RAND ARROYO CENTER

RESEARCH BRIEF

Getting Value from the Reverse Logistics Pipeline

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For many of the major components on the Army's weapon systems, trucks, and other major items of equipment, it often makes economic sense to repair them rather than replace them with new ones. Current acquisition and management of these systems in fact plan for and assume that this sort of repair will occur. Thus, the Army has an extensive reverse logistics system designed to reclaim as much value from these parts as possible. This system consists of both distribution and maintenance processes. Designated parts are turned in by maintainers to the supply system and directed to local and national sources of repair as appropriate. Repaired parts are then returned to the supply system to be issued to maintainers either immediately or when demands occur. At peacetime levels, two billion dollars worth (in year 2000) of such parts are returned to the system. Properly managed, the reverse logistics pipeline can yield great value in the form of:

- More responsive logistical support, leading to better equipment readiness
- More value reclaimed from broken parts, leading to less money spent on new parts
- Less money invested in inventory
- Fewer labor and physical resources committed to the reverse logistics process
- Better visibility over broken equipment and components

As the Army shifts to a two-level maintenance system that emphasizes component replacement in the field and off-system component repair in the "rear," reverse logistics processes will become even more important.

Researchers from RAND Arroyo Center studied the Army's reverse logistics system with an eye to initiating continuous process improvement efforts to make it more efficient and effective, and the results of their analyses appear in *Value Recovery from the Reverse Logistics Pipeline*.

Key Findings:

- **Recovering value from unserviceable reparable parts, a key component of the Army's reverse logistics processes, is a valuable link in the Army's supply chain, with more than two billion dollars worth of such items flowing through the system each year (at "peacetime" levels before Operation Iraqi Freedom.)**
- **The Army's reverse logistics pipeline processes are relatively slow and variable**
- **Streamlining the reverse logistics pipeline could improve readiness, save money, and enhance the Army's ability to manage its spare parts inventory**
- **The adoption of reverse logistics metrics is crucial for effective management and continuous process improvement**

Defining, Measuring, and Improving the Reverse Logistics Process

The Army has used the define-measure-improve methodology for a number of years to improve its logistics practices, most notably in its Distribution Management initiative. Arroyo researchers applied this methodology to the reverse logistics process to lay the initial groundwork for process improvement efforts.

Defining the Process

To define the reverse logistics process, Arroyo researchers, using fiscal year 2000 as a baseline, carefully analyzed the process of recovering value from a broken spare part that can be fixed. The figure on the next page depicts what happens to a part in the reverse pipeline. Typically, a mechanic

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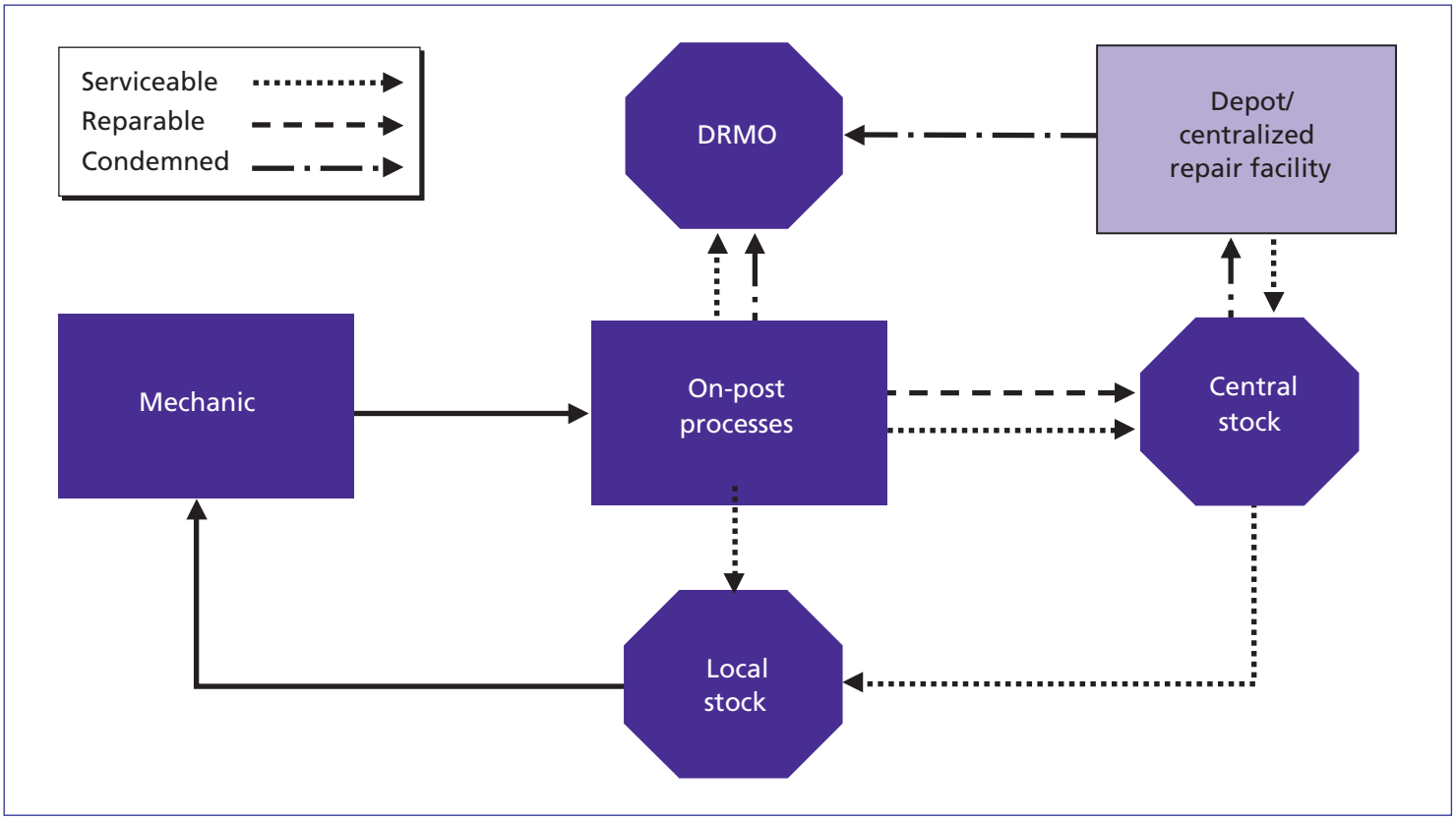
Figure 1 Endpoints for Parts or Components



turns in an unserviceable part to the unit supply activity, from which it moves through various processes and organizations until it reaches one of three endpoints (those shaped like a stop sign in the diagram). If it is serviceable or returned to that condition by local repair activities, it will be returned to local stocks for reissue when needed. Or it could be disposed of (Defense Reutilization and Marketing Office: DRMO in the diagram) if it cannot be fixed, costs too much to fix, or is simply no longer needed and is not economical to send elsewhere. Or it could go to centralized, national stock to await induction into a repair program.

Measuring the Process

For measurement purposes, the reverse logistics process begins when a soldier turns in the unserviceable part, and it ends when the part is fixed, condemned, or sent to national-level inventory to await induction into a repair program. Arroyo researchers developed metrics to monitor overall reverse logistics process time, along with process segment metrics covering all elements of the system to diagnose the sources of problems and identify opportunities for improvement. Additional metrics show the percentage of repairs completed at each type of repair activity, reflecting the ability of the processes to reclaim value from unserviceable parts.

In FY00, the total reverse logistics time for items that were repaired below depot level and returned to serviceable stocks averaged just over 33 days. Items that were condemned and disposed of averaged 28 days to process, and items that were sent to depot level for repair averaged over 82 days for movement to national inventory locations where they await repair induction. Of note, the reverse logistics process was found to be much slower and more variable than the forward process, suggesting opportunity for improvement.

Process segment metrics enable the identification of potential specific improvement areas. In 2000, for example, it took on average 6 days for units to move unserviceable parts to forward support battalions (FSBs), with half of the parts taking two days or less and 5 percent of the parts taking more than 21 days. Items sent from FSBs to general support (GS) level took an average of 17 days from departure to receipt, with a 95th percentile of over 60 days. For parts entered into repair at GS level (either installation maintenance activities or GS repair units) and successfully repaired, it took, on average, 70 days to complete this process. And time from shipment from GS level to a depot took an average of 62 days.

Improving the Process

Arroyo researchers defined improvement as the timely movement of materiel to minimize the amount of inventory investment and improve logistics responsiveness; the minimization of the resources, such as manpower, devoted to the process; and maximizing the portion of economically favorable repairs that are completed. The focus must fall on recovering value in a timely, efficient, and effective way, not just moving or piling up broken parts. Repairing parts and returning them rapidly to the inventory means that the Army does not have to keep as many in stock to ensure an acceptable level of satisfaction for customer demands. Thus, the Army can sustain the readiness of its fighting units at less cost.

Recommendations

Arroyo researchers suggested the following as ways to improve the reverse logistics process.

Streamline turn-in procedures. Turn-in requirements appear to slow the process. Areas the Army should investigate for improvement include the documentation required, cleaning, draining and safety requirements, and packaging requirements and practices.

Route items with an eye to what happens to them next. Army single stock fund requirements may cause an item to go to an intermediate organization, such as a "retrograde yard," even if it is going to be repaired elsewhere. Speedy delivery of the part to the location that can repair it has potential advantages, ultimately leading to the application of "pull" system techniques emphasized by lean value chain thinking.

Integrate the forward and reverse pipelines. Integrating the two pipelines may offer better efficiency and possible cost savings. Economies of scale may also be possible. The Army should study the opportunities for combining the delivery of serviceables with the return of unserviceables, perhaps using hub-and-spoke or "milk run" networks with routinely scheduled transportation of retrograde items.

Explore the potential of commercial software applications or techniques for improving reverse flow management. Industry has used software to automate the return process, thus reducing expenses and potential errors. One company reduced the hours required to process return pickups by about 70 percent using an Internet-based return system. The Army might also be able to achieve substantial reductions.

Align financial incentives with improvements. Financial incentives such as credit policies, transportation fee structures, and surcharges need to line up with and support decisions to improve the flow of damaged parts. Discussion between Army Materiel Command (AMC), Defense Logistics Command (DLA), and Installation Commands may lead to win-win agreements. Such issues are inherent in influencing the behavior of those involved in the reverse supply chain.

Responsive repair capability and timely throughput are the keys to improve flow through the reverse logistics pipeline. A broad range of activities needs to be examined to identify the specific ways to achieve these two goals. But they are worth pursuing because the benefits could be substantial, and the most important one is the improved readiness of combat units. ■

Related Publications

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This research brief describes work done for RAND Arroyo Center documented in *Value Recovery from the Reverse Logistics Pipeline*, by David Diener, Eric Peltz, Art Lackey, Darlene J. Blake, and Karthik Vaidyanathan, MG-238-A (available at http://www.rand.org/publications/MG/MG238/), 2004, 86 pp., $20.00, ISBN: 0-8330-3679-3. MG-238-A is also available from RAND Distribution Services (phone: 310.451.7002; toll free: 877.584.8642; or email: order@rand.org). The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. **RAND**® is a registered trademark.

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