The Army Rapid Fielding Initiative

Julia D. Carier

Abstract—The Army’s Rapid Fielding Initiative (RFI) is the process by which new equipment is distributed to soldiers either at home station or in a theater of operations. Currently, equipment is shipped from over 50 suppliers around the United States to a single central warehouse on the east coast where it is packaged into sets. The sets are then shipped to the end user stationed at one of over 40 locations around the world. It is a process that costs the Army time, money and a great deal of effort to execute. The purpose of this research is to develop various alternatives for improvement to the supply chain management system and equipment fielding operations. To develop a more efficient process, Lean methods are applied in conjunction with the Systems Decision Process (SDP). The SDP is a four step process developed by the Department of Systems Engineering at the United States Military Academy. SDP is a value-focused thinking (VFT) approach where values are the driving force behind decision making. The primary focus for this project is in the decision making phase.

I. INTRODUCTION

At the beginning of the Global War on Terror in 2002, the Rapid Fielding Initiative (RFI) was developed in response to the supply shortages experienced by military units deploying to Afghanistan. It was found that the needs and wants of soldiers and their units were not being met by the current budget. Individual soldiers and units as a whole resorted to purchasing their own equipment. As a result, the Chief of Staff of the Army tasked the Program Executive Office for Soldier systems (PEO-Soldier) with equipping all soldiers with the Soldier as a System (SaaS) Integrated Concept Team (ICT) equipment list to support both Operations Iraqi Freedom (OIF) and Operations Enduring Freedom (OEF). By the time the first fieldings occurred in support of OIF2 and OEF5, a 500,000 square foot warehouse was established in Middle River, Maryland to hold the nearly items for each of the 119,000 soldiers to be fielded. However, operational needs increased the number of soldiers to be fielded to over 187,000 combat troops and 113,000 support troops. Since then, the Chief of Staff has changed the mission of the RFI process to procuring and distributing soldier and small unit equipment in accordance with the SaaS ICT Approved Capabilities List for the entire Operating Army. As a result, the RFI operations are to occur indefinitely to support the fielding of new equipment and the replacement of unserviceable equipment. It is the goal of this project to develop a more efficient method for procurement and distribution so that soldiers are equipped before they are deployed.

II. THE RFI PROCESS

Initial fieldings for OIF and OEF went directly into the theater of operations. The warehouse was used to collect and package the SaaS ICT equipment and then ship it into theater via commercial air carriers. Equipment was then distributed to soldiers and additional items were shipped as necessary. Now, almost 98% of all fieldings are done at home station prior to deployment.

The RFI equipment demands are driven by the Army Campaign Plan [1]. It determines the order and length of deployments for all Army forces operating in theater. From the campaign plan, a master fielding schedule is developed to determine when the RFI fielding will occur at each unit. According to the Master Fielding Plan, the Program Managers place orders to each of the vendors 6-9 months in advance. The quantity ordered is based on the total number of soldiers to be fielded during that order cycle. Later, a Master Fielding Schedule is developed to determine the delivery schedule. The delivery schedule annotates the specific quantity required for fieldings occurring during a single month. Inventory is delivered usually once a month from various vendors across the United States. Additionally, the contract with the vendors only requires that the inventory leaves their location by the first of the month. Delivery of inventory to the Maryland warehouse could occur any time after the first of the month based on the distance the inventory must travel. It is kept in the Middle River, MD warehouse and then packaged and sent to the fielding sites according to the Master Fielding Schedule.

Within the warehouse and packaging facility, sets are packaged with overages to accommodate for the uncertainty of sized items and the possible increase in the number of soldiers being fielded. For example, 140% of the required number of boots are sent to fielding sites. Sizes for each individual soldier are not known before the fielding and each of the three boot vendors provides a different fit of boot. Any additional inventory is returned to the warehouse for future fieldings. If there is a shortage of an item, a request is made back to the warehouse to determine if they are in stock. If so, the items are shipped directly to the fielding site before the fielding is complete. If the item is out of stock, the item will be shipped to the unit after another order is placed to the vendor. In some cases, the
soldier does not receive the missing item until after they have deployed into theater.

There are many other problems that exist within the system. One primary issue is the tracking of inventory inside and outside of the warehouse. Currently, each supplier uses their own unique labeling system to track the inventory as it travels from the vendor to the Maryland warehouse. When the inventory arrives in Maryland, a second label, specific to the warehouse, is placed on each box. It is not until the inventory reaches Middle River that it is tracked and accounted for by warehouse personnel. Existing communication gaps between the warehouse, program managers (PMs), and the vendors further hinder supply chain management because the warehouse cannot predict the quantity or delivery date for the inventory. Additionally, inventory that is returned to the warehouse after fieldings is not being accounted for when new orders are placed. Consequently, the level of inventory is consistently increasing. As a result, some items are becoming obsolete. Obsolete inventory results in a sunk cost for the Army.

III. METHODOLOGY

A. Lean Six Sigma

Lean Six Sigma (LSS) is the combination of two methodologies, Lean and Six Sigma. Both of these methodologies concentrate on process improvement. The Lean component, developed from the Toyota Production System (TPS) in the 1980’s, is designed to improve the speed and efficiency of a system by eliminating waste [2]. Six Sigma is used to encourage continuous improvements over time. Motorola developed Six Sigma in the 1980s to improve the quality of their products by reducing variability in their manufacturing operations [3]. The focus of Six Sigma is to use statistical analysis to eliminate defects in a system. The combination of Lean Six Sigma rarely leads to drastic changes in the way an organization functions, but has been successful in removing waste and non-value added activities, and decreasing defects, which result in cost savings [4]. To achieve these goals, LSS focuses on the principles and implementation of the DMAIC methodology. DMAIC stands for Define, Measure, Analyze, Improve, and Control [5]. The solution design phase of this project was primarily developed using various improvement tools such as implementing pull systems, process flow diagrams, and value stream modeling which are tools of LSS.

B. The Systems Decision Process

The Systems Engineering Department at the United States Military Academy has developed a method by which to solve problems in a systematic fashion. Using value-based decision making, the process considers the environment and the wants, needs, and desires of the stake holders to determine the best possible alternatives to solving a problem. The Systems Decision Process is a four phase process consisting of the Problem Definition Phase, Solution Design Phase, Decision Making Phase, and Solution Implementation Phase. Each phase consists of three steps to accomplish the goals of that phase. The SDP is depicted graphically in figure 1.

![Figure 1: The Systems Decision Process](image)

The first step is the Problem Definition phase. In this phase, we use stakeholder analysis, functional analysis, and value modeling to determine the functions of the system and determine what decision makers value. The end state of this phase is a revised problem statement that focuses on the needs, wants, and desires of the stakeholders. The second phase is the Solution Design phase. In this phase, a set of feasible alternatives are developed and screened based on the requirements and constraints developed in the problem definition phase. The Decision Making phase serves the purpose of scoring the candidate solutions and sensitivity analysis to improve solutions and determine the best alternative. Finally, the Solution Implementation phase of the SDP provides for smooth implementation of the best alternative. This includes the hiring of new employees, the writing of training manuals, or any operations involved in implementation. Though the SDP is a four step process, it was designed as an iterative process that continues to revisit each phase to make continual improvements [6].

IV. ALTERNATIVES

Focusing on the Improve phase of Lean Six Sigma and the Solution Design phase of the SDP, a wide variety of possible alternatives were developed for the improvement to the RFI process. This paper focuses on three alternatives that could produce the most change in efficiency to the current RFI process.

1) Move the warehouse and packaging facility to a more centralized location.
2) Employ a third party supply chain manager.
3) Convert the current push system into a pull system where vendors ship inventory directly to the fielding sites.

A. Alternative 1

Alternative 1 deals with moving the warehouse to a more centralized location. When the process was established in 2002, having the warehouse on the east coast was ideal for fieldings both inside the continental United States and the fieldings occurring in theater. However, with the growth and maturity of this program, 98% of all the fieldings are occurring at home station before a unit deploys. Therefore, a load-distance model for location analysis was used to determine the center of gravity and the mileage that would be saved if the location was moved. The analysis was conducted by determining the weighted geographic center of all of the vendors and fielding sites based on the number of truckloads that were shipped from the vendor to the warehouse and then from the warehouse to the fielding sites. All distances were measured as straight line distances and the truck loads were determined from those delivered in fiscal year 2006. Figure 2 graphically shows the supplier center of gravity load-distance model. Using Excel Solver, we were able to determine the geographic center that would minimize the sum product for each load and distance traveled. The resulting coordinate of 38.14 degrees north latitude and 85.43 degrees west longitude, placed the location of the new warehouse only 20 miles east of Louisville, Kentucky and 650 miles west of the current location in Middle River, Maryland. Based on the loads and distances traveled during 2006, moving the warehouse to Louisville would reduce the total miles traveled by 22,000 miles. This is a 15% reduction from the current 160,000 miles traveled. In addition to the reduction in miles, the rental rates in Louisville are significantly less than they are in Middle River. For a warehouse over 100,000 square feet, the price per square foot in the area of Middle River averaged about $5.71/sq ft. In the Louisville area, the price was only $3.93/sq ft. Based on these figures, moving the warehouse would result in approximately $900,000 savings in leasing costs per year for the 500,000 square feet required to house the level of inventory produced by the RFI process. Additionally, the United Postal Service’s Commercial Air headquarters is located in Louisville, Kentucky. The significance of this will be discussed in Alternative 2, but it could potentially be used as third party supply chain manager and as an alternative to the trucking carrier currently being used by RFI. There are many other factors that must be considered when looking at this alternative. The number of years and months it would take to recuperate the costs of moving the warehouse should be considered. Costs of moving the warehouse include training new employees, managing two warehouses while the Middle River facility is being transferred, and the actual moving costs. Though analysis is not complete on this alternative, it is a viable option for reduction in operational costs and improving efficiency in the RFI process.

B. Alternative 2

The second alternative is to implement a third party supply chain manager. There are obvious communication gaps between warehouse managers, Program Managers (PM), and the vendors. To better illustrate the communication gaps, a Value Stream Map was developed (figure 3). Shown below in red are the non-value added activities (NVA), in green are the value added activities (VA), and in yellow are the non-value added, but essential activities (NVAE). Non-value added, but essential activities are those that do not add any value to the end product, but are necessary to achieve the desired end state.

In this case, the packaging facility was labeled non-value but essential because of its ability to package the inventory in such an efficient manner. Fielding teams are able to arrive at the fielding site only two days before the scheduled fielding and are able to inventory, unpack, and organize the site quickly before the fielding begins. It is the way that the warehouse packages the inventory into sets that allows the fielding team to set up so quickly. Though no value is added to the end state, the packaging facility is still considered essential. After determining which category each of the RFI process steps belongs to, a “leaner” system could be developed by eliminating the non-value added activities. Depicted above are two non-value activities. These steps
represent the disconnect between the warehouse and the PMs. By implementing a third party management system, communication between all three entities could be done in real time so that inventory levels do not rise and the number of soldiers that receive 100% of their equipment would increase. The Value Steam Model shown below (figure 4) represents a new product and information flow, free from non-value added activities. The primary difference in this Value Steam Model is a centralized Inventory Management System. One possible solution is the implementation of a commercial off the shelf (COTS) Inventory Management System to facilitate communication. Additionally, such companies as UPS could enter as the third party to bridge the communication gaps between the PMs and the warehouse. Continued analysis is required to determine the cost of implementing such a system. However, this alternative would require the least amount of overall change to the system, but could potentially fix one of the larger problems.

![Figure 4: Improved Value Steam Map](image)

**C. Alternative 3**

The final alternative would be to convert the current push system into a pull system. Industry as a whole has tried to move away from a push system and more to a pull system where the inventory shipped is based on the needs of the customer (i.e. soldiers at each fielding site). As it stands, inventory is collected at the warehouse and then pushed down to units. The level of inventory at the warehouse is driven by a delivery schedule established at the Program Manager level. A pull system would eliminate the need for a warehouse as items would be shipped directly from the vendor to the fielding site. A small warehouse could potentially be maintained to house a level of safety stock should shipments not arrive on time. Currently, the delivery window that vendors operate in is very large. Their contract requires them to ship the items by the first of the month. The amount of time it takes for the items to reach the warehouse would depend on the distance it has to travel. However, as long as the items are shipped by the first of the month, the vendor has met the demands of the contract. If a pull system is implemented, the window for delivery would have to be much smaller. Normally, it would take a fielding team 2 days to set up and inventory a fielding and then 4-5 days to complete the fielding. Deliveries would have to be narrowed down to those two days prior to the fielding. Additionally, we must consider the space that would be required to hold inventory that arrived early or late. As it stands, this is not a viable option for improvement to the RFI process. The system that is in place now would not support the demands that a pull system would require. In the future, the SaaS ICT Equipment List will increase from its current 50 items to 84 items. Should the pull system be implemented, that would mean 84 different trucks would be delivering to 12 different sites each month. Most military posts would not be able to support this level of traffic. Since this alternative would not reduce operational costs nor simplify the RFI process, it is not being recommended to PEO-Soldier for implementation.

V. CONCLUSIONS

Based on the analysis conducted, alternatives 1 and 2 will be recommended for implementation to PEO-Soldier in an effort to improve the RFI process through a reduction in cost and time. Alternative 3, however, will not be recommended as it shows no appreciable improvement to the current system and may, in fact, increase the number of resources needed to operate it effectively. A more thorough cost benefit analysis must still be conducted. With continued research and analysis of alternatives, we will be able to find the best alternative to meet the needs and wants of the stakeholders.

VI. REFERENCES