germany passed an ordinance

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<sup>32</sup> Rogers, *Going Backwards*, p.186

<sup>33</sup> Ibid., page xiv.

that put teeth into the environmentally driven reverse supply chain. Strict environmental laws in Europe make the shipper responsible for disposition of hazardous waste and recyclable materials. It did not take long before shippers started to realize that careful planning of the shipping of hazardous and recyclable items back to the distribution centers had positive impacts on the bottom line profits. Word quickly spread throughout the distribution community that profits could be mined from managing the reverse supply chain.

Environmental concerns in Europe spread to the United States in the mid 1990s as more and more landfills became restrictive on the types of items that could be placed in the landfills. Manufacturers and distributors were forced to start planning ways to reclaim hazardous materials such as motor oils, automotive batteries, and tires to prevent paying environmental impact fees. The narrow focus on reclaiming and recycling hazardous materials led to companies looking at other initiatives to recapture some of the costs associated with managing the reverse supply chain.

Catalogers such as Lillian Vernon and L.L. Bean have dealt with the problem of processing returned merchandise since the beginning their operations.<sup>34</sup> Traditional retailers such as Sears and J.C. Penney solved the returns problem early on by allowing customers to return products ordered through the catalog to the retail stores for credit or exchange. Strictly “dot.com” companies do not have this luxury. Some of the more prominent “bricks and mortar” retailers, such as Borders, that also have Internet sales sites, have adopted a model that allows the return of items ordered over the Internet to the

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<sup>34</sup> Arthur Schleifer, “L.L. Bean, Inc., Class Notes,” Harvard Business School, Boston, MA. 1993.

retail stores.<sup>35</sup> Best Buy recently adopted a similar policy of allowing Internet customers to return defective or unwanted items to their local retail stores. This policy, in the name of customer service, has the potential to create inventory problems at the retail stores, especially if the item is not a fast moving item. Items that are not normally stocked at the retail store or are slow moving items may very well find themselves in the reverse supply chain from the retail store back to the firm's distribution center or returns management center.

A study conducted by the University of Nevada, Reno in 1998 brought to light the magnitude of the financial impacts on companies by not managing the reverse supply chain. One of the participants in the study was K-Mart. K-Mart, like Wal-Mart and The Home Depot, has a very liberal customer returns policy. Although this liberal returns policy is important in developing customer loyalty, it comes at a price. One of the costs of liberal returns is potential customer abuse of the system. Such abuses include customers buying lawn mowers at the beginning of spring and then returning them at the end of the summer as defective.<sup>36</sup> K-Mart and The Home Depot have implemented a centralized database to track customer returns and identify potential abuses of the system.

Overwhelmed by the volume of returns in the reverse supply chain and their resultant drain on bottom line profitability, K-Mart turned to one of the other participants in the University of Nevada study, GENCO Distribution Systems, to serve as the contracted operator of the reverse supply chain for all of their returned merchandise. The reverse supply chain for K-Mart represents approximately \$800 million of merchandise at

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<sup>35</sup> Borders presentation at WERC Conference, 2000

<sup>36</sup> Based on conversations with Ed Winter, Director of Reverse Supply Chain for K-Mart, 16 Mar 01.

product cost each year.<sup>37</sup> Approximately two thirds of the items in their reverse supply chain is serviceable merchandise. The costs of processing the items in the reverse supply chain, above the costs of the items themselves, include:

1. Merchandise credits to the customers.
2. The transportation costs of moving the items from the retail stores to the central returns distribution center.
3. The repackaging of the serviceable items for resale.
4. The cost of warehousing the items awaiting disposition.
5. The cost of disposing of items that are unserviceable, damaged, or obsolete.
6. Fraud investigations.
7. The manning of the service desk to receive items back from customers.

Portions of these costs are offset by the return of serviceable items to the store shelves or to consumers through a secondary market such as flea markets, overseas sales, online auctions, and contributions to charitable organizations. Contributions to charitable organizations such as Second Harvest do not return monies to the company but do provide tax deductions that contribute to the company's bottom line profits as well as providing "good will" for the corporation.

GENCO Distribution Systems is a third party logistics provider that has a division that specializes in handling and processing items in the reverse supply chain. GENCO handles the reverse supply chain operations for K-Mart, Wal-Mart, Sears, Target, and Macy's. GENCO processes the returned merchandise and repackages the serviceable

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<sup>37</sup> Ibid.

items for return to the retailers' shelves for resale or for marketing the items through the secondary markets. GENCO is able to apply their internal lessons learned from their major clients to streamlining the operations for all of its customers.<sup>38</sup>

GENCO has managed to expand their reverse supply chain operations expertise into a company with over 4500 employees that operate out of eighty-five distribution centers worldwide, thirty five of these centers focus solely on reverse supply chain management. These distribution centers process approximately three to four billion dollars in returns for their customers each year.<sup>39</sup>

GENCO also handles the processing of items in the reverse supply chain for Cheesebrough-Pond USA. Prior to contracting out the management of the reverse supply chain, Cheesebrough-Pond discarded or destroyed the majority of items returned to their six distribution centers.<sup>40</sup> The first year Cheesebrough-Ponds contracted out their reverse supply chain management resulted in an increase of over one million dollars profit through a combination of reduced destruction/land fill costs and the resale of products in lieu of destruction. GENCO consolidated all the returns for Cheesebrough-Ponds at one distribution center to produce efficiencies and gain control of the processes.

BMG Music, like Cheesebrough-Ponds, uses automatic data collection to process returns into the distribution center. BMG, a large mail order music club, processes as many as 80,000 returned packages a day and averages close to 40,000 returned packages

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<sup>38</sup> Presentation by Mr. D. Eisenhuth, Vice President, GENCO Distribution, at the World Logistics Congress, March 17, 2001.

<sup>39</sup> Ibid.

<sup>40</sup> Tom Andel, "Reverse Logistics: A Second Chance to Profit," *Transportation and Distribution Magazine*, July 1997.



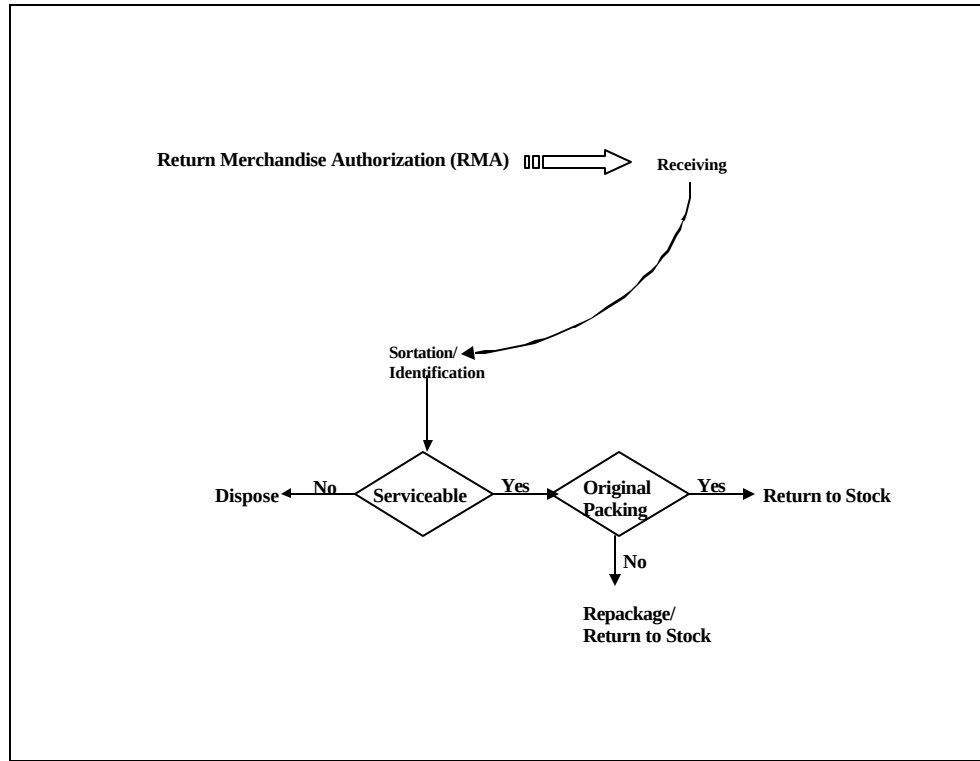
daily.<sup>41</sup> This represents approximately twenty percent of all packages shipped by BMG, a rate of returns that is close to the Army's average. BMG developed an automatic data collection system that allows them to use the same bar codes for processing returns as used for shipping the product to the customer. The use of the bar codes enables BMG to identify what customer account receives the credit and where in the distribution center the product is stored based on sales of the product.

Corporate interest in focusing core competencies is creating a trend in commercial industry to move away from the BMG model of handling returns in house and toward adopting the GENCO/K-Mart model of outsourcing the reverse supply chain and returned merchandise management. This outsourcing usually takes place in a centralized returns distribution center. The centralized system allows retail customers to return an item to the central distribution center that specializes in processing items in the reverse supply chain. The value of these centralized centers is that it allows companies to focus their efforts on the forward supply chain and allow the contracted company to focus on the items in the reverse supply chain. A recent Netscape web search revealed twelve companies that specialize in third party reverse supply chain management.

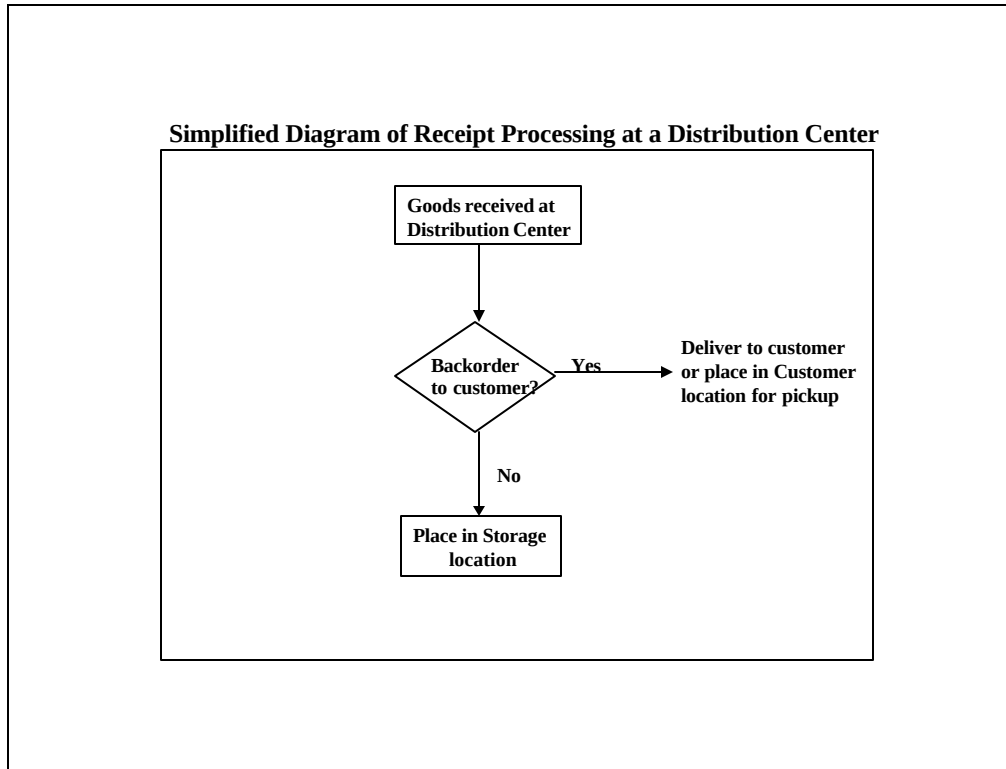
The reverse supply chain and the accompanying decisions on the serviceability of an item are shown in Figure 2. Normal receipt processing at a distribution center is depicted in Figure 3. From these two simple diagrams it is easy to see that processing items through the reverse supply chain are more complicated and time consuming than processing routine receipts at the distribution center or warehouse.

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<sup>41</sup> Clyde E. Witt, "Reverse Logistics at BMG," Supply Chain Flow Supplement to *Transportation and Distribution Magazine*, August 1998.



**Figure 2. The Reverse Supply Chain Decisions and Actions**



**Figure 3. Simplified Receipt Processing for Routine Receipts at a Distribution Center for the Forward Supply Chain**

In the automotive parts industry, the use of the reverse supply chain started during World War II, as a result of a shortage of parts. The remanufacturing and rebuilding of automotive parts is now a \$36 billion dollar industry.<sup>42</sup> Between ninety and ninety-five percent of all starters and alternators sold in the US are remanufactured.<sup>43</sup> Volumes of these proportions require detailed and accurate information systems to support them. The use of a centralized returns center provides greater control through the use of an automated system designed solely for reverse supply chain management.

<sup>42</sup> Bruce Caldwell, "Reverse Logistics," Informationweek.com, April 12, 1999, <http://www.informationweek.com/729/logistics.htm>

<sup>43</sup> Schwartz, "Reverse Logistics Strengthens Supply Chains," May 2, 2000, <http://www.tdmagazine.com/FrmNewsLoader/index.asp?articleID=2215>

The remanufacturing business for copier toner cartridges is now a billion-dollar business.<sup>44</sup> Hewlett Packard goes as far as including a prepaid returns label in every cartridge and user replaceable printer part that they sell. This label is bar coded to ensure that proper return credit is applied to the appropriate customer and for quick identification of the part in the shipping box.

This chapter has provided a snapshot of the practice of reverse supply chain management and its impacts in commercial industry. Although the focus on reverse supply chain management is relatively new, some segments of the commercial sector have been practicing reverse supply chain management for many years. The next chapter examines the way the military in general, and the Army in particular, manage the reverse supply chain and will identify areas that can provide significant improvements in the levels of support for soldiers in the field.

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<sup>44</sup> Rogers, *Going Backwards*, page 173

## **Chapter 4**

### **The Military and Applications of Reverse Supply Chain**

#### **Management**

*“The Challenge is to unearth how much a company’s existing processes are costing them.”*

*Dave Gordon, VP Burnham Logistics<sup>45</sup>*

In 1997, Dr. Marygail Brauner from the RAND Corporation’s Arroyo Center made a presentation to the Army’s Velocity Group Board of Directors<sup>46</sup> on the relationship between Army financial credit policies and Army logistics processes.<sup>47</sup> The initial concern of the Army’s senior logisticians as a result of the presentation was the differences in the amount of credit provided to an installation or unit as a result of the convoluted policies and algorithms used by the wholesale logistics system. These algorithms produced differences of up to ten thousand dollars in credits for the same part on the same day to different units based. These differences were attributed to the net asset position of the installation, the net asset position at the wholesale system, the timeliness of the unit in turning in the part, or a combination of all three.

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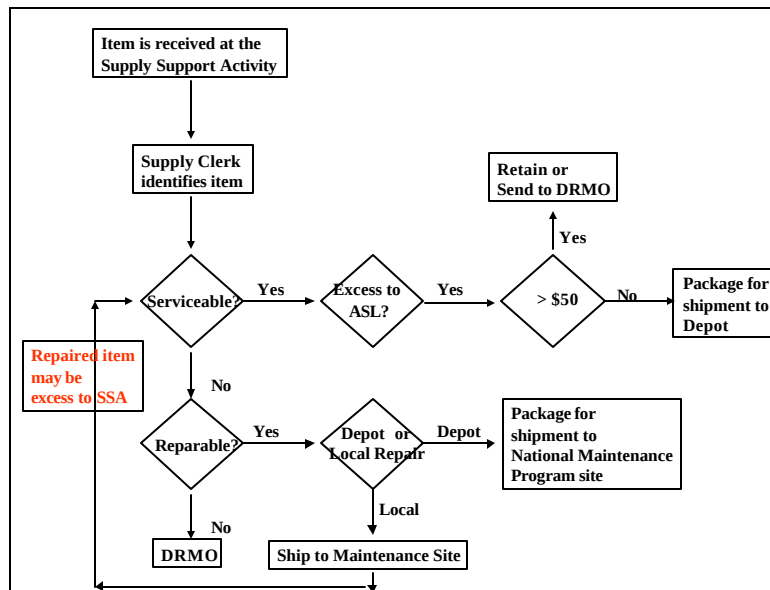
<sup>45</sup> Schwartz, Transportation and Distribution Magazine website, <http://www.tdmagazine.com/FrmNewsLoader/index.asp?articleID=22157>

<sup>46</sup> The Velocity Group Board of Directors is a group of senior logisticians, chaired by the DCSLOG of the Army and Co-chaired by the Deputy Commander of the Army Materiel Command and the Commander, US Army Combined Arms Support Command. The Board of Directors meets semi-annually to review the progress of the Velocity Management Program and provide guidance to the logistics community on process improvements.

<sup>47</sup> For more on this presentation see “Evaluating Five Proposed Price and Credit Policies for the Army,” RAND, 2000.

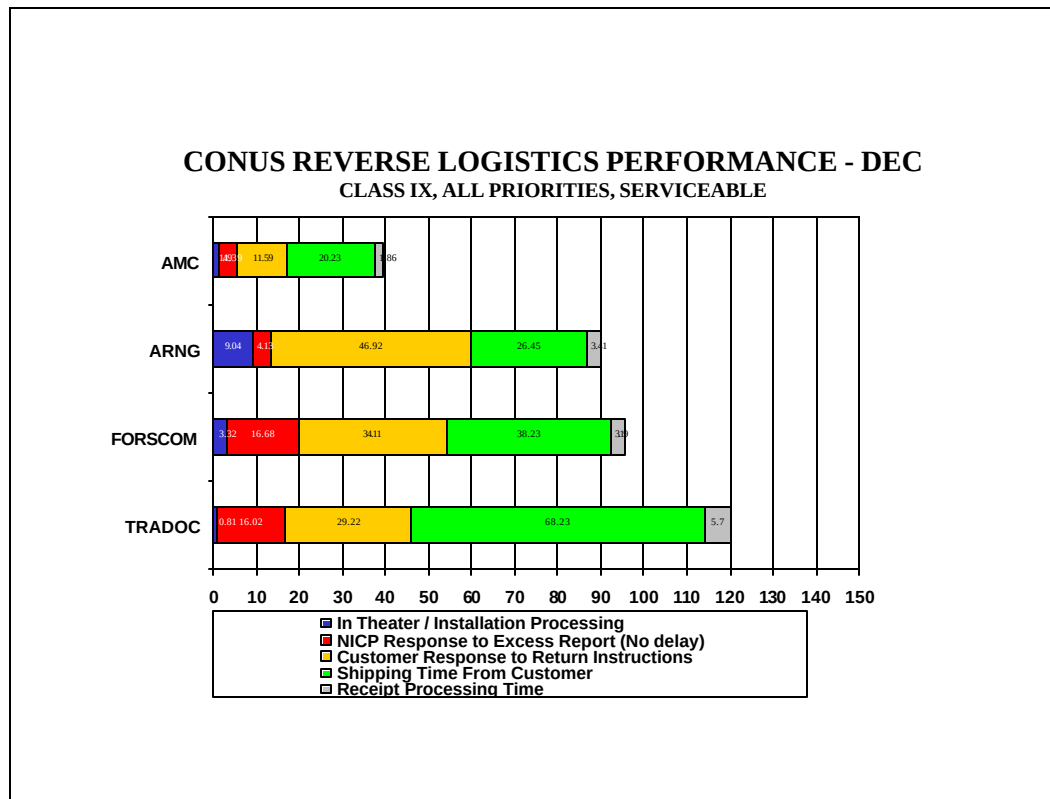
The fallout of the presentation in September 1997 was the realization that a serious problem existed in the Army in respect to the return of serviceable supplies to the wholesale system. The Army has long maintained a database at Redstone Arsenal, Alabama to track the return and disposition of unserviceable repairable items. The Materiel Returns Database (MRDB) provides tracking data on unserviceable repairables in both the transportation and maintenance systems. As a result of the 1997 presentation a study was commissioned to look at the causes of excess, or redistributable assets. The study was not chartered to examine the management of the reverse supply chain; it was only commissioned to look at the causes of excess in the system.

Items that enter the Army's current reverse supply chain are processed according to the flow chart in Figure 4. This process is more complex and time consuming than the processes associated with the forward supply chain at a Supply Support Activity. When the Army converted to the Army of Excellence Tables of Organization and Equipment in the mid 1980's, the classification section of the SSA was eliminated. The emphasis was placed on receiving, storing, and issuing supplies and not on the acceptance of returned items.



The items that pass through this process flow result in the processing times shown in Figure 5.<sup>48</sup> This figure shows the total processing time from the time that the Supply Support Activity reports the item as excess until it is back in the wholesale system and available for reissue if the item is serviceable. For FORSCOM, the major command for all Continental United States (CONUS) based tactical Army forces, the average reverse pipeline time is over 95 days. The magnitude of the problem becomes clear when this 95 day figure is compared to the average Customer Order Cycle Time (Order Ship Time) of 8.9 days for all CONUS based tactical forces. If the average Customer Order Cycle Time is less than nine days, there is a potential for the Army's wholesale supply system to order the same part from its suppliers several times, thus creating additional excess in the supply system. The time necessary to get a serviceable item back into the wholesale system from European based forces is in excess of 130 days. The Army's Logistics

Support Activity at Redstone Arsenal, Alabama maintains the Retrograde Intransit Visibility Report that captures the data shown in Figure 5.

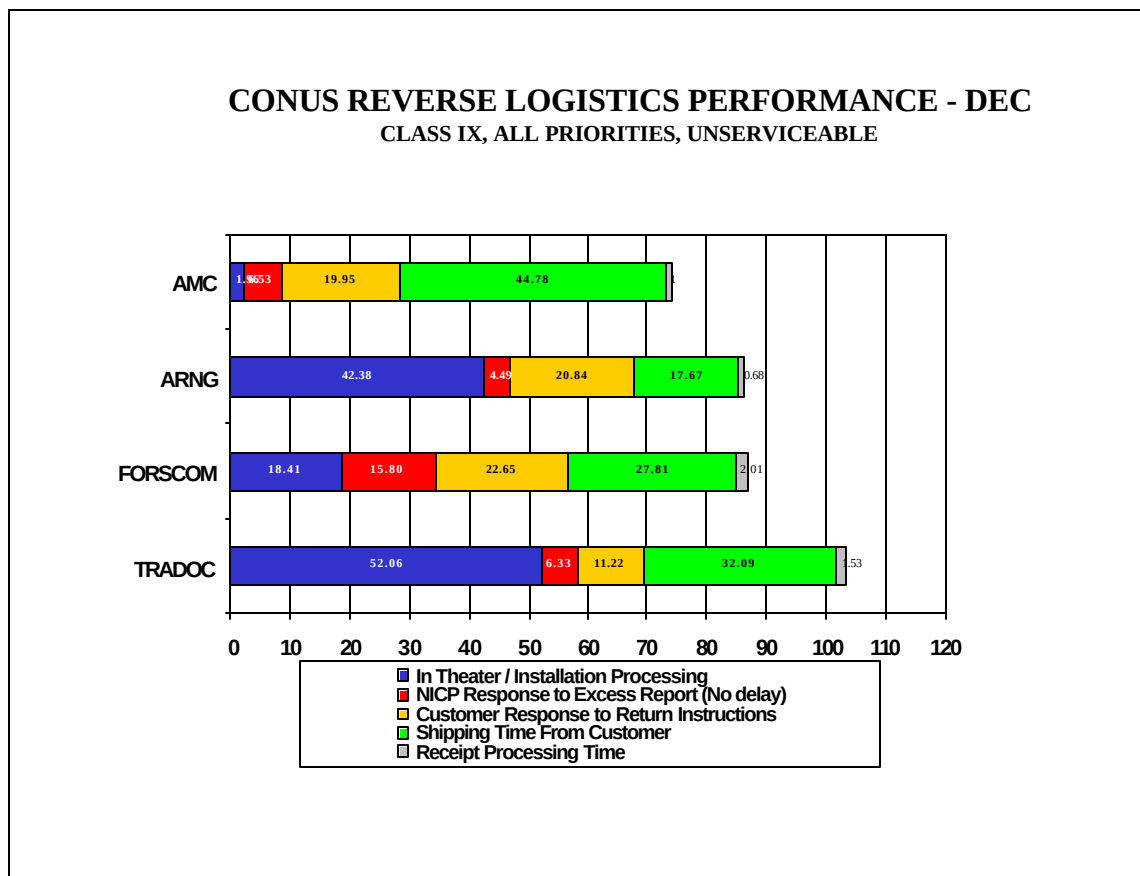


**Figure 5. US Army Reverse Pipeline Processing Times for Serviceable Supplies Returned to the Wholesale Supply System (Dec 2000).**

Figure 6 shows the time necessary for unserviceable items to reach the National Maintenance Program site.<sup>49</sup> These times are in addition to the maintenance repair cycle times to return the item to a serviceable condition. Once the item is repaired or rebuilt, additional time is necessary to return the item to the wholesale supply system so that the part is again available for issue. The data for Figure 6 is taken from the Logistics Support Activity's Recovery Improvement Program Reporting System and the Materiel Returns Database.

<sup>49</sup> Ibid.





**Figure 6. Processing Times for Unserviceable Reparable Items Returned to the National Maintenance Program for Repair or Rebuild (Dec 2000).**

The data used to compile Figures 5 and 6 is maintained in the Logistics Support Activity's (LOGSA) databases and can be accessed through the Logistics Integrated Database (LIDB). This data has been captured by LOGSA for over a decade in conjunction with the collection of Order Ship Times. Only in the last three years has the Army become aware of the value of this information.

The United States Army Forces Command (FORSCOM) in conjunction with the Georgia Tech Research Institute developed a plan to track items in the reverse pipeline using Radio Frequency and Automated Identification Technology. This program would have provided the Army with an almost real time system to track parcels in the reverse

pipeline. The system was designed to operate in a manner similar to the tracking system utilized by Fedex, UPS, and the US Postal System. The system was designed to work on a Windows platform. The intangible value of a Windows based system is that soldiers and civilians throughout the Army are knowledgeable enough on the Windows operating system to enable a shorter train up period for the system. An additional plus for this system was that the reports charts appeared in an Excel format, thereby making them easy to import into PowerPoint briefing charts.<sup>50</sup> The FORSCOM system provided users with useful information in a easy to understand format.

The problem with this system is that the development and testing of the system was tied to the development and testing of the Global Combat Service Support System – Army (GCSS-A). In January 2001, the Army decided to pull the plug on the over due and over budget GCSS-A program and start back at the requirements development stage. This decision moved the fielding of GCSS-A from the originally proposed 1999 fielding to somewhere in the 2004 time frame. This decision delayed the development and fielding of the tracking system proposed by FORSCOM.

### **Analysis**

The analysis of the methods used by commercial industry and the Army's current systems will use Dr. Dawe's previously mentioned six symptoms that there may be a problem in the reverse supply chain. Using these symptoms as a guide will establish the degree of the problem the Army is currently experiencing in the reverse supply chain management arena.

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<sup>50</sup> For more on the FORSCOM proposed system see the Reverse Logistics links on the Velocity Management Program homepage at <http://www.cascom.army.mil/vm>.

The first of Dr. Dawe's symptoms of a reverse supply chain problem is that returned supplies arrive faster than they are processed. The average processing time at the Army's two major Depots (San Joaquin, CA and Susquehanna, PA) for outgoing shipments is 1.1 days.<sup>51</sup> According to a briefing presented by FORSCOM to the Velocity Management team in December 2000, the average time to process a returned item at the depots was approximately 8.5 days.<sup>52</sup> This significant increase in processing times for items in the reverse supply chain compared to items in the normal supply chain correspond to Dawe's first symptom of a problem in the reverse supply chain as well as his fourth symptom of a problem, lengthy processing times for returned goods. The value of the items that were processed back into the depots during the June 2000- November 2000 timeframe was in excess of \$1.5 billion. The value of the items in the reverse supply chain also points to a significant problem.<sup>53</sup>

At the wholesale level, Dawe's third symptom does not appear to be a problem. The problem with unidentified items and or unauthorized returned merchandise is a problem at the SSA level. During the regeneration phase of a rotation at the Army's National Training Center (NTC) a team of soldiers is dedicated full time to identify items prior to the parts being returned to the NTC's Main Supply Support Activity. Since an item has to be identified before it can be declared as excess, the symptom of unidentified items at the wholesale system does not exist. The process of identifying parts at the Supply Support Activity delays the return of the item to the wholesale system for re-issue

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<sup>51</sup> Velocity Management website, <http://www.cascom.army.mil/vm>

<sup>52</sup> FORSCOM Presentation to the Velocity Management Team at CASCOT, December 2000. [www.cascom.army.mil/vm](http://www.cascom.army.mil/vm).

<sup>53</sup> Ibid.

to another unit with a requirement for that part. This time delay is in addition to the 95-day average reverse supply chain times shown earlier.

The sheer volume of items processed by the wholesale depots, an average of over 40,000 per month during the last half of 2000,<sup>54</sup> creates a backlog of items awaiting processing at the depots. This backlog of items waiting processing back into the supply system tracks with Dawe's second symptom that indicates a problem – large amounts of returned inventory held in the distribution center. Not only does this cause a problem in getting serviceable items back on the shelf and available for issue, but it also slows down the processing of new items coming into the depot to replenish the shelves or fill customer orders.

Dawe's fifth symptom that indicates a potential problem in the reverse supply chain is not knowing the total cost of the returned merchandise process. The FORSCOM study that resulted in the proposed tracking system captured the dollar value of the items in the reverse supply chain. However, what was not captured in the FORSCOM study or the studies by the RAND Corporation is the total cost of operating the reverse supply chain. The total costs of operating the supply chain in reverse include the processing at the company level, to include repackaging the item for return to the Supply Support Activity; the processing at the SSA level; the transportation costs; and the processing costs at the wholesale depot to put the item back on the shelf in a ready to issue condition. At any given time in the last half of 2000, there was a daily average of \$8.38

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<sup>54</sup> Ibid.

million dollars in the reverse supply chain.<sup>55</sup> Surprisingly enough, the average daily value of the items in the forward supply chain in 1998 was only \$7.4 million.<sup>56</sup>

Dawe's sixth problematic symptom is that customers lose confidence in repair activities. The RAND studies clearly show that the number of "work arounds" to get the parts from other sources increases significantly as the time to repair an item becomes increasingly longer.

Having established that there is obviously a problem with the Army's reverse supply chain processes, it is important to look at what is causing the items to fill the reverse pipeline. According to the RAND study items entering the reverse pipeline come from two levels – the unit level and the SSA level. The causes at these two levels are shown in Figure 7.

| <u>Unit level excess</u>                                                                                                                                                                                                                                           | <u>SSA level excess</u>                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Unserviceable reparableables</li><li>• Change of Command Inventories</li><li>• Prescribed Load List Reviews</li><li>• Found on Installation</li><li>• Turn in of end item equipment</li><li>• Formal inspections</li></ul> | <ul style="list-style-type: none"><li>• Unserviceable reparableables that are not repairable at the Direct Support Unit level</li><li>• Authorized Stockage List Reviews</li><li>• Immediate returns - cancellations or repair to excess</li><li>• Customer returns</li><li>• Turn in of end item equipment - support requirement eliminated</li><li>• Disposal of items to the Defense Reutilization and Marketing Office</li></ul> |

**Figure 7. Events that cause items to enter the reverse supply chain.**

<sup>55</sup> Ibid.

<sup>56</sup> Briefing to the Velocity Management Board of Directors, May 1999.

The Army has addressed the root cause of some of these events through the Velocity Management Program and its initiatives to streamline the supply processes. The Velocity Management Dollar Cost Banding initiative changed the algorithms and criteria used to calculate what should be stocked at the SSA level. Prior to this initiative all items on the SSA's Authorized Stockage List (ASL) were reviewed every six months to determine if the item was demand supported. The same demand support criteria were applied to all items in the ASL regardless of the dollar value of the item. This resulted in the same level of management for washers and screws as for tank engines. The criteria dictated the level of stockage based on previous demand and resulted in items being dropped from the stockage list one review only to be added back as a result of the next review. By establishing new criteria based on a longer previous demand period coupled with the value of the item, turbulence was reduced and the number of items churning in the reverse supply chain were reduced.

However, the biggest contributor to the bloated reverse supply chain continues to be customer cancellations that do not reach the SSA before the requisition has already passed to the wholesale system and customer returns as a result of bad diagnosis of faults and multiple ordering of the same part. Once a proper diagnosis is performed and the proper parts put on order, the original requisition is cancelled. If the original part has already been shipped, it will become excess and enter the reverse supply chain.

Some of the problems associated with the creation of excess material are not unique to the Army. In a presentation to the American Productivity and Inventory Control Society's annual conference in October 2000, Dave Garwood presented a list of

ten root causes of excess inventory.<sup>57</sup> Selling less than planned was the number one cause. “Selling” less than planned at the SSA level based on flawed forecasting results in dropping an item from the ASL at the time of review and produces excess material. This material is either returned to the wholesale system for reissue or disposed of through the Defense Reutilization and Marketing Office (DRMO) system or sometimes the Dempsey Dumpster.

Long lead times is the second most common cause of excess in the commercial sector. The RAND studies showed that the longer the lead times for an item to be received, the better the chances that the item would be substituted, reordered, or locally procured. All of these methods create excess that must pass back through the reverse supply chain. Another common cause listed by Mr. Garwood was inaccurate inventory records. Inaccurate inventory records coupled with a lack of visibility of distribution inventory for the Army has produced items being repaired or rebuilt that are excess to the organization and therefore must be returned to the wholesale system through the reverse supply chain. Repairing items that are excess to the supply system consumes dollars, parts, manpower, and transportation assets and puts more serviceable items in the reverse supply chain.

With such a large problem that is costing the Army a large, but uncalculated, cost to process, is there a workable solution? The next chapter addresses possible solutions to this problem.

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<sup>57</sup> Dave Garwood, “Five Steps to Make Your Inventory Spin,” presentation to the APICS Annual Conference, Oct 2000, Orlando, FL.

## **Chapter 5**

### **Conclusions and Recommendations**

*“The truth is, for one reason or another, materials do come back and it is up to those involved in the warehouse to effectively recover as much of the cost for these items as possible.”<sup>58</sup>*

The problem of how to manage items in the reverse supply chain has existed for years. Catalog retailers have wrestled with this problem since the advent of catalog merchandising. Catalogers such as J.C. Penney and Sears were able to counter the problem by accepting merchandise back into their retail stores even if it was purchased through their catalog division. Other retailers and more recently e-tailers (merchants that sell exclusively through the Internet) have been forced to address the handling of returned merchandise rapidly to ensure proper credit is given to consumers and to get the serviceable merchandise back on the shelves for resale.

Reverse supply chain management is not a problem unique to the Army and the Department of Defense. It is, however, a key area that consumes large amounts of resources and one in which the entire Defense community is falling behind the progress of the commercial sector. The reverse supply chain contains an average of almost a million dollars a day more than the forward supply chain that supplies repair parts and other supplies to Army’s worldwide units. On any given day there is an average of over 30,000 items in the Department of Defense’s reverse supply chain.

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<sup>58</sup> Whalen, “In Through the Out Door,” p. 33.



Commercial industry became concerned about the processes in the reverse supply chain initially because of environmental concerns and then as a way of increasing profits by reducing logistics related costs. Estimates for commercial industry put the value of the reverse supply chain at over \$62 billion annually. The Defense community historically has not concerned itself with profitability and therefore has not been concerned with recapturing the costs of items in the reverse supply chain. One primary reason for this lack of concern is the relatively small credit provided to units that return excess material and the fact that the items are usually already needed by another unit that will pay full price for the item.

In a recent article in *Warehousing Management Magazine*, Jim Whelan, the associate editor, stated that the “ultimate goal of a successful reverse supply chain program should be to phase itself out over time through systematic process improvements.”<sup>59</sup> One of the most successful process improvement programs in recent years is the application of Motorola’s and General Electric’s methodologies tied to their Six Sigma programs.<sup>60</sup> The conclusions and recommendations in this chapter will apply the General Electric methodology of Define, Measure, Analyze, Improve, and Control (DMAIC) to the Army’s reverse supply chain processes. These recommendations may not phase out the need for a reverse supply chain management system – as long as there is pressure to get weapons systems up to maintenance standards, there will be mistakes in

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<sup>59</sup> Ibid., p.34.

<sup>60</sup> Six Sigma is a statistical process control measure that is literally 3.4 errors per million transactions. The Motorola Six Sigma program utilizes six steps to improvement. The six steps are to identify the product or service that is provided; identify the customers and what is important to them; identify what is needed to meet the customers’ expectations; define the process for doing the work; mistake proof the process; and ensure continuous improvement by measuring, analyzing, and controlling the improved process. The General Electric methodology for six sigma improvement is a little simpler: Define, Measure, Analyze, Improve, and Control.

the system. But the recommendations in this chapter will help the Army and the Department of Defense get a handle on the reverse supply chain problems.

Reverse supply chain processes were defined earlier in this paper as the return of supplies that are surplus to the needs of the unit or are unserviceable and in need of rebuild or remanufacturing to return the item to a serviceable status. Processes involved in a reverse supply chain are depicted in Figures 2 and 4. These process maps provide the ability to focus on what processes need to be changed.

FORSCOM's proposed tracking system, although tied to the Global Combat Service Support System – Army (GCSS-A), did provide a glimpse into the required measurements needed to get control of the flow in the reverse supply chain. Measurements provided by this system indicated major problems in the reverse supply chain. Not only did this system give a snapshot of the volume of the supplies being returned to the wholesale supply system, but it also provided a snapshot of the dollars of inventory tied up in the reverse pipeline that were not available to customer units with valid requirements for the parts. FORSCOM's proposed system also provided a means of tracking online the processing by each installation and each processing point within the reverse supply chain. The value of this information is that it enables the user to identify potential problem areas and non-value-added processing points that can be eliminated or improved to speed the flow of materials back through the supply chain.

Process maps created in the define phase (Figures 2 and 4) coupled with the measurements gathered in the measurement phase provide the basis for the analysis phase. The next step in the DMAIC methodology is to analyze the available data. The analysis provided in Chapters 3 and 4 of the Army's current system and the application of

reverse supply chain management in commercial industry clearly shows that the Army definitely has a problem.

### **Recommendations**

Improving the process is the fourth step in the DMAIC methodology. Studies by the RAND Corporation's Arroyo Center identified the primary root causes of excess items that are returned to the supply system. A large contributor to the problem is the misdiagnosis of faults at the maintenance facilities. The easiest and quickest way to improve this problem is to add time to the maintenance Advanced Individual Training programs and re-institute the Master Diagnostician Program that became one of the victims of the Army's Drawdown. Misdiagnosis of faults and the multiple ordering of parts to correct a fault are partially leadership-induced problems. Pressure to keep vehicles at a certain readiness level, usually regardless of cost, prompts commanders to put pressure on the maintenance and repair parts clerks to order the parts within twenty-four hours of the equipment reaching a deadlined status.

Placing a part on order within twenty-four hours has become an unwritten policy that has perpetuated itself throughout the Army. In order to meet this "standard" mechanics order a part for the most common faults on a particular piece of equipment, whether or not that really is the correct fault. This pressure to get the part rapidly prompts the young supply clerk to reorder the part multiple times in the hope that one of the requisitions will arrive in time to get the equipment fixed. Establishing a new policy that states that the proper diagnosis of a fault is more important than the quick diagnosis will help eliminate this problem. This is one area where a 75% solution today is not better than a 100% solution tomorrow. Such a policy could significantly reduce the

amount of excess items that require manpower and transportation assets to return to the supply system. A new policy would also assist commanders in balancing their Operations and Maintenance budgets because they will not be chasing credits for items that were returned excess as a result of a pressured quick, but faulty diagnosis.

The second recommendation to improve the reverse supply chain management for the Army is a bit tougher to implement. A cost analysis needs to be conducted to determine the feasibility of establishing a Defense Logistics Agency central returns management center. Determining the real cost of processing an item through the reverse supply chain has to be the initial step in this analysis. Once this value is known an accurate dollar value can be set for whether or not an item is returned to the wholesale supply system or maintained at the local installation level. The value of what should be returned to the wholesale supply system needs to consider the criticality of the item and the procurement lead times to replenish the item at the wholesale level.

Additional considerations at the item manager level should be the total dollar value of the items being returned as excess to the retail level and the demand for the items from other units. Department of Defense-wide fielding of the Joint Total Asset Visibility program will provide the capability to leave an item at the local level and use that location as a virtual location for the wholesale system. This would prevent the requirement to ship the item to the wholesale system only to ship it again to the unit that really needs the item.

The second phase of the analysis is to determine the feasibility of establishing a central returns center using the model currently in place at the GENCO facilities. The Defense Depot, Red River, Texas is currently operating at approximately one third of its

capacity and serves primarily as a mini-depot in support of Fort Hood and Fort Riley. This facility could serve as the Defense Central Returns Center. Every installation currently contracts for its own transportation needs to return items to the depots. Creating a central returns depot at Red River would allow the Department of Defense to contract for shipment of all serviceable items to one location. This central returns center would then process the items into the center and determine if the items are ready for issue to another unit.

Creating a central returns center would relieve the two major depots from processing returned merchandise and new supplies in the same facility and would increase the productivity of the two major depots in supplying the Department of Defense with repair parts. A central returns center would unencumber the forward supply chain and thereby improve the customer order cycle times. This improvement in the customer order cycle times will instill a new confidence in the supply chain and reduce the number of multiple orders that result in excess supplies.

The central returns processing center at Red River Depot would be responsible for determining the real serviceability of the returned items and ensuring that the serviceable items are repacked to prevent damages. A central returns center would have the capability to either return the serviceable items to the two major depots or serve as alternate storage locations for the item managers to request shipments from.

Using regularly scheduled transportation for every installation will reduce the holding times at the installations while they wait for a full truckload of returned supplies. The consolidation of all excess items to one centrally managed location will reduce the much publicized problem of items being shipped to the Defense Reutilization and

Marketing Office for auction sales only to be bought back by the government at a later date. All items would be consolidated at the central returns center allowing for greater efficiencies for the smaller items that currently end up in the disposal and miscellaneous auction bins at DRMO. An additional benefit from a central returns center will come from expanding operations from an Army managed center to a Defense Logistics Agency managed facility to support all of the Department of Defense.

The true value added to the Department of Defense in establishing a central returns center will be in the identification of items using Radio Frequency/Automated Identification Technology linked to the Joint Total Asset Visibility system to provide real time accountability and real time credits to the supported units. With the cost of the transportation no longer an installation responsibility, items will be returned faster, consolidated, identified, and ready for issue to fill another requirement in a shorter amount of time. These efficiencies will eventually allow the reverse supply chain problem to become a minor issue throughout the Department of Defense.

Reducing the amount of items clogging the supply chain travelling in reverse will reduce the need for larger stockpiles of supplies at all levels. If the size of the supply stockpiles are reduced, the size of the logistics footprint will be reduced and operate more efficiently and effectively in supporting soldiers in peace, peacetime operations, or in times of conflict.

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