STRATEGY RESEARCH PROJECT

SUB-OPTIMIZING LOGISTICS

BY

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ABSTRACT

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This paper focuses on methods for enhancing the current Army logistics system. It begins with a definition of "optimization" and then identifies current limitations within the logistics system. Four impacts of these limitations are discussed in detail as follows: excess at the wholesale level, excess at the retail level, financial management, and pricing/credit policy. Four current initiatives to rectify these limitations are also presented. These initiatives are the Single Stock Fund, Global Combat Support System-Army, the Army Strategic Logistics Plan, and the Advanced Logistics Program. Two private sector supply/information systems used by Caterpillar and Wal-Mart are briefly examined. The paper concludes with a summary describing the current state of optimization and identifies four recommendations. These recommendations focus on providing more centralized control for the Deputy Chief of Staff for Logistics, immediately implementing the Single Stock Fund concept, closing the FORSCOM Materiel Management Center and implementing certain RAND study recommendations.

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SUB-OPTIMIZING LOGISTICS

Optimization is defined as a process of orchestrating the combined efforts of all components of a system toward achievement of the stated aim of the system. Sub-optimization occurs when the performance of a system component has a net negative effect on the performance of the total system. The system that is not as functional or effective as it should be is often characterized by internal competition or over emphasized subsystems without regard to the aim of the whole.[1] An optimal logistics system is essential to maximize efficiencies and best support all facets of the Army.

Clear leadership and vision are required to combine all the components of the logistics system toward one optimal system. Limiting characteristics or weaknesses in the logistics system are unacceptable as the Army transitions to Force XXI and prepares for the Army After Next (AAN). This paper examines weaknesses in the present logistics system and some of the impacts these weaknesses are having across the Army. The paper then looks at how the Army is addressing its logistics system weaknesses and recommends ways for system optimization.

LOGISTICS SYSTEM WEAKNESSES

The logistics system we have today evolved from the Army's warfighting experience. "Logistics has been designed and implemented as an integral element of the Army's operational culture."[2] The implementation of Force XXI and AAN requires logisticians to continually examine policies, processes, and procedures to ensure optimal support to the operational Army. As part of this continuous review, the Army Strategic Logistics Plan (ASLP) identified the following limiting characteristics in our present logistics structure:

- Command-channeled, horizontal structure.
- Confusing descriptions of the organization of logistics systems and processes: retail/wholesale levels; strategic, operational, tactical echelons.
- Processes and business practices based on hierarchical structure; sequential echeloned financial and logistics data processing; redundant processing of identical data elements; no baseline for source data automation.
- Technology insertion lagging; planning offers sustained stovepiping; resources focused on short-term solutions.
- Logistics systems (structure, training, automation etc.) functionally oriented (supply, maintenance, transportation etc.).
- Less than full asset visibility and diffused ownership of the pipeline.
- Systems design and oversight responsibilities fragmented among various design centers and agencies.
- Oriented to the Army's 20th century culture.[3]

These weaknesses show a fragmented and unfocused group of subsystems. Synchronization and synergy is required to achieve an optimal logistics system. Today's logistics system is not as

functional or effective as it should be. Functionally oriented and over emphasized subsystems without centralized oversight responsibilities cause inefficient logistics execution. The limiting characteristics are addressed by a number of current initiatives later in the paper.

IMPACTS OF WEAKNESSES

The following paragraphs amplify the impacts of sub-optimization on the present Army logistics system. Some of these impacts can be seen in the creation of excess materiel at both retail and wholesale levels, inability to manage budgets with the current financial system, and supply policies that do not promote efficiencies. The discussion highlights some actions taken to reduce the problem. Recommendations are also presented to better support the goal of creating an optimal logistics system.

Excess

One of the most serious impacts of our present system is excess materiel. It is the result of several of the identified limiting characteristics. Hierarchical structure based business practices, redundant processing of data, and limited asset visibility are a few of the problems associated with excess. It is very apparent that a number of subsystems in supply management have created an overall negative effect on the performance of the total system.

Excess-Wholesale

In 1989, Army Materiel Command (AMC) supply inventories were approximately $18 B. These levels were commensurate with the Cold War way of thinking. The large force structure reduction since 1989 decreased the requirements for parts throughout the Army by over 60%.[4] Most item managers habitually worked two to three years into the future on requirement determination using the Requirements Determination and Execution System (RDES) management system.[5] The surge production and large build up of repair parts during Desert Storm/Shield followed immediately by the large force reduction turned the wholesale and retail communities upside down. The quick end to the war and immediate retrograde of large amounts of supplies filled warehouses across the country. The problem was compounded by the amount of excess units were holding in anticipation of needs. Projections from stock on hand and stocks recovered from Desert Storm were staggering. Some inventory was projected to last well past the year 2020.

AMC has made progress reducing inventory and fixing the long lead time for procurement. Inventory reductions since 1990 have been huge with a 49% reduction in inventory position and 40% reduction in on hand stock. However, there is still much work required. The on hand inventory, in 1997, based on requirements should have been $4B, but the actual on hand inventory was

$10.5B. During this same timeframe from 1990-1997 procurement lead times (PLT) were reduced by 67%. In 1990, it took on average three years to procure an item. AMC has brought that down to approximately one year. The question becomes how much stockage is enough? Is the Army using the right tools to gauge that?

Rand Arroyo and the Army Materiel System Analysis Activity (AMSAA) recently conducted a study titled, ""Optimum" Inventory for AMC-Managed Items". In this study they concluded reduced procurement lead times and smaller order/authorization quantities have the potential of reducing the current inventory level by $8.4B over the next 10 years. There is also a potential "one time" inventory savings of $6.3B and avoiding repair of selected items with large quantities already on hand. Reduced lead times and smaller quantities would also reduce forecasting error. The model for requirement determination is under review in coordination with the Velocity Management Repair Process Improvement Team.[6] Another important initiative is the Single Stock Fund that will combine wholesale and retail logistics management. This initiative will be discussed in detail later in this paper.

Excess-Retail

The FORSCOM Redistribution Program, which later expanded to become the FORSCOM Materiel Management Center (FMMC), is an

excellent example of success in innovative management. Unfortunately, the success of this program demonstrates the inefficiency in the logistics systems as a whole.

The initial plan was to cost avoid the millions of dollars units were losing on the turn in of selected serviceable repair parts to the wholesale level. Desert Shield/Storm and other contingency operations, in conjunction with huge force reductions created unusually large amounts of excess at the retail level. The parts and equipment were purchased from FORSCOM funds and the thought of turning supplies in to the wholesale level and getting a small return credit, only to have another FORSCOM unit need the same part the next day, seemed extremely wasteful.

The plan was to redistribute parts within FORSCOM at a cost saving to the unit and FORSCOM. The unit would turn in their excess and managers at the materiel management center would put the excess items on hold at the local Supply Support Activity (SSA) or ship them to a FORSCOM redistribution hub. The FMMC would buy the parts at wholesale table credit rate, plus an additional incentive credit of 5%. FORSCOM then sold the excess parts at 80 % of the Army Master Data File (AMDF) price. The guarantee from FORSCOM was no cost to the installation. The FRC would only stay in business as long as it made enough money to pay their employees. In fact, FORSCOM hired individuals, FRC

Expediters, to work in each Division Materiel Management Center to oversee redistribution for each division. The initiative was a huge success. It began with a select number of high demand secondary items and immediately began to expand.

The result was a FORSCOM distribution system within the Army's distribution system. The units were able to save money by buying and turning in to the FRC. FORSCOM was able to cost avoid money by redistributing parts already paid for. A win, win at the retail level.

The FORSCOM initiative demonstrates the high cost associated with the wholesale supply system. The program adversely affects wholesale management because item managers and depots expect demands and reparable items from the field based on historical trends. The parts redistribution and repair within FORSCOM skewed requirements determination and reduced depot workload on many reparable items. The FMMC program is simply a duplication of the wholesale supply and distribution system.

Financial Management

The linkage and functionality of financial management with logistics systems is an excellent example of sub-optimization. The day you cannot balance your checkbook is the day you should stop spending money. Under current financial and logistics system interface, units are incapable of balancing their checkbook on any given day. Because of this weakness, the

financial subsystem has a negative affect on the performance of the overall system.

There is no financial interface to assist units in money management. Units order parts with a clear understanding of how much it will cost based on the latest Army Master Data File (AMDF). Yet, the cost can change if the AMDF price changes from the time the unit orders the part to when they receive it, which is when the account is debited.[7] When a unit turns in either an unserviceable or serviceable repair part, there is no mechanism informing the unit of the dollar amount of credit they are receiving. The unit does receive the database Commitments Accounting System (dCAS) financial report which displays credit approximately two to three weeks after turn in of the item. If no credit is given, the unit must assume there was none to give or question each item to ensure 100% of the authorized credit is received. If this sounds time consuming and inefficient, it is.

The supply system with the fielding of Unit Level Logistic System-Ground (ULLS-G) and Standard Army Retail Supply System-Objective (SARRS-O) is completely automated. Soldiers order parts electronically by sending the request to the next higher supply source who will either fill the requisition or pass it to the next higher supply source. The system is continually updating the unit on previous parts ordered but not received, and even updating price changes to the AMDF for parts the unit

may order in the future. In the era of software programs like Quicken or Money 99, programs that will even recommend ways to reduce taxes, the Army has not fielded an automated means to assist the commander in management of his budget. Even worse is the problem of inefficiently informing the commander of expenditures and what credit he will get from the turn in of an item.

In a recent study by the Rand Corporation on credit, pricing and surcharge policies, they recommended a number of near term changes to the Army's system. Rand recommendations were:

- Set retail credit rates item by item in order to provide units with better information and more accurate pricing.
- Adopt an exchange price policy which reduces delays and uncertainty in credit by strictly using AMDF credit rates.
- Fund cost components by other means, which equates to only paying for the true repair of the item and not the expensive overhead costs associated with depots.

These recommendations are in line with streamlining and clarifying logistics and financial policy and procedures.[8] Logistics systems must be directly linked to the financial system in a way transparent to the user. These changes also support the goal of optimizing the logistics system.

Pricing and Credit Policy

Pricing and credit policy changes are directly related to the limiting characteristics of the logistics system, discussed previously. Less than full asset visibility, diffused ownership of the supply pipeline, and redundant processing and business

processes based on a hierarchical structure directly contribute to sub-optimal management of logistics materiel.

Over the past few years, there were significant changes in logistics policy with respect to retention levels and requisition objectives. There were changes in credit policy including both wholesale and the alternate credit policy below wholesale. These changes are in many ways an attempt to get the Army on track to reducing inventory and eliminating layers of stockage at all levels. The numerous policy changes cause uncertainty with customers.[9]

Currently, the monetary credit a unit receives from a turn in can vary from zero to 100 percent depending on the Net Asset Posture (NAP) of the installation at the time the installation processes the turn in document. Theoretically, a customer could turn a part in that morning and get 100 percent credit; or turn one in that afternoon and get zero credit. The smart customer checks the NAP at installation and holds all excess until the NAP is below the installations requisitioning objective to ensure 100 percent credit. This credit policy actually encourages customers to hold excess, which affects the wholesale manager's ability to forecast. The same credit policy is true for unserviceable parts although the return can vary from zero to 80 percent. The credit variation makes it almost impossible to track finances.[10]

Policy changes must be kept to a minimum and only change when it supports the soldier in the field. Centralizing management with the Single Stock Fund initiative will eliminate many of these problems. The Single Stock Fund has the potential to fix most of the issues with policy and credit.

MILITARY INITIATIVES

Horizontal structure, a system functionally oriented, as well as fragmented design and oversight responsibilities are directly opposed to the goal of optimization. All of these traits create a sub-optimized system. The only way to optimize is through the synergistic effects of the subsystems working toward the best overall system. This process cannot be done without centralized command and control and each of the individual subsystems moving toward the aim of a single functional and efficient logistics system.

Single Stock Fund

An important initiative toward synchronization of effort is the Single Stock Fund (SSF). The SSF initiative will help to make the Army's logistics and financial processes much more effective and efficient. Under the current structure, supply management has both wholesale and retail levels. This separation of supply management causes many of the problems discussed previously. In particular, retail supply management decisions often negatively affect the wholesale level. The FORSCOM

reinvention initiative is an example of a problem associated with two levels of supply in the Army. It causes multiple points of sale, ledgers, and billing while there are layers of managers overseeing the same commodities. The two levels also cause redundancy in stocks while requiring long lead-time on some items due an inaccurate picture of needs at one level or the other. Bottomline, the two levels sub-optimize supply and financial management.

The present system has independent requirement determination, duplicate maintenance requirements and capabilities, potential to accumulate excess, and duplication of workload.[11] The SSF will integrate logistics in a vertical vice horizontal fashion. The merging of the wholesale and retail portion of the Army Working Capital, Supply Management Army (AWC-SMA) will produce a single, nationally managed fund. A single system of processes and business practices will eliminate the hierarchical structure and all of its inherent weaknesses. "In itself, SSF will revolutionize supply, maintenance, and financial practices by integrating currently separately managed wholesale and installation inventories into a single virtual entity."[12]

Clearly, SSF is addressing a number of the limiting characteristics and weaknesses identified in today's logistics structure. SSF will improve the command channeled, horizontal

structure pitfall while eliminating one of the most confusing aspects of the logistics structure and processes; namely, the retail and wholesale levels of supply and maintenance. It will streamline processes and business practices by using a single item manager and eliminate redundant processing of data elements while integrating financial and logistic data processing and management. The issue of no baseline for source data automation will be facilitated by SSF, but only resolved with the fielding of Global Combat Service Support-Army (GCSS-A). SSF will clarify ownership of assets in the supply pipeline and assist in asset visibility.

The system design is centralized and with the leadership of the Deputy Chief of Staff for Logistics (DCSLOG) focused as never before to ensure coordination of effort for near and far term fixes. SSF is designed to be flexible and adaptable to joint and commercial requirements. The overarching objective is a logistics and financial system that will support the warfighter in peace and war.[13] SSF is presently designed to interface with the present legacy systems in supply and finance. It is also working in concert with GCSS-A development and fielding.

Global Combat Support System - Army

GCSS-A will be the business automation enabler for the Total Army. It is being designed to support Force XXI and the

Revolution in Military Logistics (RML), acting as a conduit to the AAN process.[14] GEN Hartzog's (former TRADOC Commander), vision of GCSS-A is for a single, seamless Combat Service Support (CSS) system to move information; supportive of Army 21 and Army After Next; containing no discrete stove pipes, but enabling horizontal integration; and using interfaces wherever necessary.[15] A key feature of GCSS-A is the plan to encompass more than logistic systems but also financial, medical, and other non-logistic Combat Service Support (CSS) functions. This approach will greatly enhance CSS management.

The current CSS operations and information management systems are designed similar to the CSS organizational design, with stovepipe structures and very little horizontal interface. Communication among systems is frequently through the passing of floppy disks verses an automated link. The lack of a common, shared relational database to support a CSS system was a key issue identified in the Total Distribution Plan after Operation Desert Storm. The Chief of Staff of the Army recognized logistic automation as one of the Army's top three programs.[16] GCSS-A will support CSS with functions of manning, arming, fixing, fueling, moving, and sustaining. It will also interface with other CSS systems with a minimum amount of data entry requirements.

GCSS-A will eliminate a number of identified weaknesses in the logistics arena. GCSS-A will be the business information

system for the Army, a seamless and integrated CSS management system. One operating system, language, and communications protocol will replace ten retail systems. These ten systems currently have six operating systems, eight languages, and four communication protocols. GCSS-A windows based enabler will facilitate training and support commercial interface. This will provide the baseline for source data automation and eliminate much of the redundant processing of identical data elements. System design is centralized, thus ensuring the appropriate level of oversight at DA DCSLOG. GCSS-Army will provide a nationally managed logistics system.[17] This, in conjunction with SSF business practices, will alleviate a large number of identified logistic weaknesses with current systems. GCSS-A and SSF are critical initiatives to move logistics into Force XXI and AAN.

GCSS-A and SSF both contribute significantly toward an optimal logistics system. These two initiatives will eliminate many of the recognized limiting characteristics evident today. However, there are literally hundreds of additional initiatives that must be focused to support the aim of a single, optimal logistics system. The Army needs a management tool to orchestrate the hundreds of separate subsystems to obtain one optimal logistics system.

The Army Strategic Logistics Plan

The Army Strategic Logistic Plan (ASLP) is the source document to ensure synchronization and optimization for logistics.

> "The purpose of the Army Strategic Logistic Plan (ASLP) is to provide the forum and media necessary to synchronize the revolutionary efforts of individual logistics organizations, automated systems, processes, technology insertions, and policies with strategic direction of the Army."[18]

This is no easy task considering the amount of change the Army is going through in an effort to support future battlefields.

The ASLP encompasses all levels, organizations, and processes of Army logistics. It focuses on three process cycles in support of the Revolution in Military Logistics (RML) vision; today (current), Force XXI (near term), and Army After Next (long term). The plan complements the broader perspective of logistics complying with Department of Defense guidance and includes all activities that facilitate military operations. The Deputy Chief of Staff for Logistics (DCSLOG), HQDA has staff responsibility for developing and executing the ASLP. The Director, Logistic Integration Agency (LIA) is the functional proponent and manages the development and implementation of the plan.[19]

The ASLP will ensure all aspects of future logistics are coordinated and do not sub-optimize any one aspect of the

envisioned RML process. Goals and attributes of the Revolution in Military Logistics are:

Goals:

- A Revolutionary Military Force.
- Rapidly Project Sustained Decisive Military Power.

RML Attributes:

- Distribution Based Logistics
- Seamless Single Logistics Information System.
- Integrated Operational and Logistical Planning
- Seamless Integrated Support from all Sources:
  - Army, Joint, Government, Industry, Allies
- Enhanced Supportability and Streamlined Logistics will be built into the Army After Next.
- "Balance Peacetime Efficiency with Wartime Effectiveness."[20]

Coordinating and synchronizing all aspects of logistics throughout the Army are necessary to ensure results are in line with Department of Defense (DOD), Joint, and Army leadership and the Revolution in Military Affairs (RMA). The ASLP allows the Army to prioritize scarce resources on the high priority enablers to ensure near and far term goals are met.[21] While all logistic initiatives are synchronized to support the RML goals and attributes, DOD is working on long term solutions which cross Service boundaries

The Advanced Logistics Program

The Advanced Logistics Program (ALP) is a joint research effort with the Defense Advanced Research Projects Agency (DARPA) and the Defense Logistics Agency (DLA). This initiative

is intended to focus and synchronize military logistics systems to achieve optimum logistics solutions. "The program will define, develop, and demonstrate fundamental enabling technologies that will permit forces and sustainment materiel to be deployed, tracked, refurbished, sustained, and redeployed more effectively and efficiently than ever before."[22]

ALP will leverage advanced information technologies to develop an automated, multi-echelon, collaborative information system, and transportation technologies able to plan, monitor, replan, and re-execute logistical support even if assets are already enroute. ALP is based on a computer network allowing real time visualization and interaction at all phases of an operation. It will include all components of military and commercial CSS allowing the warfighter to quickly understand all aspects of logistics and sustainment implications. It will enable him to quickly generate plans, monitor the situation, and replan maximizing the assets available to support his mission.

The ALP is working toward combining efforts of all the components within DOD to optimize the military logistics system. This initiative demonstrates the DOD commitment toward optimization. Industry has also embraced the goals and attributes associated with an optimal logistics system. Industry is ahead of the Army in many respects toward achieving the aim of a seamless and synchronized logistics system.

INDUSTRY INITIATIVES

Caterpillar's Parts and Services Support Center (P&SS) is an excellent example of an advanced supply system working today. Caterpillar has named the system High Velocity Product Support, and the system provides parts from Bakersfield to Beirut to Bangkok. Their mission is very similar to the Army or military: provide the fastest possible response to a customer's needs. Caterpillar does this through advanced technology, sophisticated logistics systems, superior service, and quality parts. The distribution network over five continents is able to ship 99.7% of requested items within two hours. The parts order processing system can locate a part throughout the Caterpillar system. Their materiel management programs ensure the right parts are on hand when needed. Their future development is already working on sophisticated prognostics designed to locate an operating problem before failure. It will then forewarn the local dealer who can get the needed parts before the system ever becomes unserviceable.[23]

Another current business case study is Wal-Mart. Today if a customer walks in to any Wal-Mart and requests an item the clerk can tell them if they have any on their shelf, in their store storage area, in the Wal-Mart storage area, or at any other Wal-Mart location. In a case study by MITRE Corporation, this competitive awareness is the key competitive advantage in the

retail sector. In a recent interview, the Wal-Mart president commented that he did not worry about competitors that thought Wal-Mart was in the retail business, only those who sought to compete with him in the information business. Wal-Mart spent $452M in 1995 and $1,027M in 1996 on information technology. Their cost of distribution was 3% of sales verses 4.5 to 5% by their competition.[24] To remain viable both in the business sector and in the quickly changing Army Force XXI and AAN model, logistics must be adequately resourced, particularly in the information technology area. These two examples illustrate the viability of leaner, more flexible logistics that fully support the mission; right time, right place, right stuff...always at best value.[25]

SUMMARY

Limiting characteristics in the logistics system create sub-optimal performance. The impact of weaknesses is extremely costly in wasted dollars and time. Excess, financial management problems, and policy issues are but a few examples of impacts caused by weaknesses in the logistics system. Many of the current initiatives are moving toward optimization. SSF and GCSS-A are key enablers to achieve a synchronized and optimal logistics system. The Army Strategic Logistic Plan is necessary to orchestrate the numerous efforts in logistics support. The key is to ensure that all of the component parts comprised in

the logistics system are in synchronization with the optimal logistics end state. It is also key for the DCSLOG to enforce the direction laid out in the ASLP. Industry has demonstrated the ability and realized the advantage of a synchronized and functional logistics system. The goal of orchestrating the combined efforts of all system components toward the most functional and efficient logistics system is paramount.

Optimization of the entire logistics system to support soldiers today and in the future is the end state. Each of the present day limiting characteristics can be overcome. Major strides are being taken to address issues in our present system and potential issues as we move toward Force XXI and Army After Next. The ASLP is a key management tool for integrating the hundreds of subsystem enablers into a single logistics system. Only through centralized oversight and continued orchestration of the synchronization of all the components of a logistics system can optimization be attained. The DCSLOG must take charge of this responsibility. An optimal logistics system is essential to maximize efficiencies and best support all facets of the Army.

RECOMMENDATION

The Army is taking the proper steps to eliminate sub-optimal logistics. Weaknesses are identified and initiatives to eliminate these weaknesses are being implemented. Nevertheless,

more can be done, and faster by implementing the following recommendations.

(1) Give complete authority on all CSS programs and issues to the DCSLOG. Thus centralizing command and control to more effectively and efficiently carry out the ASLP.

(2) Implement the SSF program immediately following operational testing. This is a major step in the development of a single logistics system.

(3) Close the FORSCOM Materiel Management Center. Thereby eliminating duplication of effort. Incorporate their programs and initiatives into the SSF business practices.

(4) Implement the Rand study recommendations on inventory management and credit and pricing policy. This would bring systems more in line with optimal business practices.

(5) Mandate all CSS initiatives be an integral component of GCSS-A.

These recommendations support the goal of an optimal logistics system. The mission is right time, right place, right stuff…always at the best value.[26]

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