

NAVAL POSTGRADUATE SCHOOL Monterey, California



THESIS

**TRAINING IN COMMERCIAL LOGISTICS
PRACTICES TO IMPROVE INVENTORY
MANAGEMENT IN THE ARMY**

by

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December, 1996

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**TRAINING IN COMMERCIAL LOGISTICS PRACTICES TO IMPROVE
INVENTORY MANAGEMENT IN THE ARMY**

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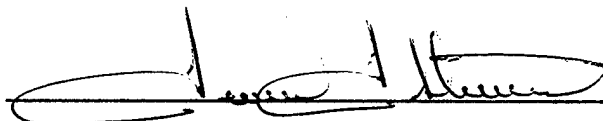
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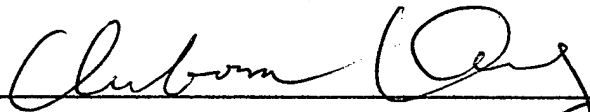


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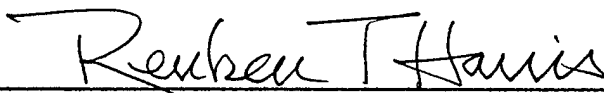
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ABSTRACT

The Department of Defense (DoD) and private firms share a common set of logistical challenges. Rising costs, external pressures, new technology, and other factors have focused attention on improving logistics management. GAO believes top management support and training are fundamental to improving economy and efficiency for DoD's inventory management system. This thesis examines current inventory management training and policies for secondary item inventories used by the Department of the Army to determine the potential impact of increased training in commercial logistics practices on Army inventory management. The study briefly describes the Army Supply System, evaluates current performance, reveals current training practices, discusses commercial logistics practices, and identifies the key factors required for implementation of commercial logistics practices. These key factors form the basis for a comparison between the public and private sectors. Finally, McCaskey's model of organizational behavior is used to assess the potential for increased performance through training in commercial logistics practices. This study concludes that training in commercial logistics practices will not improve the inventory management system. There are inherent differences in the political, economic, legal, and social environment that must be addressed first.

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1. INTRODUCTION

A. RESEARCH INTENT

Recent General Accounting Office (GAO) reports have been critical of the Department of Defense's (DoD) inventory management of secondary items. These reports allege the availability of resources and DoD's emphasis on spare parts during the 1980s have resulted in excessive inventories.

The private sector has faced the challenge of better inventory management. Faced with declining resources, many private sector firms have slashed on-hand inventories, streamlined their distribution systems, and developed close relationships with a small number of suppliers to improve the bottom line. They carefully manage the logistics system to achieve maximum efficiency and increase value to their customers.

GAO believes the contrast between DoD's excessive inventories and sharply declining budgets provide the ideal circumstances for cultural change. GAO concludes top management support and training are fundamental to improving economy and efficiency within the DoD inventory management system.

This thesis explores current policies and training used by the Army for managing secondary item inventories. It examines the causes of excess inventories, identifies the current level of training, defines commercial logistics practices, and evaluates the potential for increased efficiency through training in commercial logistics practices.

B. BACKGROUND

The Army manages a highly complex, widely dispersed inventory of secondary items. These inventory requirements are based on demand, item cost, procurement lead times, and performance goals. Assets are managed using state of the art inventory models, computer information systems, and complex procedures designed to ensure the desired logistics support capability. Currently, the Army is concerned about shortfalls in modernization and protection of the industrial base. The concern is justified because money is tight. The end of the Cold War and the intense focus to reduce the federal deficit has led to severely constrained defense resources.

Simultaneously, the private sector has focused attention on improving logistics management in order to meet the challenge of rising costs and increased competitive pressures. Consequently, a new logistics paradigm has emerged where competitive firms are able to do more with fewer resources through careful management of the logistics system. Firms seeking to gain the competitive advantage have identified their logistic functions as value added centers. The use of innovative concepts, information technology, and lateral integration of supply channels form the core of this effort. These private sector firms have successfully reduced inventories through effective control of procurement lead times and by ordering smaller quantities more frequently. This effectively shifts the burden of inventory to the supplier. The goal is to carry no inventory and have a highly reliable distribution system that can deliver inventories, "Just In Time" (JIT). Just In Time, Economic Order Quantity (EOQ) models, Electronic Document Interchange (EDI), consolidation of stock points, and other initiatives comprise private sector, "Commercial

Best Logistics Practices” and form the underlying basis for improved economy and efficiency.

A recent report published by the General Accounting Office (GAO) on DoD inventory management indicates significant improvements can be realized by implementing training in these private sector “Commercial Logistics Practices”[Ref. 1:p.2]. In conducting the study, GAO solicited views from experts within the field and nine private sector companies. Among the variety of techniques determined necessary to bring about cultural change, two were found to be of prime importance. These are: a top management commitment and support for the desired values and beliefs and employee training to convey the desired values and development of skills for implementation. The GAO later visited various major DoD inventory management activities and arrived at the following conclusions: DoD has not developed or promulgated written plans and guidance on how to use training to effect the desired change and DoD’s training courses lack the content and emphasis necessary. The challenge now is how to reduce inventories without sacrificing responsiveness.

C. SCOPE OF THESIS

This thesis is applicable to DoD and the Department of the Army. It is concerned only with Army inventory management of secondary items. The author’s research focusses on five primary areas: 1) defining the current operating system, 2) identifying the extent of the Army’s inventory management problems, 3) defining commercial logistics practices, 4) examining the political, structural, and cultural impediments to change, and 5) analyzing if training in commercial logistics practices would benefit the Army. Specific

recommendations relating to rewards and incentive structure will not be discussed. The research objective is to make recommendations about training and current inventory practices.

D. METHODOLOGY

The author obtained information from a variety of sources. Sources include an in-depth study of published material and personal interviews conducted with key members of the staff assigned to the Pentagon, supply activities, inventory control points, and schools. Published sources were used to provide background information on the Army supply system, commercial logistics practices, and regulatory procedures. Using this information, the author selected the DoD, Office of the Joint Staff and the Army, Team Chief, Secondary Items, Office of the Deputy Chief of Staff for Logistics to conduct personal interviews. Personal interviews were also conducted with key members of staff and item managers at selected activities within both the Defense Logistics Agency and the Army Materiel Command. Additional highlights include visitation to the Defense Distribution Depot, Letterkenny, Pennsylvania and the Directorate of Logistics at the U.S. Army Training and Doctrine Command. A complete listing of all the activities visited, personnel interviewed, and summary of questions is included in the appendices. Conclusions were drawn from objective analysis of data.

E. ORGANIZATION

This thesis contains eight remaining chapters. Chapter II briefly describes the Army inventory management system. Chapter III identifies some of the predominant causes and measures the value of Army excess inventories. Chapter IV discusses inventory

management training. Chapter V defines commercial logistics practices and provides examples of various applications in the private sector. Chapters VI looks at the characteristics necessary for implementation of commercial logistics practices. Chapter VII examines the fundamental differences between the Army and private sectors. Chapter VIII discusses organization behavior and the potential impact of Army training in commercial logistics practices. Chapter IX contains the conclusions and recommendations of the thesis.

II. THE ARMY PROCUREMENT SYSTEM

A. INTRODUCTION

The U.S. Army Supply System represents a complex organization responsible for material management and distribution of tremendous quantities of food, fuel, repair parts, and equipment necessary to sustain the large number of American soldiers. Inventory management supports peacetime operations and provides adequate supplies of war reserve material. This chapter provides a broad overview of the Army procurement system. Its purpose is to enhance the readers understanding of Army inventory management.

B. LEVELS OF SUPPLY

The Army Procurement System has two levels of supply: Retail and Wholesale.

1. Retail Level

The retail level is that level of supply below the wholesale level directly supporting the customer. Retail level stock age is oriented towards attaining *maximum operational readiness* of customer support units. Installation supply, maintenance activities, and Material Management Centers (MMC) are engaged in retail level support. These are referred to as Supply Support Activities (SSA). MMCs process requisitions; receipt, store, and issue supplies; maintain property book accounts; and related functions. [Ref. 2:p.17]

2. Wholesale Level

The wholesale level of supply support includes national inventory control points, depots, terminals, arsenals, central wholesale data bank plants, factories associated with commodity command activities, and special Army activities retained under direct control

of Headquarters, Department of the Army. The wholesale system procures supplies for the Army from either commercial sources or government plants. Wholesale supply support activities provide support by distributing supplies to the SSAs for stock-age or for issue to the users [Ref. 2:p.18]. Three main wholesale activities procure supplies and equipment for the Army. These are the Defense Logistics Agency (DLA), the Army Materiel Command (AMC), and the General Services Administration (GSA).

a. *Defense Logistics Agency*

The Defense Logistics Agency (DLA) serves as the principal agency for centralized management of common military logistics support [Ref. 3:p.1-5]. Most of the items stocked are consumables for which there exists stable demand. They also manage a number of weapons systems for the Army. Their goal is to achieve an 85% stock availability for these systems. DLA consists of six inventory control points (ICPs), two distribution regions (East and West), 18 Depots, and five Service Centers. DLA is a Defense Business Operating Fund¹ (DBOF) activity.

b. *Army Materiel Command*

By far, the Army Materiel Command (AMC) is the largest, most complex material command with worldwide responsibilities for research and development, acquisition, and logistics support [Ref. 4:p.12.17]. AMC manages a wide variety of tasks ranging from development of weapons systems, to laser research, to the distribution of spare parts, and equipment maintenance. AMC also has responsibility for procurement of

¹ Defense Business Operating Fund (DBOF) activities charge customers the true cost of an item including material, operations, labor, and capital equipment costs (surcharge).

ammunition for all U.S. military services, DoD wide chemical/ biological/radiological research, and Army security assistance efforts. With headquarters in Alexandria, Virginia, AMC operates through 11 major subordinate commands [Ref. 5:p.1-3]. AMC has four primary inventory control points, each responsible for acquiring a specific type of commodity: CECOM (communications and electronics), MICOM (missiles), TARDEC (tank/automotive parts, ammunition, and chemicals), and NADAC (soldier systems). AMC is a DBOF activity.

c. General Services Administration

The General Services Administration (GSA) is one of the Federal Governments largest buyers. Every year, GSA contracts for approximately \$10 billion worth of goods and services. Typical supplies and services include: office supplies, furniture, and equipment; motor vehicles and parts; hand and power tools; paint, waxes, and adhesives; and light fixtures and bulbs. Customers of GSA include most agencies of the Executive Branch, the Judicial and Legislative Branches, government facilities, and military organizations. The GSA headquarters is located in Washington, D.C., and includes 11 regional offices. GSA is completely self supporting. It receives no Federal or DoD funding support. [Ref. 6:p.1-6] Therefore, research will focus on DLA and AMC.

Item managers located at wholesale Inventory Control Points (ICP) classify inventories using Item Management Codes (IMC). They assign IMC codes by screening material characteristics against 11 criteria. Items meeting the following criteria are managed by AMC. Items which do not meet the following criteria are assigned to either DLA or GSA. [Ref. 7:p. 2-1,2-6]

a. Criterion 1 - Major End Items of Equipment

This criterion includes major end items of equipment (e.g. weapon systems) important to the operational readiness of units. Generally, these are high cost items directly tied to unit allowances.

b. Criterion 2 - Depot Level Repairable

This criterion includes items that are designated for repair at depot level and below. Authority for retention evolves from consideration of the repair pipeline to ensure efficient management of the item.

c. Criterion 3 - Engineer/Design Critical

Engineer/design critical refers to items for which requisite quality must be ensured to avoid the consequences of catastrophic failure of the next higher assembly, end item, or weapon system.

d. Criterion 4 - Single Agency

This criterion includes all items controlled by a single agency. The purpose is to ensure that items of certain design, unique test characteristics, special test inspection, and quality control requirements are retained by the service.

e. Criterion 5 - Security Classified Items

This criterion includes all items requiring special inventory management due to security classification. It provides for the retention of items by the services with a CONFIDENTIAL or higher security classification.

f. Criterion 6 - Nuclear Propulsion

This criterion includes all items used in nuclear power plants or associated systems which require stringent technical or quality control and intensified management. These items have special inventory management and procurement controls and are restricted for issue to specified nuclear customers.

g. Criterion 7 - Nuclear Hardened

This criterion includes all items uniquely and specifically designed to be nuclear hardened against the effects of electromagnetic pulse (EMP), radiation thermal heat (HEAT), blast shock, and other effects created by nuclear explosions.

h. Criterion 8 - Nationally Vital Program

This criterion refers to items requiring extraordinary management control techniques and close surveillance within the supply system to ensure the successful execution of a nationally vital program.

i. Criterion 9 - Design Unstable/Preproduction Test/Altered

This criterion permits the services to retain items of design instability in formative stages of development if changes upon entry of an item into the system may reasonably be predicted.

j. Criterion 10 - Special Categories

This material is limited to items fabricated at military industrial activities for local use or direct issue, or items designated by and fabricated at military industrial activities and not subject to procurement from civilian industrial sources, or items categorized as modification, alteration, or conversion sets, or kits intended for one time use.

k. Criterion 11 - Program Customers

These are often called nonstandard or Foreign Military Sales (FMS) unique items. This criterion authorizes retention of items used by Security Assistance Program (SAP) customers. Such items may exist within the supply system when DoD no longer uses an item previously sold to a SAP customer, DoD incorporates a nonstandard item into an end item previously sold to an SAP customer, or locally purchased items not normally managed by DoD are demand supported by SAP customers.

C. INVENTORY MANAGEMENT

1. Retail Inventory Management

The Army has numerous specialists assigned to manage inventories at the retail level. They include officers, warrants, and enlisted personnel assigned to combat units and SSAs. Unit level authorizations are determined by a Prescribed Load List (PLL). The PLL is a list of unit maintenance repair parts that are demand supported, non-demand supported, and the specified initial stock-age repair parts for newly introduced items. The PLL represents the authorized level of inventory maintained at the customer level designed to sustain the unit for a specified number of days [Ref. 2:p. 16]. Customers submit requisitions for repair parts to the MMC and turn-in repairables through supporting maintenance organizations.

An SSA can use five methods to obtain items from a supply source. These methods include requisitioning through the wholesale activity, local purchase, cannibalization, use of Contractor Owned Parts Stores (COPARS), and use of the Defense Reutilization and Marketing Office (DRMO). The initial method to be used depends on the commodity, the situation, or the cataloguing status of the required item. The Assigned Stock-age Level

(ASL) determines the quantities of spare parts to be retained by the at the SSA. The ASL provides the authority to stock the item.

The Requisition Objective (RO) at the SSA identifies the maximum quantity of an item authorized to be on-hand and on order at any time. The Reorder Point (ROP), expressed as a quantity of stock, serves as that point at which time stock replenishment requisitions are submitted to the wholesale activity to maintain a stock age objective. This point consists of the sum of the safety stock level and the average demand during the order ship time and repair cycle time (if applicable). When the quantity of net assets (stock on hand plus outstanding orders) is equal to or is less than the ROP, another requisition is submitted for replenishment. [Ref. 8:p. 37]

The Standard Army Retail Supply System (SARSS) refers to the software used for automated supply systems management at the retail level. SARSS provides receipt, storage, issue, replenishment, inventory adjustments, performance reports and excess identification. The Unit Supply UPDATE 14 provides the regulatory guidance for retail supply support.

2. Wholesale Inventory Management

Item managers located at the wholesale activity Inventory Control Points (ICP) manage the wholesale inventories. They are general schedule (GS) civilian employees, hired under the Federal Civil Service System. Their responsibilities include: establishment of inventory levels, inventory maintenance, procurement of supplies, distribution, and coordination with retail customers. They manage the inventories using unique automated systems that maintain stock control, conduct historical demand forecasting, and make procurement recommendations. Item managers use a process called Requirements

Determination to forecast demand and compute a recommended buy quantity when an item reaches its reorder point (ROP).

The Commodity Command Standard System (CCSS) refers to the standard automated logistics system used by the Army's AMC wholesale activities. The system was developed in the 1970s and is one of the most comprehensive systems used within DoD. DLA uses a system called the Standard Automated Material Management System (SAMMS). SAMMS is comprised of five operating subsystems: Distribution Standard System (inventory levels), Requirements Determination (forecasting), Financial (costing), Technical, and Entry Exit (screens and tracks requisitions) [Ref. 9]. CCSS and SAMMS do not interface or provide asset visibility to the customer level.

Item managers have the authority to coordinate the procurement of items they manage. Generally, procurement authorization levels are assigned according to grade. Item managers forward procurements exceeding their level to the next higher approving authority.

Table 2-1 provides the authorization levels for two wholesale activities.

REVIEW LEVEL (PROCUREMENT ACTIONS)

TITLE/GRADE	DLA	AMC
Item Manager, GS 5/7	TO \$10K	N/A
Item Manager, GS 9	TO \$50K	TO \$25K
Item Manager, GS 11	TO \$100K	TO \$25K
Section Chief, GS 12	TO \$200K	TO \$25K

Table 2-1

Generally, wholesale activities organize item managers into product centers or teams.

Item managers can manage from as few as five (e.g., sets, kits, or major end items) to as

many as 1800 different products. The number of items they manage is usually based on grade and intensity of item demand. The higher grade levels (GS11/12) manage fewer items of greater demand. The lower grade levels (GS5/7/9) manage a greater number of items with lower demand.

D. REQUIREMENTS DETERMINATION

One of the most important tasks of the item manager is the requirements determination process. Item managers use the requirements determination process to forecast demand in order to compute a recommended buy quantity when an item reaches its reorder point (ROP). The requirements determination process is designed to reduce the extreme variability commonly associated with the demand for military services.

The methods used by the different wholesale activities vary, but have many common features. For example, they use rates of demand experienced in the past as a basis for predicting future demand quantities and employ use of Economic Order Quantity (EOQ) models to determine the optimal level to buy. The amount of demand data ranges from 24 to 60 months for AMC and DLA, respectively. The forecasting models employ moving average and exponential smoothing techniques to forecast future demand and recommend a new ROP. These systems reduce variability in the procurement cycle by consideration of other factors designed to compensate for safety, administrative lead times, and procurement/production leadtimes. These factors comprise a series of procurable elements of inventory called the requirements stack which determine the Requirements or Stock-age Objective (RO). The RO is the maximum amount of assets authorized to be on hand or on order for a particular item of supply. [Ref. 9 & 10]

However, there are some distinct differences in the forecasting techniques employed by both models. AMC's CCSS system considers an additional element for war reserves in the requirements stack. Additionally, their statistical forecasting system includes two supplementary levels above the RO. The first supplementary level is the Funded Approved Force Acquisition Objective (FAFAO) level. The FAFAO considers unfunded war reserves and demands over the budget cycle and serves as a break point to allow credit for turn-in of repairables. The second supplementary level simply provides retention of stock above the FAFAO for economic or contingency reasons. Economic retention considers demand, life of the weapon system, and risk of obsolescence. Contingency retention considers unpredictable demand (e.g., future FMS sales, disaster relief, and civil emergencies). Item managers are allowed to buy up to the RO. Retention against economic and contingency levels are item manager options.

Another difference is in the application of the forecasts. SAMMS system uses a quarterly forecast of demand to set ROPs. AMC's CCSS system uses a dollar driven management intensity to determine the forecast of demand. High demand items with an annual demand exceeding \$100 thousand are forecasted monthly. Medium demand items with an annual demand between \$25 thousand and \$100 thousand are forecasted quarterly. Low demand items with an annual demand of less than \$25 thousand are forecasted annually.

The levels and lead time quantities represent the inventory requirements necessary to sustain customer demands most economically. Both forecasting models provide only a recommendation to the item manager. The item manager can adjust inventory levels.

E. DEPOTS

The Army has two types of depots: maintenance and wholesale distribution depots. Maintenance depots provide major overhaul and rebuild capability for major end items of equipment. Wholesale distribution depots provide receipt, temporary storage, and distribution of wholesale material to the retail support activities. The distribution depots serve only as custodians of the property. Additionally, distribution depots conduct inventories used by the item manager to update the inventory data base. Both AMC and DLA have established distribution depots using a regional support concept. In 1992, AMC transferred responsibility for management of the Army distribution depots to DLA. However, cognizance over the inventories remained with AMC. Inventory and transaction costs fund the budget for the distribution depots.

F. SUMMARY

This chapter provided a review of the Army Supply System. It indicates there are two levels of supply: Retail and Wholesale. The retail level is that level of supply below the wholesale level directly supporting the customer. The wholesale level of supply support includes national inventory control points, depots, terminals, arsenals, central wholesale data bank plants, factories associated with commodity command activities, and special Army activities retained under direct control of Headquarters, Department of the Army. There are three main wholesale activities that procure supplies and equipment for the Army. These are the Defense Logistics Agency (DLA), the Army Materiel Command (AMC), and the General Services Administration (GSA). Item managers located at wholesale Inventory Control Points (ICP) manage wholesale inventories and classify them in accordance with 11 criteria.

Items meeting the criteria are managed by AMC. Items which do not meet the criteria are assigned to either DLA or GSA. Additionally, item managers use the requirements determination process to forecast demand in order to compute a recommended buy quantity when an item reaches its reorder point (ROP). The following chapter examines the Army's current level of performance in inventory management.

III. CURRENT ARMY PERFORMANCE IN INVENTORY MANAGEMENT

A. INTRODUCTION

The Department of Army has undertaken a number of initiatives to reduce the size of its inventories. These initiatives have achieved considerable success. Since 1989, the Army has reduced inventories for secondary items by 42%. The Army plans to reduce inventories further by \$1 billion over the next five years [Ref. 11]. However, there is concern that the Army might be reducing inventory too rapidly and of the impact such reductions might have on the industrial base. LTGEN John J. Cusick, J-4, Office of the Staff indicates:

Inventories have become a matter of relating dollars to readiness There is no robust industrial base anywhere The number of excess items in need of repair further increases the burden already placed on Operation and Maintenance (O&M) funds The Army has a shortage of \$3.5 billion in funding war reserves There's work to be done in this area. [Ref. 12]

The degree of the problem concerning excess inventories is difficult to measure. The lack of a clear, standardized definition compounded by a number of related issues involving valuation, inclusion of repairables, DRMS inventories, war reserves, contingency and economic stocks, and other factors increase the difficulty. Chapter III defines excess inventories, discusses some of the predominant causes, and identifies the three methods used by the Army for measuring inventory.

B. EXCESS DEFINED

Generally speaking, most activities define excess as that level of inventory which exceeds the RO or of which there exists no demand history [Ref. 11]. However, as

previously discussed, retention beyond the RO may be authorized for economic and contingency reasons. In such cases, the cost to retain these items to meet future requirements may be less than the cost of disposal. Retention may be more cost effective.

When determining demand history, AMC uses a 3 year base for new weapons systems and 5 years for all others. Items must have 12 demands per year. DLA uses a 6 year base. Anything beyond these periods is excess. Item Managers conduct semi-annual reviews to identify these items. Excess items are shipped to DLA for disposal by the DRMO. Shipping, demilitarization, and declassification costs must be paid for by the owner.

C. CAUSES OF EXCESS

Generally, most attribute the current levels of inventory to President Reagan. During the late 1970's and early 1980's, international tensions in Iran and Afghanistan and the Reagan administration's determination to outspend the Soviet Union on the military resulted in an unprecedented peacetime increase in national defense spending. The increase in defense spending contributed to an attitude to buy bold and spend everything allocated. Increases of more than 45% in constant US dollars were appropriated and spent during the fiscal years 1981 through fiscal years 1987 [Ref. 13:p.101]. The author's research indicates there are a number of other causes for excess inventories. A few of these factors are discussed below. Appendix A contains a detailed summary of the causes.

1. Changes to the Requirements Objective

Changes to the RO is the predominant cause of excess inventories. Changes to the RO occur when there is a decrease in demand or a change in any of the elements comprising the requirements stack [Ref. 11]. At the retail level, changes originate from a wide range

of activities including outdated technical manuals, poor preventive maintenance procedures, faulty quality assurance, poor execution of request turn-in procedures, inadequate catalog/status/ reconciliation measures, training, and more [Ref. 14]. At the wholesale level, force modernization, changes to the weapon system life cycles, and procurement cycle reduction efforts are common causes [Ref. 11].

2. Lack of Asset Visibility

Refers to the inability to see inventory assets either laterally or vertically and items in transit. The lack of asset visibility is created by stovepipe systems which are tailored meet the specific needs of the individual users. This leads to a large number of multiple use items or redundancy in procurement actions. For example, many of the DLA weapon system support items are multiple use: Army 43%, Navy 21%, Air Force 34%, and Marine Corps 73% [Ref. 15]. However, no-one can see what the other one has.

3. Lack of Customer Confidence

Caused by undue command influence stemming from a philosophy of *Readiness At Any Cost* or *The Firstest with the Mostest is the Winner*. The emphasis at the unit level is on readiness. Material availability plays a significant role in readiness capability. Customers do not trust the system to supply what they need. Procurement specialists at the retail level may over-order and hoard supplies (just-in-case inventories). The result is bottlenecks, procurement delays, and excess material. For example, the 24th Infantry Division (mechanized) was one of the first units to deploy Saudi Arabia in support of Desert Shield/Storm. The emphasis on material availability and lack of confidence resulted in units submitting multiple requisitions for the same item.

4. Force Modernization

During initial procurements, the contractor provides an Interim Support List (ISL) which reflects the type and quantity of initial spares required to support the new system. In many cases, the contractor simply makes the wrong guess or his estimates of system reliability may vary. Life of Type buys further compound the problem. Life of type buys refer to the procurement of all the spares necessary to support major weapons systems during its projected life cycle. The goal is to ensure DoD's capability to maintain support for the system long after the contractor production facilities have shut down. In either case, many of these spares may never be used. The contractor's incentive is to maximize the ISL. The greater the number of lines, the greater the profit. Of the 6,000 lines recommended by the contractor to support the B-2 bomber, less than 400 of these items have been used [Ref. 16].

5. Base Realignment and Closure

Base Realignment and Closures (BRAC) decrease demand, result in the loss of trained personnel, and always identifies property not on the accountable records. This occurred when DLA closed the Memphis, Ogden, and Columbus depots [Ref. 17]. Additionally, the U.S. Army Training and Doctrine Command (TRADOC) experienced the loss of a number of trained item managers as result of the drawdown [Ref. 18].

6. Support of Allies

DoD's support of its Allies through Security Assistance Programs (SAP) result in the retention of obsolete equipment and spare part inventories. The recent fielding of F-16 aircraft to Jordan under the G-Grant program provides a good example. The U.S. will retain spare part inventories to support their future requirements.

7. Demilitarization

Units tend to focus on readiness and training issues. Dollars for demilitarization² or to repair excess take a backseat. For example, there are 3,032 obsolete riot control dispersers (condition code f) retained the Defense Distribution Depot, Letterkenny, Pennsylvania. The cost for storage is estimated at \$13 thousand annually [Ref. 19].

8. Item Manager Incentives

Item managers say, "*The worst thing that can happen to an inventory manager is to run out of stock*" [Ref. 20]. Supervisors look at monthly activity reports reflecting SMA, number of back orders, and the average customer wait time.

9. Increased Life Cycles

The increased lifespan of certain weapon systems have forced item managers to retain items for which there exists no demand history. For example, no one ever expected the C-141 aircraft to be in service beyond 20 years. Items previously considered excess are now required to support the aircraft [Ref. 16].

10. Economic and Environmental Issues

Certain items can have an adverse impact on the economy or environment. For example, the Defense Distribution Center, Letterkenny, Pennsylvania retains stockpiles of various ores (e.g., asbestos, lead, nickel, TALC, and zinc) that cannot be disposed of. Selling the material on the open market would either negatively impact the world market price or is prohibited by environmental law. The depot has approximately 137,967.9 tons of the material occupying some 1.1 million square feet of open storage space [Ref. 19].

² Disassembly of an end item for security, environmental, or economic reasons.

11. Ineffective Manager Controls

A recent report indicates ICP's were prematurely and unnecessarily ordering wholesale inventories. The reports states the conditions occurred because management controls were ineffective and did not ensure that item managers always made the most prudent decisions. The report concluded that of the \$1.06 billion of consumable items that ICP's were in the process of ordering, consumable material valued at \$126.6 million (11.9 percent) exceeded current requirements. Of this amount, approximately \$88.9 million was premature and \$37.7 million was unnecessary. Therefore, the avoidable cost associated with carrying the inventory was placed at \$59.6 million. [Ref. 21]

12. Contracting Regulations

The purchasing function in government has become a highly regulated process, defined and controlled by numerous laws, rules and regulations, judicial and administrative decisions, and policies and procedures. Their purpose is to promote equity and accessibility versus selection of the best source. Compliance with these regulations can add months to the procurement process. These delays may be further compounded by the contractors ability to deliver. His abilities may be stretched to the limit.

13. AMC/DLA Leadtime Reduction Efforts

As wholesale activities seek methods to reduce ALT and PLT, the quantity of stock required to reduce variability decreases. This effects RO and results in excess. Many procurement actions may already be in process and cannot be canceled. [Ref. 17]

D. METHODS OF MEASURING EXCESS

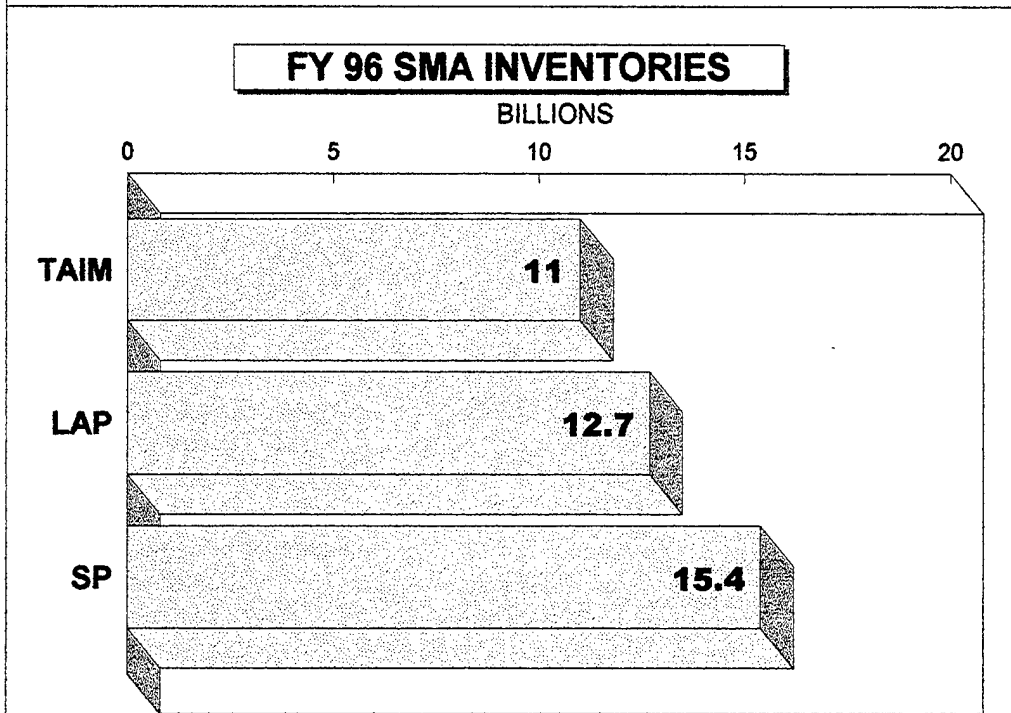
The Total Army Inventory Management System (TAIM) has authority over the single stock fund accounts, real time requisition processes, and property management system for the Army. For accounting purposes, TAIM revalues inventory at the latest acquisition price and includes both repairables reduced by the cost of repair and potential DRMO inventories valued at salvage price (about 2%). This method has been approved by the Office of the Secretary of Defense (OSD) and is the generally accepted method used by the service components, wholesale activities, and the GAO for reporting assets to Congress. The report is called the Supply System Inventory Report (SSIR) and submitted monthly to Congress.

The Army uses two other methods for evaluating inventory: Latest Acquisition Price (LAP) and Standard Price (SP). LAP values all inventories at the latest acquisition price and provides an assessment of the current replacement cost. SP values all inventories at the latest acquisition price and includes the surcharge for handling. SP attempts to measure the Army's total investment in inventories. The latter two methods tend to reflect higher costs associated with excess inventories. Table 3-1 provides a comparison of the total SMA (retail and wholesale) inventories for fiscal year 1996 using the three methods of evaluating inventory.

E. CURRENT VALUE OF ARMY EXCESS INVENTORIES

Using Standard Price, table 3-2 depicts the current value of Army excess inventories at \$3.75 billion for June 96. The amount is determined by subtracting the current requirements objective (RO) from the current on-hand inventories. As mentioned in chapter II, the RO is the maximum amount of assets authorized to be on hand or on order for a

METHODS OF INVENTORY VALUATION **A GRAHIC COMPARISON**



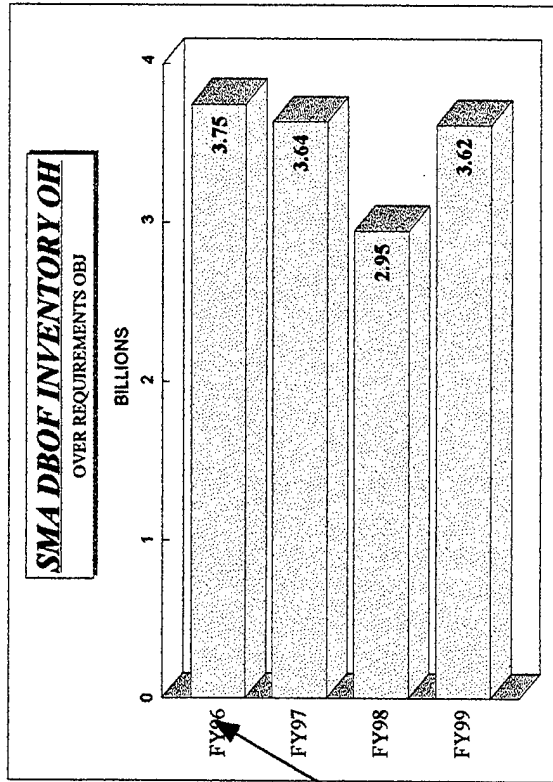
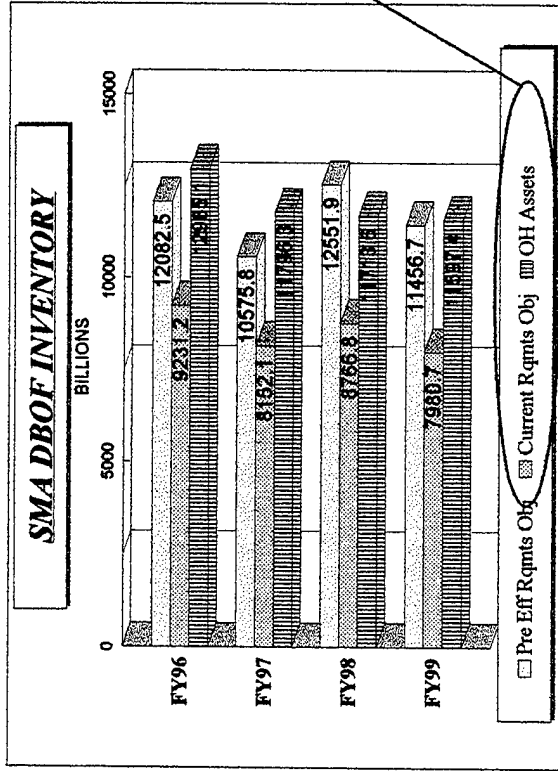
TAIM: Supply System Inventory report (SSIR) revalues inventory at the Latest Aquisition Price (LAP), includes reparables requiring repair reduced by the cost of repair, and includes potential DRMO inventory valued at the salvage price (about 2%).

LAP: Inventory valued at the Latest Aquisition Price (LAP).

SP: Inventory valued at the LAP and includes surcharge.

Note: SMA inventories reflects retail and wholesale levels.

SMA DBOF INVENTORY Requirements vs OH Inventory



	FY96	FY97	FY98	FY99
Peacetime Rqmts Obj	6886.1	5873.9	6458.1	5667.9
Mob Requirements	2345.1	2278.2	2308.7	2312.8
Total Rqmts Obj	9231.2	8152.1	8766.8	7980.7
Assets EOP	12985.1	11796.3	11713.6	11597.4
Unfunded MOB Rqmts	1188.4	1096	1095.1	1087.8

WHY INVENTORY EXCEEDS REQUIREMENTS OBJ

- A. AMC leadtime reduction efforts (ALT/PLT)
- B. Troop strength drawdown
- C. Life of Type Buys
- D. Inventory includes economic and contingency retention stocks
- E. Inventory includes unprotected war reserves

NOTE: June 96/USAMC Consolidated SM-3a, 3c, and 4/Figures at Standard Price/Billions of Dollars

Table 3-2 from [Ref 11]

particular item of supply and includes other procurable elements of inventory designed to compensate for procurement lead time. Referring to the table, the Army places the value of the RO for Army DBOF inventories at \$9.23 billion. However, on-hand assets were placed at \$12.98 billion. This results in inventories exceeding requirements by \$3.75 billion or 41%. The pre-efficiencies RO reflects requirements prior to adjustments in demand. Colonel Genteman, Team Chief for Secondary Items, attributes these excess inventories to:

- AMC lead time reduction efforts,
- Soldier strength drawdowns,
- Life of type buys, and
- Inclusion of economic and contingency retention stocks and unprotected (unfunded) war reserves in assets.

AMC initiatives designed to reduce administrative and procurement lead times decrease the quantities required for safety stock. Additionally, both soldier strength drawdowns and reductions in the contractors interim support list decrease demand. Contracts already issued or in the process of being issued for procurement of these items prior to these changes often cannot be canceled.

F. SUMMARY

This chapter defines excess as that level of inventory which exceeds the RO or of which there exists no demand history. It indicates there are thirteen causes for excess inventories and provides a brief summary of each. It identifies three different methods for measuring inventory and places the current value of all Army SMA DBOF excess inventories at \$3.75 billion. The next chapter discusses inventory manager training.

IV. INVENTORY TRAINING

A. INTRODUCTION

This chapter examines inventory management training. Its purpose is to identify the type of training inventory managers receive and how that training is applied. The first two sections provide a general overview of the training received by inventory managers at the retail and wholesale levels. The final section identifies how supervisors measure inventory manager performance.

B. RETAIL LEVEL

Generally, U.S. military personnel perform the supply and inventory management functions at the retail level. The Department of the Army (DA) trains supply and inventory management personnel using a combination of technical schools and on-the-job training. All supply and inventory management personnel assigned to Active Duty, Reserve, and National Guard components must complete the technical schools. Most positions are characterized by a high degree of personnel turnover. Excepting for the Logistics Executive Development Course (LEDC-FIT) and the Army's Logistics Management College (ALMC), courses do not include training in commercial logistics practices. LEDC-FIT and ALMC are schools reserved for selected military officers and graduate students. The Army has three categories of military personnel: enlisted, warrant officers, and commissioned officers. The following section briefly describes the technical training received by some of the inventory management personnel.

1. Enlisted

DA assigns enlisted personnel by unique functional codes called military occupational specialties (MOS). MOS codes identify the technical field and skill level³ of training. The Unit Supply Specialist, 92Y and Automated Logistics Specialist, 92A, levels 10-40 perform many of the automated supply and logistics tasks at the retail level.

Technical development for these personnel occurs after basic training with assignment to Advanced Infantry Training (AIT). AIT training courses range from 10 to 12 weeks in duration and provide basic automation systems and unit supply management skills.

Technical development continues with promotion to E-5 and assignment to the Basic Non Commissioned Officers Course (BNCOC). BNCOC courses range from 9 to 10 weeks in duration and provide training in leadership, supervision, and advanced MOS skills. Additionally, they include a four hour period of instruction on current and future DoD initiatives. DA requires completion of BNCOC for promotion to the grade of E7.

Final technical development occurs later with assignment to the Advanced Non Commissioned Officers Course (ANCOC). ANCOC courses range from 10 to 12 weeks in duration and provide a comprehensive knowledge of those duties required to perform as platoon sergeants or skill level IV managers. DA requires completion of ANCOC for promotion to the grade of E8. Table 4-1 identifies the levels of technical training and course concentration.

³ Skill levels are used to refer to a level of training associated with enlisted grades E1 through E7.

Additionally, both the proponent agency and local installations offer a variety of related courses. These courses are usually shorter in duration and designed to meet the specific needs of certain activities. Attendance at these schools is normally at the discretion of the unit commander. A few examples include courses in: Standard Property Book Redesign (SPBS-R), SARSS, and Unit Level Logistics (ULLS).

COURSE	DURATION	HOURS	CORE CURRICULUM
92Y10 AIT	10 WKS	356	BASIC UNIT SUPPLY PROCEDURES
92A10 AIT	12 WKS	427	BASIC LOGISTIC AUTOMATION SYSTEMS
92Y30 BNCOC	9 WK	334	ADVANCED TRAINING IN ORGANIZATIONAL CLOTHING AND MAINTENANCE, FORECASTING AND STORAGE OF SUPPLIES, AUTOMATED DATA PROCESSING, TACTICAL ARMY COMBAT SERVICE SUPPORT, STANDARD PROPERTY BOOK REDESIGN
92A30 BNCOC	10 WKS	388	ADVANCED TRAINING IN SARSS, DIRECT SUPPORT UNIT STANDARD SUPPLY SYSTEM (DS4), MANAGEMENT OF PLL, AND ULLS
92Y40 ANCOC			FINAL TECHNICAL DEVELOPMENT WITH CAPSTONE TRAINING IN ORGANIZATIONAL CLOTHING AND MAINTENANCE, FORECASTING, DATA PROCESSING, STANDARD PROPERTY BOOK REDESIGN (SPBSR)
92A40 ANCOC	12 WKS	437	FINAL TECHNICAL DEVELOPMENT WITH CAPSTONE TRAINING IN CLASS IX, SUPPLY AND MAINTENANCE MANAGEMENT, AND STOCK ACCOUNTING AND WAREHOUSING

Table 4-1. Enlisted 92A and 92Y Career Training Development. After Ref. [22].

2. Warrant Officers

DA assigns warrant officers by functional MOS codes. The Supply Systems Technician, MOS 920B serves in a variety of positions at both the retail and wholesale levels. The Supply Systems Technician training requires satisfactory completion of both the warrant officer basic and advanced level courses within their functional area. Table 4-2 identifies the levels of technical training and course concentration.

COURSE	DURATION	HOURS	CORE CURRICULUM
920B BASIC	9 WK	365	COMBAT SERVICE SUPPORT, MAINTENANCE, FINANCIAL MGT, PETROLEUM AND WATER, PROPERTY ACCOUNTABILITY, PLL, SSA, MATERIAL AND WHOLESALE LOGISTICS, STOCK RECORD ACCOUNTING, HAZARDOUS WASTE, AND SARSS.
920B ADV	10 WK	360	LEADERSHIP, COMMUNICATION, FINANCIAL MANAGEMENT, GENERAL MILITARY, THEATER LEVEL COMBAT SERVICE SUPPORT, MATERIAL MANAGEMENT AND WHOLESALE LOGISTICS, ULLS, SUPPLY SUPPORT ACTIVITIES, SARSS 1 AND 2A

Table 4-2. Warrant Officer 92B Career Training Development. After Ref. [22].

3. Commissioned Officers

DA assigns officers by functional branches. There are two functional branches which provide the bulk of inventory management support at the retail level. These are the Quartermaster and Ordinance branches. Generally, Quartermaster officers serve as the material managers assigned to the operational units and MMCs. Ordinance officers serve as the maintenance managers assigned to the DS and GS support maintenance activities.

DA develops the technical skills of these officers through assignment to two primary schools. These schools are the Officer Basic Course (OBC) and the Combined Logistics Officers Course (CLOAC). Additionally, all officers are required to attend the Combined Arms and Services Staff College (CAS³) and may be selected for the Command and General Staff College (CG&SC). CAS³ and CG&SC provide training in staffs organizations and planning. Table 4-3 identifies the technical course eligibility requirements and concentration.

GRADE	COURSE	DURATION	HOURS	CORE CONCENTRATION
2LT	OBC	3.5 MTHS	525	BASIC FUNCTIONAL SKILLS
1LT/CPT	CLOAC	5 WKS	199	ADVANCED SKILLS

Table 4-3. Logistics Officer Technical Training Development. After Ref. [22].

C. WHOLESALE LEVEL

1. DLA

DLA has three general categories of training for development of item managers: required functional, refresher, and Professional Qualification Standards (PQS). Required functional training represents a standardized program of instruction and certification for all professional, administrative, supervisory, and technical positions. Functional training requirements are prepared by DLA's Defense Civilian Personnel Support Office (DCSPO) in Dayton, Ohio, and distributed to subordinate DLA activities. The training consists of a standardized combination of classroom, cross functional, and on the job training (OJT) in core curriculum unique to the position. DLA activities may substitute equivalent experience for classroom training by written request. Each activity must maintain Individualized Development Plans (IDP) reflecting periods of classroom instruction, relevant OJT experiences, and long term goals developed by the participant. Each activity publishes an annual training plan indicating course descriptions, dates, and the number of credit hours. Classes are taught locally and funded by DLA. There are two categories of required functional training available to item managers: Supply Management Entry Level Training and the Material Management Mid Level Development Program (MLDP). [Ref. 23]

a. Supply Management Entry Level Training

DLA designed this training for supply management, entry level interns in the grades GS5 through GS9. Interns with college degrees begin training as a GS7. Their target grade is GS11. The Outstanding Scholar Program is designed to attract applicants with a 3.45 or better grade point average. Interns without a degree begin training as a GS5. Their

target grade level is GS9. The program consists of about 700 hours of formal classroom instruction in: statistics, logistics, administrative skills development, and Total Quality Management. The bulk of these classes focus on Supply Management and Decision Support Analysis. Additional training includes OJT and a varying number of hours across functional areas within the organization. Interns must complete the program three years from the date of employment. DLA requires a grade of C or better to complete the program.

b. Material Management Mid Level Development Program

DLA designed the MLDP for mid-managers in the grades GS9 through GS11. The objective of the program is to ensure a high degree of technical competence in preparation for future vacancies as supervisors in logistics management. Course requirements are expressed in specific competencies and/or tasks which must be demonstrated to successfully complete the program. Participants must maintain a B average and complete the course within two years. Mandatory training for all MLDP participants includes:

- Completion of three weeks of core curriculum classroom instruction in DLA management activities,
- Completion of certain management development courses unique to their position,
- Participation in specialized enrichment assignments and cross functional training,
- Completion of all required training applicable to their current grade,
- One year of OJT in a GS11 position with certification of satisfactory performance, and

- Completion of formal training required by the Defense Acquisition Weapons Acquisition Institute level II certification, including DLA Supply Management and Defense Supply Center Contract Quality Assurance.

Periodic refresher training is supplementary training designed to reinforce previously acquired skills. The requirements for refresher training evolve from procedural changes and training workshops conducted by the DCPSO. As new requirements are identified, the DCPSO incorporates these requirements into the required functional training classes. Item managers previously completing program requirements may be required to take refresher training. These classes are conducted locally through DLA mobile training teams. DLA recently added six refresher training courses to the intern program.

Professional Qualifications Standards (PQS) represent a certification process for testing the item managers inventory management skills. Item managers must demonstrate their abilities to supervisors using hands on techniques that result in a pass or fail evaluation. The Consolidated Business Training (CBT) portion of the PQS is an on-line program of self directed study to prepare item managers for the PQS certification. Sections of the program comprise the fundamental knowledge, skills, and abilities required of the item managers and enable individual training through the activities automated systems. Item managers progress through the study program at their own pace. Item managers are not required to obtain certification however, earn additional promotion points for certification. CBT can also provide on line remedial training.

Employees at the Defense General Supply Center, Richmond represent an older workforce. Two thirds will retire within the next 10 years. Most have a

considerable number of years of supply related experience. Due to the Defense drawdown, DGSCR has not hired interns (except Quality Assurance) within the last five years.

2. AMC

AMC also trains item managers using standardized functional and periodic refresher training programs. Entry level training for interns consists of a standardized program of both specialized classroom instruction and relevant OJT experience. Interns must earn a grade level of B or better for satisfactory completion of the program. Periodic refresher training refers to supplementary courses designed to enhance previously acquired skills and identify procedural changes. These classes are conducted at the activity location. Activity training managers coordinate refresher training requirements and maintain training records. AMC funds all required item manager training. AMC has two intern programs: [Ref. 24]

a. AMC Commandant Intern Program

AMC reserves participation within this program to candidates with a college degree that possess a 3.45 or better grade point average. Degrees in business related fields are preferred, however not required. The program includes 9 months of classroom training conducted at the School of Engineering and Logistics, Texarkana, Texas. Classroom instruction focusses on integrated supply management, logistical support analysis, maintenance management, requirements determination, and budget stratification. Following the school, they are assigned to activities to gain relevant OJT experience. Additional training includes education in functional relationships and attendance at specialty courses taught at the Quartermaster Center and School, Fort Lee, Virginia. Item managers completing training requirements assume GS11/12 level positions.

b. Local Intern Program

Personnel hired for participation with this program substitute a relevant amount of experience in logistic related fields to meet minimum education requirements. The program includes 5-7 months of combined classroom and OJT training. Classroom instruction is similar to that of the AMC intern program although, tailored to meet the requirements of the individual. The bulk of the classes are taught locally. Item managers completing training requirements assume GS9 level positions.

Generally, the item managers interviewed at the AMC, Communications and Electronics Command, Fort Monmouth, New Jersey possessed either relevant education or a considerable number of years of supply related experience. All were hired under the local intern program and had completed the prescribed courses. These managers appeared extremely proficient and expressed familiarity with commercial logistics practices.

D. CUSTOMARY METHODS OF EVALUATING PERFORMANCE

Commanders assigned to operational units are rated on readiness. Their policies lean towards quick inspections and inflated demand. Consequently, retail and wholesale activities evaluate performance in terms of attaining *maximum operational readiness* of supported units. Generally, their performance is measured in three ways: [Ref. 9 & 24]

1. Supply Material Availability

Supply Material Availability (SMA) refers to the percentage of time a requisition will be filled when it first hits the system. DLA has a goal of 85%. Most item managers say they can meet stock availability goals.

2. Number of Backorders

A backorder occurs when there is insufficient stock within the system to support the customer requirements. The goal is to reduce the number of backorders.

3. Average Customer Wait Time

Average Customer Wait Time (ACWT) refers to number of days occurring between the time the customer submits the order to the time of final receipt. DLA refers to ACWT as Supply Response Time (SRT). The goal is to minimize the number of days. The ACWT for the Army is from 23 to 26 days.

DLA has included an additional factor for evaluation of item manager performance. The sales to inventory rating compares average sales to on hand inventories. For example, a 1:7 ratio indicates \$200 million in sales from \$1.4 billion in inventory.

E. SUMMARY

The Department of the Army (DA) trains supply and inventory management personnel through a combination of schools and on the job training assignments. Generally, training does not include exposure to commercial logistics practices. Both DLA and AMC train item managers through the Entry Level Development Program. Commanders assigned to operational units are rated on readiness. Consequently, retail and wholesale activities evaluate performance in terms of attaining *maximum operational readiness*. Supply and inventory managers at both the retail and wholesale levels are well trained in skills and abilities to perform the required tasks. Supervisors evaluate performance based on maintaining supply material availability, reducing the number of back-orders, and limiting the average customer wait time. The next chapter examines commercial logistics practices.

V. COMMERCIAL LOGISTICS PRACTICES

A. INTRODUCTION

Andersen Consulting hails the 1990's as the "Decade of Customer Service" and indicates that, "Rising costs and increased competitive pressures have forced firms to identify the logistics function as a potential means of differentiation, cost reduction, and increased value for their customers" [Ref. 26:p. 2]. Consequently, a new logistics paradigm has emerged where competitive firms do more with less resources. The use of innovative concepts, information technology, and lateral integration of supply channels form the core of this effort.

This chapter provides an overview of commercial logistics practices. Commercial logistics practices refer to those techniques, methods, customs, processes, rules, guides, and standards normally used by business, but are either applied differently or are not used by the Federal Government [Ref. 25:p. ES-I]. The goal of this chapter is to identify the methods used by the private sector to resolve inventory management problems. It examines the purpose of inventory management, discusses the predominant commercial practices, and provides specific examples of how they have been applied in the private sector.

B. COMMERCIAL APPLICATIONS

Commercial applications of logistics practices focus on inventory management. Inventory represents a stored resource that is used to satisfy current and future business needs. It can serve many important functions that add flexibility to a firm. Some of the functions of inventory are to: quickly meet customer demands, separate the production and

distribution processes, take advantage of quantity discounts, hedge against inflation and price changes, protect against stock-outs, and serve as a buffer between sales predictions and actual demand. However, inventory is also one of the most expensive assets of a firm, representing as much as 40% of total invested capital. Other negative aspects of inventory are poor quality⁴, risk of obsolescence and damage, use of occupied space, committed assets, increased insurance and materials handling costs, and shrinkage. Generally, firms maintain four types of inventories: raw materials, work-in-process, maintenance/ repair/ operating supply, and finished goods inventory.

Traditional inventory systems are referred to as “push” systems. Inventory is procured and stored based on expected demand and pushed “down” to production facilities and retail outlets. To the contrary, modern inventory systems reduce inventories through effective control of procurement lead times to minimize on-order requirements and by frequent ordering of smaller quantities. These systems “pull” inventory in response to customer demand, effectively shifting much of the burden of inventory to the supplier. They require suppliers to meet short lead times and high fill rates-without back orders. Reduced inventories mean heavy reliance on the distribution system to deliver the right goods at the right place at the right time.

Lean inventory management serves as a competitive advantage that enables firms to reduce costs without sacrificing customer service. Some of the more predominant commercial practices used by the private sector to reduce inventories are:

⁴ Large inventories inhibit detection of quality problems.

- Just In Time (JIT),
- Outsourcing,
- Direct Vendor Delivery,
- Total Asset Visibility (TAV) and Electronic Data Interchange (EDI), and
- Cycle Time Reductions

C. DISCUSSION OF COMMERCIAL PRACTICES

1. Just-In-Time (JIT)

The JIT inventory system is a scheduling philosophy that serves as an alternative to the use of inventories. With JIT, firms synchronize the entire supply channel to respond to the requirements of operations and customers. They no longer stockpile inventories at the factory or distribution center. Instead, they develop close relationships with suppliers to ensure inventories arrive "just in time" to meet production needs or customer requirements. Inventory and associated costs are transferred to the supplier's domain and frequently measured in hours versus days. Successful implementation of JIT can significantly reduce the quantities of operating and safety stocks. However, late deliveries and poor quality components can stop an entire production line. JIT has become synonymous with the elimination of waste, synchronized manufacture, and reduced inventory.

Audio manufacturer Bose Corporation used JIT to reduce the size of its inventories. In doing so, they replaced the material planner, buyer, and salesperson within their purchasing office with representatives from various suppliers. They did the same for their transportation office. Lance Dixon, Bose director of purchasing and logistics explains:

We're now able to use the material in transit that's flowing from around the world into our plants as a routine inventory location. Most inventory sits on the shelf and you have money tied up in it. We brought our transportation suppliers on site, the manager from Roadway for trucking and the manager from Proctor for import/export activity in one room under my transportation manager. This gives us a command center for every mode of transportation, inbound and outbound. Under JIT, when the panicky buyer calls transportation, this elaborate computerization and control network allows them to find all locations where part number 123 exists. One may be on the dock in Taiwan, one may be halfway across the ocean, one may be coming into Seattle, one on railcar, and one unloading in Boston. Everything happens on my floor space, and these companies sitting in this room can work together in crisis situations. [Ref. 27:p. 95-102]

2. Core Competencies and Strategic Outsourcing

The combined use of two approaches to strategic management, outsourcing and core competencies allow business organizations to leverage their resources [Ref. 28:p. 64]. Outsourcing refers to the practice of allowing third party providers to perform traditional business activities, once considered integral to most firms. Generally, these third party providers furnish superior service in areas where the firm may lack a critical strategic need and/or special capabilities. Outsourcing enables firms to focus on core competencies⁵ or areas where it can achieve definable preeminence and provide unique value for their customers. Hence, a number of third party logistics providers have emerged.

The successful application of these two approaches are significant and can leverage a firm's resources in four ways. First, concentrating internal resources on what a firm does best can maximize the return on investment. Second, well developed core competencies can serve as barrier to entry. Thirdly, the firm can utilize the providers investments, innovations, and specialized capabilities that might normally be too expensive or impossible to duplicate.

⁵ Strategies developed around a central set of corporate skills.

Finally, in a dynamic environment, the firm can decrease risk, reduce cycle time, lower investment costs, and be more responsive to customer service needs. Mintzberg and Quinn provide two examples:

Nike, Inc., is the largest supplier of athletic shoes in the world. Yet it outsources 100% of its shoe production and manufactures only key technical components of its "Nike Air System." Nike creates maximum value by concentrating on preproduction (research and development) and post production activities (marketing, distribution, and sales)

Knowing it could not make the best chips, boxes, monitors, cables, keyboards, and so on for the explosively successful Apple II, Apple Computers outsourced 70% of its manufacturing costs and components Apple focused its internal resources on its own Apple DOS (disk operating system) and the supporting macro software to give Apple products their unique look and feel Operating with an extremely flat organization, Apple enjoyed three times the capital turnover and the highest market value versus fixed investment ratio among major computer producers throughout the 1980s. [Ref. 28:p. 64]

3. Direct Vendor Delivery

Direct vendor delivery (DVD) represents another form of the "pull" inventory system. Suppliers engaged in direct vendor delivery ship their products directly to business activity retail outlets. These suppliers "listen" to the consumer through retail point of sale (POS) systems and quickly respond with the merchandise demanded. They carry the full burden of inventory costs and must be capable of responding quickly to customer demands. Buyers forego the high costs associated with holding inventories. However, a major disadvantage is the cost of transportation. These costs usually rise with an increase in the number of Less Than Truckload (LTL) shipments. DVD requires a close relationship between the firm and its suppliers.

While reaping substantial benefits for the retailer, DVD can cause numerous problems for the supplier. For example, Christina Duff, a reporter for *The Wall Street Journal* revealed that department stores are increasingly taxing the logistical capability of apparel suppliers. She went on to say:

Department stores have started to increase their emphasis on logistics. Take the rules about shipping. Packing labels may be required to include, say, eight specific bits of information. Often the label has to be affixed to a specific place on a particular kind of shipping box. Then the clothes have to be prepriced and hung, facing a certain way, on special hangars. And stores will accept the goods only on certain days. [Ref. 29:p. B1-B3]

4. Total Asset Visibility/Electronic Data Interface

Total Asset Visibility (TAV) refers to a firm's ability to track inventory or the flow of products both laterally or vertically from point of origin to point of departure within the logistics system through the use of automation systems. Electronic Data Interface (EDI) refers to the computer-to-computer exchange of standardized business information that enable TAV. With EDI, firms transmit information such as purchase orders, shipping advice, and receiving reports electronically by telephone and satellite communications. EDI permits firms to operate in a near real time environment and track worldwide inventories. Buyers and supplier reduce material delays by reducing procurement lead times. EDI systems are used extensively by commercial firms today. However, there is one major concern relating to the use of EDI systems. The quality of output data is only as good as the input provided by the user.

Other forms of EDI include the use of Point of Sale (POS) systems and Microchip Technology for Logistics Applications (MITLA). POS systems allow forecast (demand)

information to be collected at the time of sale through use a laser scanner that reads a bar code on the product label. MITLA provides a method of collecting inventory data by means of an electronic device attached either to an item or a container of several items. The device transmits an electronic signal that provides information to a remote receiver. Sears provides an excellent example of the use of EDI systems as reported by Menlo Logistics:

Vendors send an advance shipment notification to Sears by EDI. Sears' computer then determines if the shipment is truckload or LTL. LTL shipment information is transmitted electronically to the Menlo computer, which responds with the optimum carrier and routing, relaying that information via EDI Sears determines the rate and pays Menlo through EDI. The result is a smooth-running process with minimal paperwork and easy communication between shipper and service provider. [Ref. 30:p. 4]

5. Cycle Time Reduction

The concept of cycle time captures all the essential elements of customer service which the logistician can control. The order cycle refers to all the time related events that make up the total time required for a customer to receive an order. It begins with the submission of the purchase order and concludes with receipt of the goods by the customer. Five steps comprise the total order cycle time: order placement and transmittal, order processing, order preparation and filling, shipment and delivery, and status reporting. Typical transactions occurring during each of these phases may include order verification, credit clearance, payment, order picking, packing, and transportation. Cycle time compression focuses on the various functions within each of the five phases in an attempt to reduce cycle time. The use of automated systems, consolidation of functions, and parallel sequencing have had dramatic results in reducing total cycle time. Johnson & Johnson (J & J) has greatly improved its cycle time through the use of automated systems. For example:

J & J uses Manugistics, an integrated set of supply chain management applications, to help it meet the replenishment demands of all its customers. Using information from EDI transmissions, this software links the Support Center with J & J's customers and distribution centers. The system is tied directly to the company's order management system, which includes order processing, transportation load building, and sales reporting systems. Information from these systems is fed downstream to each of the separate operating units to provide decision support throughout the organization. [Ref. 27:p. 95-102]

D. SUMMARY

This chapter indicates rising costs and increased competitive pressures have forced firms to identify the logistics function as a potential means of differentiation, cost reduction, and increased value for their customers. These commercial logistics practices focus on inventory management and include such practices as: Just In Time (JIT), Outsourcing, Direct Vendor Delivery, Total Asset Visibility (TAV) and Electronic Data Interchange (EDI), and Cycle Time Reduction. The next chapter discusses some of the factors required for implementation of commercial logistics practices.

VI. FACTORS REQUIRED FOR IMPLEMENTATION OF COMMERCIAL LOGISTICS PRACTICES IN THE ARMY

A. INTRODUCTION

Improving corporate logistics is not just a matter of will or an investment in high technology. It requires a number of factors to be in place. This chapter identifies each of those factors. It begins by summarizing the results of a study conducted by the University of Maryland, on behalf of the Department of Energy's (DOE), Office of Transportation and the research efforts of two distinguished professors, Dr. Jay Heizer and Dr. Barry Render. Heizer and Render co-authored the text, *Production and Operations Management*. Thereafter, this chapter discusses each of these factors in detail.

B. UNIVERSITY OF MARYLAND STUDY

The DOE's, Office of Transportation commissioned the University of Maryland to conduct a study in search for ways to improve shipping operations. The study originated from projected increases in the packaging, processing, shipping, and delivery requirements for the DOE. The results were compiled using extensive database searches, literature reviews, interviews with diverse experts, and in depth company interviews. The study found a number of elements to be critical for success. The following identifies the four most important elements they found critical for success:

- 1) Forming long-term partnerships between carriers and shippers is the most important element. This reflects the trend in logistics away from transactional exchange towards relational exchange.

2) The second most important element is carrier quality programs that operate through both pre-qualification and on-going performance metrics to incorporate safety, performance, value, compliance, and process improvement into logistics management.

3) Risk management ranked third and includes risk identification, analysis, reduction, and communication.

4) Information management ranked fourth. Information flow is the key to many other factors, including quality programs, risk management, performance measurement, and relational exchange. [Ref. 31:p. 12]

These factors are the antithesis of many past American business practices and require significant cultural change. Long term relationships and carrier quality evaluations go against the idea of "all shippers are the same, go with the lowest bidder." Now companies must work together and trust each other in a combined effort to lower costs. Risk management requires such activities as marketing, production, and finance departments to work together to find, analyze, and reduce risk. This represents a marked improvement from the attitude of, "That's a distribution problem, let the shipping department figure it out." Whereas, the free flow of information was once considered a threat, managers can no longer withhold information as a means of retaining power. E-mail and Electronic Data Interchange (EDI) have increased information flow and eliminated these potential bottlenecks.

C. HEIZER AND RENDER FINDINGS

Heizer and Render examined JIT purchasing and concluded the goals and characteristics of JIT are:

1) *Elimination of Unnecessary Activities.* For instance, the receiving activity and incoming inspection activity are unnecessary under just-in-time. If purchasing personnel have been effective in selecting and developing vendors, the purchased items can be received without formal counting, inspection, and testing procedures. Production can contribute by providing

accurate, stable schedules, adequate lead time for engineering changes to be implemented, and time to develop ethical suppliers.

2) *Elimination of In-Plant Inventory.* Virtually no raw material inventory is necessary if materials that meet quality standards are delivered where and when they are needed. Reduction or elimination of inventory allows problems with other aspects of the production process to be observed and corrected.

3) *Elimination of In-Transit Inventory.* Modern purchasing departments address in-transit inventory reduction by encouraging suppliers to locate near the plant and support rapid transportation of purchases. The shorter the flow of material and money in the resource “pipeline,” the less inventory.

4) *Quality and Reliability Improvement.* Reducing the number of suppliers and increasing long-term commitments to suppliers tends to improve supplier quality and reliability. Vendors and purchasers must have mutual understanding and trust. [Ref. 32:p. 541-545]

Heizer and Render Characteristics of JIT Purchasing
<p>Suppliers Few suppliers Nearby suppliers or clusters of remote suppliers Repeat business with same suppliers Active use of analysis to enable desirable suppliers to become/stay price competitive Competitive bidding mostly limited to new purchases Buyer resists vertical integration and subsequent wipe out of supplier business Suppliers are encouraged to extend JIT buying to <i>their</i> suppliers</p>
<p>Quantities Steady output rate (a desirable prerequisite) Frequent deliveries in small lot quantities Long-term contract agreements Minimal paperwork to release orders Delivery quantities variable from release to release but fixed for whole contract term Little or no permissible overage or underage of receipts Suppliers encouraged to package in exact quantities Suppliers encouraged to reduce their production lot sizes (or store unreleased material)</p>
<p>Quality Minimal product specifications imposed on supplier Help suppliers to meet quality requirements Close relationship between buyers' and suppliers' quality assurance people Suppliers encouraged to use process control charts instead of lot sampling inspection</p>
<p>Shipping Scheduling of inbound freight Gain control by use of company-owned or contract shipping and warehousing</p>

Table 6-1. Characteristics of JIT Purchasing from Ref. [32:p. 542].

D. DISCUSSION OF CHARACTERISTICS

1. Long-Term Close Relationships with Suppliers

Developing long term, close relationships with competent suppliers is essential to just in time inventory management. The reduced levels of inventory mean more frequent deliveries and a heavy reliance on both the supplier and distribution system. Leading edge firms seek out suppliers of high quality, low cost products. They evaluate suppliers based on quality and ability to meet delivery schedules. Past performance becomes a major indicator for success. They remain with them for as long as the relationship remains mutually beneficial.

These leading edge firms rely heavily on open and two way communications to the develop mutual trust and respect that can lead to long term, close relationships. Close relationships enable the buyer to share information with the supplier; primarily in the form of production/operating schedules, so that the supplier can anticipate the needs of the buyer. The sharing of information reduces response times and eliminates uncertainties.

These firms may further attempt to develop and integrate suppliers into their logistics system. Support can include everything from training, to engineering and production assistance, to formats for information transfer and include work spaces directly within the buyer's facilities. Buyers and vendors consider themselves as co-workers. Suppliers take care of the buyer's needs and are treated as an extension of his buyer's factory.

These relationships can be mutually beneficial in the form of increased profits. Both inventory and administrative costs are eliminated. The increased profits and risk are shared by both parties. Heizer and Render point out:

Viewing the supplier as an adversary is counterproductive A healthy vendor relationship is one in which the supplier is committed to helping the purchaser improve its product and win orders. Suppliers can also be a source of ideas about new technology, materials, and processes Likewise, healthy relationships also include those in which the purchaser is committed to keeping the supplier informed of possible changes in product and production cycle A good supplier relationship is one where both partners have established a degree of mutual trust and a belief in the competence of each other. [Ref. 32:p. 536-539]

2. Risk Management

Reduced inventories increase risk and the chances for stock out. Potential problems emanate from the risk of not having the critical components or final consumer goods on hand, when needed. Just in time inventory management is very difficult when there are long lead times. The degree of risk increases proportionately with the cost of a stock out. Leading edge firms decrease risk by carefully managing supplier relationships, employment of demand and simulation models, increasing the frequency of procurement, reducing lot sizes, focusing on quality, and controlling the distribution process. The University of Maryland study concluded that risk management was an essential element in an effective logistics organization. It emphasized:

Promoting and achieving compliance with safety procedures, which involves educating senior management about their responsibilities and liabilities under the law, insisting that risk avoidance and risk reduction practices are understood and utilized, and holding serious violators immediately and visibly accountable Communicating risk management efforts to the public and developing mechanisms for interacting with community groups, public officials, and the media. [Ref. 31:p. 16]

3. High Quality Products

Quality refers to low variation in product performance per customers expectations. With reduced inventories, zero defects is the goal. With small lot sizes and minimal

inventories, there is no safety stock to replace non-conforming or defective units. Quality problems can disrupt the flow of materials and shut down an entire production line. The key to quality is preventing defects versus detecting them. Commercial firms employ a variety of techniques to improve quality. A few of these techniques include: process charts, cause and effect diagrams, statistical process control, and Total Quality Management (TQM). Quality assurance becomes part of the supplier domain. Empowerment of employees in the production process can be a powerful tool in the prevention of defects. Heizer and Render note that:

Better quality means less inventory and a better, easier-to-employ JIT system. Often the purpose of keeping inventory is to protect against poor production performance resulting from unreliable quality. If consistent quality exists, JIT allows us to reduce all the costs associated with inventory. [Ref. 32:p. 86]

4. Integrated Cooperative and Advanced Automation Systems

Highly integrated information systems coupled with extensive use of automated inventory management equipment characterize the organization environment. These systems facilitate the use of leading edge logistics concepts and allow a firm to reach increased levels of performance. Leading edge firms focus on integration across supply channels; building bridges, operating links, and partnerships with suppliers, customers, and carriers. Information systems reduce the need for extensive warehousing, eliminate redundancy in procurement, and minimize the impact of disruption to inventory shortfalls. Information systems allow companies know exactly what inventory they have, where it is, and where it's going (if in transit). The cost of safety stock and carrying inventory is passed to the supplier. In an article on managing logistics in the 1990s, Andersen Consulting stated:

Companies cannot effectively manage costs, provide superior customer service, and be leaders in logistics performance without leading-edge information systems. Advanced logistics systems involve three aspects First, timely and accurate information is essential. This requires source data capture and real time information processing capabilities. For example, a warehouse worker should not have to send pick documents to an office for key-punching and batch processing, but should scan or keypunch each transaction as it occurs Second, integrated applications software with full functionality is a key part of an effective logistics information system. Full functionality will differ for each company but may include capabilities such as the ability to allocate inventory to a specific customer or lot traceability. Third, advanced decision support is an important part of a logistics information system. Capabilities in this area include logistics network planning models which allow a what-if simulation of the cost and customer service impacts of alternative logistic network structure and policies; routing and scheduling analytic programs which can be used to reduce transportation costs; order consolidation programs that can design the best shipping strategies; and analytic software to evaluate alternative inventory deployment and management strategies. [Ref. 26:pp. 4-5]

An example of a company that has improved its inventory receiving function through information technology is Frank's Nursery & Crafts in Detroit, Michigan. They

implemented a portable voice system that directs workers through receipt verification and assignment of storage location. Data collection is by voice and barcode scanners. All information is exchanged in real time by radio frequency between the voice system and the dedicated personal computer managing the information In addition to significantly improved inventory accuracy, the new automatic data collection system immediately improved worker productivity 30% The system paid for itself in only 13 months Workers are guided through ... verification steps by voice prompts generated from the system. Because receiving at Frank's is a decision-tree process, over 100 potential voice prompts are pre-programmed Following the prompts, workers then collect data as required using either voice data entry or bar code scanning. [Ref. 33:pp. 1-2]

5. Few Suppliers

Firms find it better to create partnerships with a few good suppliers versus having a large number of suppliers that compete against each other. The reduced number of

suppliers enhances the potential to create mutually beneficial relationships. Thus, process variation and product quality are improved. Heizer and Render state that:

Companies around the country are cutting back the number of suppliers by as much as 90%. They are demanding higher levels of service and product quality from the survivors. And they are willing to pay a premium on the theory that getting things right initially is cheaper in the long run. Heizer and Render then give examples: Xerox has cut its number of suppliers by 90%, Motorola by 70%, General Motors 45%, Ford 44%, and Texas Instruments 36%. [Ref. 32:p. 539]

6. Stable Demand With Small Lot Sizes

Commercial logistics practices work best with a regular or stable (predictable) demand. With regular demand, patterns can be divided into trend, seasonal, and random components. When random variation is insignificant, demand can be reasonably predicted using a variety of forecasting techniques. Regular demand patterns enable both supplier and purchaser to effectively plan for the future to maximize productivity while minimizing cost.

JIT inventory also requires frequent deliveries in small lot sizes. The JIT philosophy does not permit the large shipments that would unnecessarily build high inventory levels and increase costs. Instead of the large shipments that must be counted, inspected, and stored, suppliers make smaller deliveries on a more frequent basis to accommodate the firms requirements. This minimizes the in-plant inventory, and reduces stock-age costs. However, JIT has the potential to increase transportation costs. Heizer and Render note that:

To achieve just-in-time inventory, managers *reduce variability caused by both internal and external factors*. Inventory hides variability- a polite word for problems. The less variability in the system, the less inventory is required The key to JIT is producing small lot sizes to standards. Reducing the size of batches can be a major help in reducing inventory and inventory costs. [Ref. 32:pp. 579-581]

They quote Toshiba president Fumio Sato:

Customers wanted choices. They wanted a washing machine or a TV set that was precisely right for their needs. We needed variety, not mass production' says Sato. The key to variety is finding ways to make money from ever-shorter production runs. Sato urges managers to reduce setup times, shrink lead times, and learn to make more products with the same equipment and people Usually, they make a batch of 20 before changing models, but Toshiba can afford lot sizes as small as 10. Product life-cycles for low-end computers are measured in months, not years, so flexible lines allow the company to guard against running short of a hot model or overproducing one whose sales have slowed. The results are less inventory, less space devoted to inventory, less obsolete inventory, lower holding costs, and a focus on the products currently in demand. [Ref. 32:p. 587]

7. Centralized Management and Control

Leading edge companies centralize their logistics system within close proximity to senior management and at the strategic apex of the company. This enables top management to incorporate logistics into the strategic planning process and develop mission statements that reflect changes in the internal and external environment. The logistics operations are characterized by well defined written policies and procedures that allocate financial and human resources towards selected logistic goals that support strategic goals. Centralization enables the firm to maintain tight control while consolidating shipments and lowering costs. Efficiency and performance increase concurrently with the reduction in costs. The research team at the University of Maryland surveyed 20 companies seeking best logistics practices and found that all of them had:

centralized their strategic logistics management function...in proximity to the corporate center. This pattern contributed to company-wide planning and organizational activities. All cited increased control, improved efficiencies, and lowered costs as the primary motivations behind their centralization philosophy. [Ref. 31:p. 9]

They provided an example using Pfizer Pharmaceutical:

Pfizer discovered that by centrally pooling shipping demand, consolidating freight, streamlining administrative procedures, and integrating its information systems, its logistics function could be more productive while achieving considerable savings. Company-wide carrier rates were established through negotiations and corporate policies. Using the buying power gained from aggregated demand, they were able to set a lower national rate from Yellow Freight Systems than the individual business units had managed to achieve. Procurement costs also fell as economies of scale allowed higher discounts and lower unit prices. [Ref. 31:p. 9]

8. Low Stock out Cost

Commercial logistics practices work best when the potential dollars lost from being out of stock on an item are relatively low. An example is a clothing retailer, who might convince a customer to purchase another item or to back order the desired good, knowing that the logistics system can quickly respond. Substitutability of products helps, because a company could use another supplier if one was out of stock.

An example of how a high stock out cost hampers implementation of commercial logistics practices comes from the airline industry. An airliner that is not mission capable can cost thousands of dollars per hour in lost revenue, so quick response is a must. Jim Stansbury, the Team Leader for Corporate Contracts at DSCR, examined Boeing and General Electric (GE) inventory practices for jet engines. GE uses the commercial logistics practices discussed in this research, holding a minimal inventory that turns ten times per year. Boeing uses a more traditional inventory system with high quantities of material on hand, and an inventory turn of .5 per year. In 1992, Boeing's SMA was a consistent 99%, with delivery occurring in under 24 hours anywhere in the world. GE's SMA ranged from 80-85%. Customers could not afford the low SMA that GE's commercial logistics practices

provided, so they have increasingly turned to Boeing. Since 1992, GE has substantially increased its inventory in an effort to boost its SMA and keep customers. [Ref. 34]

9. Good Labor Relations

The above factors will only work if management and labor work together to improve logistics. Mutual trust is a prerequisite to the kind of rapidly moving, integrated, cross-functional work force needed to be competitive today. An example of how commercial logistics practices can be used against a firm comes from the 1992 strike by the United Auto Workers (UAW) against the General Motors die shop in Lordstown, Ohio. Heizer and Render report that:

Ironically, the UAW used one of the cornerstones of GM's leanness strategy against it: the just-in-time delivery of parts. JIT, in theory, eliminates the need for costly stockpiling of parts. The GM Lordstown plant adopted JIT 18 months earlier. 'It's become a great weapon...just-in-time puts the entire power of the UAW in just one local chapter' says Detroit auto analyst Arvid Jouppi. Supplies are kept so tight that sometimes helicopters have to fly in and out of the GM plant loaded with JIT deliveries. [Ref. 32:p. 545]

E. SUMMARY

This chapter identifies some of the major factors required for implementation of commercial logistics practices. These factors include development of a close relationship with a limited number of suppliers, shared risk, a focus on quality, integrated information systems, stable demand with small lot sizes, centralized management, low stock out costs, and good labor relations. The next chapter discusses some of the differences between the private sector and the Army.

VII. DIFFERENCES BETWEEN THE ARMY AND THE PRIVATE SECTOR

A. INTRODUCTION

Army inventory management differs from that of the private sector in several respects. This chapter discusses some of the qualitative factors that contribute to these differences. Many of these factors serve as inhibitors to implementation of commercial logistics practices.

B. COMPLEX REGULATORY CONTRACT REQUIREMENTS

Government contracting is considerably different from that of the private sector. The government contracting function is a highly regulated process defined and controlled by innumerable laws, rules and regulations, judicial and administrative decisions, and policies and procedures. The government designed these regulations to promote both equity and accessibility in source selection and regulate the actions of purchasing agents. Government purchasing generally includes a broad range of items to support a wide spectrum of services by a large number of differentiated production subunits. Quite often, the objectives of equity and accessibility conflict with the idea of economy and efficiency and serve as inhibitors that preclude the adoption of commercial logistics practices.

1. Development of Long Term Relationships with Few Suppliers

Government contracting regulations inhibit development of long term relationships with a few suppliers. Under the Competition In Contracting Act (CICA) of 1984 and the Federal Acquisition Regulations (FAR), government contracting operates on the premise

of "full and open competition." Additionally, contract awards are competed individually with no commitments for future follow-on business" [Ref. 25:p. 3-4]. The government's approach essentially attempts to increase the number of suppliers without consideration to development of long term relationships. There is little or no continuity from one contract to the next. The concept of equity takes precedence over business sense.

2. Reduction of Cycle Time

Essentially, the government's need for a rigid, formal contracting process effectively works against cycle time compression. The government's approach is in direct contrast to the attitude of cooperative contractual agreements between buyers and sellers found in the private sector [Ref. 25:p.5-3]. Government purchasing agents serve as stewards of public funds in pursuit of socioeconomic objectives defined by the bureaucracy. Accountability is heavily emphasized. Consequently, the government relies on a complex set of rules and procedures to promote fairness and eliminate the possibility of subjective bias arising from solicitation, source selection, and performance. Despite recent reform, the length of the process emanating from the requirement to comply with this complex set of rules and procedures makes it difficult to reduce cycle time. Therefore, inventory levels must remain relatively high to compensate for long replenishment times.

3. Quality

The government's emphasis on "purchase price" in source selection often results in poor quality. The emphasis continues to occur despite the fact that, in many cases, the added reliability or quality may be worth the higher price. The government's adoption of the "best value" approach, the section 800 panel report, and implementation of the Federal

Acquisition Streamlining Acts I and II demonstrate an attempt to put common sense back into the procurement process. These measures provide major reform in the areas of procedure, source selection, and use of commercial off-the-shelf items. The full impact of these changes has yet to be realized.

Additionally, the socioeconomic objectives of government contracting to provide for the economic development of local, small, and disadvantaged businesses can result in selection of lower quality firms or products. Source selection is often based on race, gender, or company size versus product quality or vendor past performance. It can also result in higher prices, or in purchases from a company that may not be in around when spare parts or technical assistance are needed.

4. Competition

Contracting regulations also tend to limit the number of firms willing to engage in competitive bidding. This indirectly reduces quality by limiting competition. For example, government regulations require firms to offer their "best customer price" to the government. However, many firms reserve the best price for their most favored customers. Most favored customer relationships originate from long term associations of mutual commitment and cooperation. In this example, the government demands to be treated as a best customer without being willing to behave as one. [Ref. 25:p. 5-4]

Additionally, delays in payment and litigation serve as an obstacle. The government demands the lowest price while frequently is the last customer to pay and the most likely to initiate litigation. Therefore, it is understandable why many firms that could supply better quality products at lower prices refuse to bid on government contracts. [Ref. 25:p. 4-4]

The government further reduces competition by insistence on far more information than the commercial sector:

The government generally requires more documentation, such as user and maintenance manuals and schematic drawing packages, than is normally produced with commercial products. Generating these documents is usually a distraction for the supplier, since people are diverted from their usual work activities to develop them. Additionally, they are reluctant to provide detailed technical data about their products for fear of revealing competitively advantageous information. Unless a firm is in business to produce technical documents, requesting them in addition to what is normally provided with a product in different form or format discourages vendors from selling their products to the government. [Ref. 25:pp. 5-3, 4]

There are several other factors which tend to reduce competition. The government frequently requires data rights with sufficient detail to enable it to competitively rebid subsequent contracts. A firm's refusal to engage in competitive bidding often reflects its concern over the potential loss of specialized techniques and processes (trade secrets). Many firms also consider the government's requirement to provide cost and pricing data for contracts exceeding \$500,000 as a requirement to reveal proprietary information [Ref. 25:p. 5-4]. This practice has no counterpart in the private sector. Finally, the large volume of paperwork involved in government contracting often discourages vendors from competitive bidding.

When the government acquires an item from a commercial supplier, the contract usually developed is enormously detailed and complex compared to commercial contracts for similar items. The government attempts to protect itself from all conceivable contingencies through the incorporation of multitudinous and voluminous contract clauses. These clauses, which are used to ensure that the government receives a quality product at a fair price, are often in direct conflict with standard commercial practices and the Uniform Commercial Code. [Ref. 25:p. 5-2]

In summary, limited profit, late payment, lack of commitment for future business, requests for proprietary information, and award of contracts based on criteria other than price and quality inhibit the number of suppliers willing to engage in competitive bidding.

B. INTEGRATED INFORMATION SYSTEMS

The Army inventory management system is characterized by information systems designed to meet the specific needs of the individual organization. SAMMS, CCSS, and SARSS do not interface internally or externally within their environment. Their inability to interface or lack of a centralized database leads to redundancies in procurement actions and severely impedes cycle time compression. The problem is compounded by the lack of EDI, MITLA, scanners, and related electronic devices that enable total asset visibility.

The services are making a significant effort to improve this deficiency. Joint Total Asset Visibility (JTAV) represents one such initiative. The objective of JTAV is to provide interoperability among current inventory systems. When fully implemented, JTAV will provide asset visibility "from the factory to the foxhole." The Army is the lead agency. LTC Blickley of DoD's J-4 staff indicates the intent of JTAVs is threefold:

- 1) JTAV will allow cross referencing of component assets and integrate/eliminate stovepipe systems. All services have agreed. Finance and other activities will also be incorporated.

- 2) JTAV will provide the user with visibility from the industry to the foxhole. The goal is to restore customer confidence and eliminate desert surplus.

- 3) JTAV will be limited by specific patterns of search, rules of transfers, and capability. The challenge lies in identifying the rules of the game. For example, if the CINC's own the Task Force operating in the Theater of Operations, who determines what activity has priority over the disposition of critical assets?

C. PREDICTABILITY OF DEMAND

Unlike the commercial sector, Army inventory requirements are driven by national security commitments. There is no forecasting model that can predict next year's demand for the military services. A wartime inventory model is completely different from that of a peacetime model. Foreign crises frequently flare up without warning. Each one results in a "Come as you are" situation. Many critical components used in Army weapons systems have lead times of beyond one year and cannot be significantly reduced. As a result, the Army must maintain stocks of items it may never use as insurance against the threat of a foreign crisis.

Additionally, military demand is generally more affected than demand in the private sector by external factors such as federal laws and regulations and political processes. Spending occurs through a complex budgeting process that reflects the numerous political choices of elected officials, public opinion, political interest groups, and contractors. These decisions directly impact the size of the force structure, procurement needs, life of current weapon systems, and related issues that effect inventories. An often repeated statement by Keven J. Grant, former manager of procurement, Arizona Department of Transportation is, "Politics and purchasing do not mix; but in government they have to." [Ref. 35:p. 763]

D. MONOPSONY

Acquisitions involving a monopsony serve as an inhibitor to implementation of JIT inventory management. A monopsony is an economic term that refers to a market where there exists only a single buyer. Monopsonies occur frequently for defense related items, since the exclusive use of state-of-art weapon systems provide the United States with a

competitive edge on the battlefield. In the case of a monopsony, implementation of JIT inventory systems is impractical. Frequent delivery of small lot sizes would leave a manufacturer's production line idle much of the time. Suppliers of a monopsony must produce in large lot sizes and then utilize their production resources to satisfy the needs of other customers.

While monopsony is unavoidable for weapons systems, it is not necessary for many secondary items such as spare parts, clothing, and medical supplies. However, government regulations sometimes drive secondary items into this situation, resulting in the government being the only buyer for an item. The following four cases pinpoint how this can happen:

1) The government's use of detailed specifications often limits the number of potential solutions to a stated need ... relative isolation of the writers of military specifications from users, buyers, and the marketplace. The result is a breakdown in understanding user requirements and what is available in the marketplace. [Ref. 25:p. 2-5]

2) In addition to the writers of specifications, "Acquisition personnel are not usually trained in how to conduct market research, surveys, and analyses" [Ref. 25:p. 2-6]. Consequently, they may be unaware of how to find potential solutions to a need without procuring a government unique item.

3) Government contracting sometimes functions on the exact manufacturing process to be followed, rather than on form, fit, and function. A commercial item with the same or better performance characteristics might be rejected because a specific process was not followed.

4) There is a cultural bias in DoD to favor new items over those available commercially:

DoD's propensity is to favor (issue) guidance for new developments while providing relatively little guidance for procuring existing items. With minimum guidance to government buyers and a natural inclination to believe one's own requirements are unique, the default *modus operandi* is to go for new development rather than take time to determine whether or not something already exists that could satisfy the requirement. [Ref. 25:p. 2-6]

E. PROXIMITY TO SUPPLIERS

In many cases, it is simply not possible for the users to be located within close proximity of the suppliers. United States international commitments require Army forces be deployed worldwide.

F. STOCK OUT COSTS

There is a high risk associated with the cost of a stock-out in the Army. Whereas the commercial sector measures the cost of a stock-out in terms of dollars, this is not the case for defense related items. The Army must be ready to respond to a crisis at a moment's notice, anywhere in the world. The cost of a stock-out is sometimes even measured in lives.

G. GOALS AND PERFORMANCE MEASURES

A crucial difference between government and the private sector stems from organizational goals. Government organizations often have multiple goals that are both vague and conflicting. The resulting goal ambiguity makes performance expectations difficult to specify. Equity and organizational effectiveness are the dominant concerns. To the contrary, goals in the private sector are typically clearer and performance measures are fixed for extended periods of time with efficiency a dominant concern.

As indicated in Chapter IV, military commanders assigned to operational units are rated on mission readiness. Their policies lean towards quick inspections and inflated demand requirements designed to achieve readiness at any cost. Consequently, retail and wholesale activities evaluate performance in terms of attaining *maximum operational readiness* of supported units. Generally, performance is measured in three ways: Supply Material Availability, Number of Backorders, and Average Customer Wait Time. These

performance measures conflict with the idea of efficiency, more commonly associated with commercial logistics practices.

H. LOCATION OF AUTHORITY

Army inventory management has both the characteristics of a centralized and decentralized organizational structure. For example, procurement of major weapons and integrated logistics support for these systems is highly centralized near the top of the organizational structure and subject to both the political and economic environments. Conversely, inventory management for all remaining items is shared between AMC and DLA and is highly decentralized. Inventory managers at these activities routinely coordinate for procurement of inventories based on delegations of authority issued to them. Thus implementation of commercial logistics practices remains inherently difficult.

I. PERSONNEL WITH HIGH TURNOVER

Personnel that order supplies and manage the inventories at the retail level are typically young, inexperienced, and characterized by a high turnover rate. Their performance reflects the command's emphasis on readiness and a lack of faith in the supply system. As such, they contribute greatly to the inefficiencies of the inventory management system. Typical examples are poor execution of request turn-in procedures, inadequate catalog/status/ reconciliation measures, and use of outdated technical manuals.

J. SUMMARY

This chapter discusses the major differences between the Army and the private sector regarding inventory management. It demonstrates there are numerous differences that frequently preclude the use of commercial logistics practices.

VIII. IMPACT OF TRAINING IN COMMERCIAL LOGISTICS PRACTICES UPON ARMY EXCESS INVENTORY

A. INTRODUCTION

The chapter examines the implication of training in commercial logistics practices to determine if such training would reduce excess inventories. It begins with a definition of training followed by an examination of the effect of training on organizational culture and concludes with an analysis of the existence of a relationship between training and excess inventories.

B. DEFINITION

Psychologists use varying definitions of training. Goldstein refers to training as the systematic acquisition of attitudes, concepts, knowledge, roles, or skills that result in the improved performance of work [Ref. 36:p.175]. Henry Mintzberg refers to training and behavior formalization synonymously with achieving standardization. According to Mintzberg, training is the use of formalized instructional programs designed to establish and standardize in people the requisite skills and abilities for particular jobs in organizations. Behavior formalization is the system of rules, job descriptions, regulations, and evaluations imposed by the manager to control and evaluate performance. Combining the two provides a level of standardization that guide behavior toward desired outcomes [Ref.28:p.335]. On-the-job training, (OJT), formal training programs, team building, and career development are common forms of training.

C. EFFECT OF TRAINING ON CULTURE

Generally, most organizations train and develop their employees to increase the efficiency of human resources and achieve a competitive advantage. However, training can further be used as a method to achieve cultural change. Deal and Kennedy include training as one of the 7 key ingredients to bring about successful change in values, norms, and behavior [Ref. 38:p.175]. Their research indicates transition training enables people to shift from one culture to another.

Michael B. McCaskey's article, "Framework for Analyzing Workgroups" reveals that an organization's culture is closely related to the outcomes produced by the people. However, he emphasizes culture is beyond the *direct control* of the manager [Ref. 37:p.1-14]. According to McCaskey, culture represents the combined effect of three organizational design factors: the people assigned within the organization, the tasks the people are required to perform, and the formal organizational structure and rules by which these people operate. The design factors represent internal elements controlled by the manager and are shaped by other forces referred to as contextual factors. Contextual factors are forces which determine how the organization evolves and operates. McCaskey asserts that the organization's history and traditions, economic clout, physical setting within the environment, state of the economy, level of politics, consumer attitudes, and actions of competitors are contextual factors that contribute to organizational design. Contextual factors are beyond the realm of the organization to control. They embody the organizations sense of purpose and its interaction with the environment.

Managers arrange the design factors to achieve maximum efficiency for the organization. Their success is directly related to their degree of control over these factors. Design changes may result in higher or lower productivity, increased or decreased levels of employee satisfaction, and a mixture of emotions that result from participation in the group. Design changes may be either positively reinforcing to strengthen behavior or negatively reinforcing resulting in further changes in the design factors.

The McCaskey model of organization behavior represents a dynamic system whereby a change in any part of the model can lead to changes throughout the entire process. The patterns of behavior, norms, and roles that emerge from people and their interaction with this process represent the group culture. Research psychologists have recently expanded the McCaskey model by incorporating two additional design factors. These two factors are the level of technology and process/systems. The complete model is shown graphically. Figure 8-1.

D. RELATIONSHIP BETWEEN TRAINING AND CAUSES OF EXCESS

The following paragraphs examine the causes of excess inventories identified in Chapter III and classifies them in accordance with McCaskey's model. The objective is to identify the existence of any relationship between training and the causes of excess inventories.

MCCASKEY'S MODEL

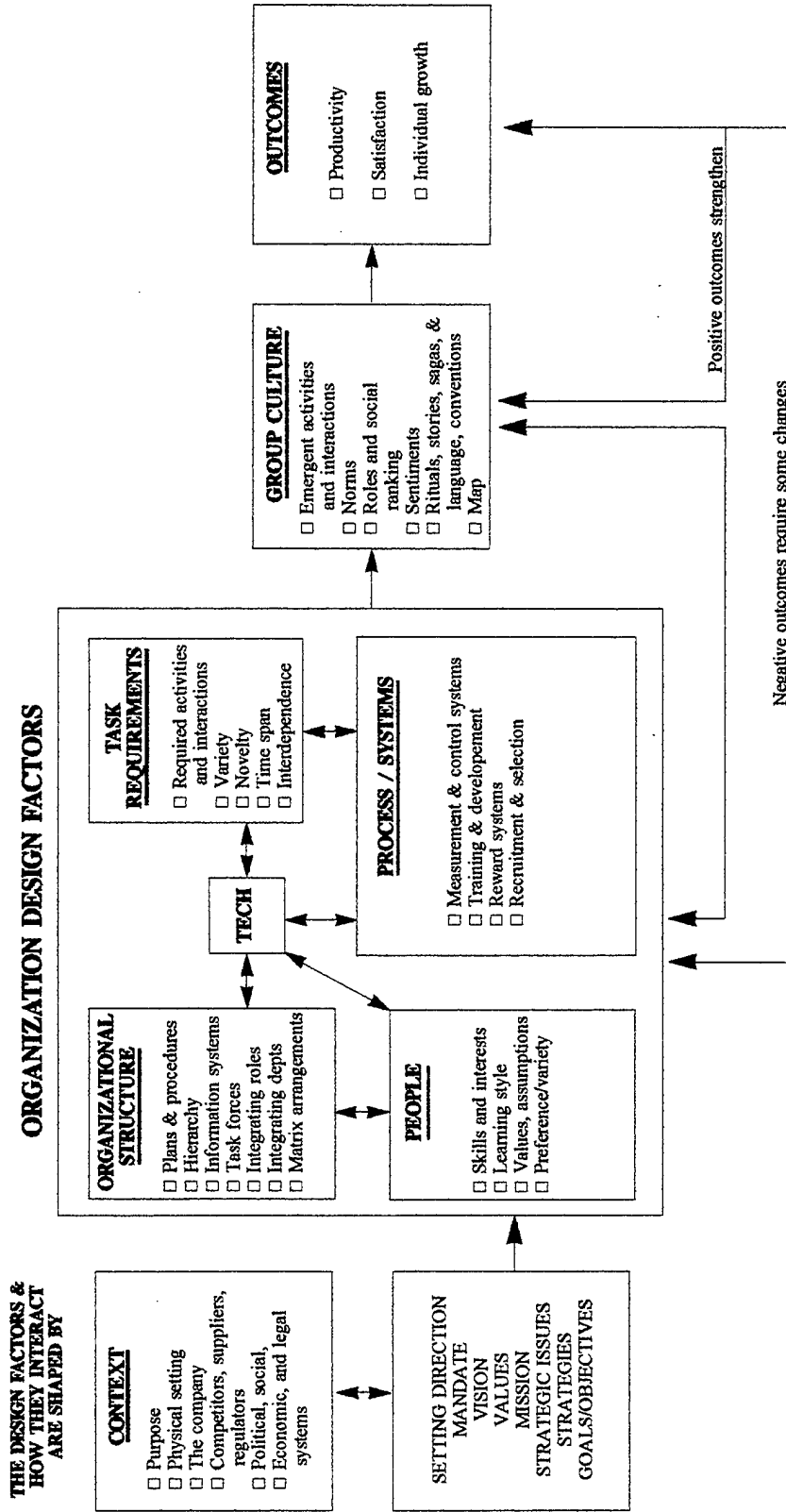


Figure 8-1 Revised McCaskey Model for Analyzing Work Groups, After Ref. [39].

1. Changes to the Requirements Objective

Changes to the Requirements Objectives (RO) result from a change in demand or any of the elements comprising the requirements stack. Sources of these problems are both contextual and design. Contextual sources are commonly political, economic, and social. Examples might include decisions regarding: the elimination of obsolete weapon systems; reliability improvements; changes in operational use; and reductions in repair cycle time, leadtimes, and war reserve requirements. Design sources reflect lack of training and ineffective controls at the wholesale level. Examples might include: the use of outdated technical manuals, poor preventive maintenance procedures, inadequate catalog, unit status, or reconciliation measures, and poor execution of request for turn-in procedures. Limited basic procedural training at the retail and customer levels could help to reduce some of the latter problems.

2. Lack of Asset Visibility

Lack of asset visibility results from the use of non-integrated information systems tailored to meet the specific needs of the using organization. Lack of integration leads to redundancy in procurement actions and a lack of confidence in the supply system.

The lack of asset visibility is a contextual problem that occurs from the decentralized nature of the DoD organizational structure, a political environment that fosters competition for scarce resources, and traditional relationships between the activities. The rapid pace of technology development and limited availability of funding tend to compound the problem. Training would not improve this issue. However, DoD has undertaken a number of other initiatives to resolve this problem.

Joint Total Asset Visibility (JTAV) and the Global Combat Support System (GCSS) represent two initiatives to provide asset visibility. The idea behind the Global Combat Support System (GCSS) is to place all activities on the Internet to provide a common operating environment. GCSS would enable asset visibility and enable exchange of assets. As with JTAVs, similar questions arise concerning transfer authority and payment.

3. Lack of Confidence

Lack of confidence within the supply system is created by a command environment which emphasizes readiness at any cost. Activities may submit multiple requisitions for the same requirement and hoard supplies. The problem is contextual in nature. The Army's sense of purpose, the legal issues relating to contracting regulations, the lack of asset visibility, the political environment, and the decentralized nature of the DoD procurement system contribute to this problem. Training would not improve this issue. However, the Army has undertaken a number of initiatives to resolve this problem.

Velocity Management represents the combined initiative of the Army, Deputy Chief of Staff for Logistics, AMC, and the Combined Arms Support Command to restore confidence within the supply system. The purpose of Velocity Management is to reengineer the logistics processes to speed the flow of material within the U.S. and overseas locations. Process improvements will focus on order processing, distribution, repair cycle time, inventory stock age levels, and financial procedures. The objective is to reduce order cycle time from 26 to 3 days. Additionally, both AMC and DLA are implementing similar measures to reduce lead times.

4. Force Modernization

The competitive environment is different for procurement of major weapons systems and certain military commodities versus that in the commercial sector. The problem is contextual in nature. Most often, the Army represents a monopsony in acquisitions regarding state of the art, major weapon systems and related defense commodities. However, its power is often limited by the size of the industrial base and the inherent risk associated with development of weapon systems. Political, economic, and legal processes further impact the procurement process. The government is often forced to accept the contractor's interim support list and estimates on reliability. Training would not improve this issue.

5. Base Realignment and Closure

Base consolidations and closings create excess by reducing demand and identifying property not on the accountable records. Generally, Base Realignment and Closure (BRAC) committee decisions are a contextual problem. It represents decisions made by the political community and the economic environment in which the Army operates. Training would not improve this issue. However, the implementation of controls to insure the accountability of inventories at the distribution points could help to reduce somewhat the incidence of unaccountable stock.

6. Support of Allies

DoD's requirement to support Allies through Security Assistance Programs (SAP) results in the retention of unnecessary items or obsolete equipment. The problem is contextual in nature. Retention of these items is necessary to support both regional

commitments and the many different configurations of weapons systems sold to various countries. The Allies often cannot afford to procure all the spare parts required to support the system. They rely on the United States for support, which in many cases may be the sole source. United States support of SAPs and regional commitments are political issues decided between the executive and legislative branches. They are necessary to support foreign policy objectives and represent political reality. Training would not improve this issue.

7. Demilitarization

The increased number of regional commitments have placed a heavy emphasis on readiness and training. Faced with scarce resources, activities simply do not have the funds for demilitarization of obsolete equipment. Demilitarization places an unnecessary burden on unit Operations and Maintenance (O & M) funds. This problem is contextual in nature and reflects both the political and economic environments. Training would not improve this issue.

8. Item Manager Incentives

Supervisors at wholesale activities measure item manager performance by monthly review of activity reports reflecting supply material availability, the number of back orders, and the average customer wait time. The problem is a design problem resulting from the incentives of the formal organization. These measures promote readiness and reflect traditional values of organizational effectiveness. Item managers perceive that the worst thing they can do is to run out of stock. There is little incentive for efficiency. Training would not improve this issue.

In 1995, DLA began charging for both covered and open storage space at the distribution activities. This measure has the potential to reduce excess inventories by making it much more expensive to retain inventories.

9. Increased Life Cycles

The increased life cycles of certain weapon systems have forced item managers to retain items for which there exists no demand history. The problem is contextual in nature. Longer life cycles reflect the impact of the economic and political environments. Item managers are simply forced to retain excess material to support the extended life of these systems. Training would not improve this issue.

10. Economic and Environmental Factors

Warehouses that hold portions of the national stockpile cannot sell or dispose of stored items. The problem is contextual in nature. Retention of national stockpiles are a matter of public law. The sale of large quantities of certain commodities on the open market would have an adverse impact on commodity prices or could even be prohibited through environmental law. Consequently, the Army maintains its current stocks of these commodities. Training would not improve this issue.

11. Ineffective Manager Controls

The recent report indicating item managers are prematurely and unnecessarily ordering wholesale inventories is both a contextual and a design problem. Decreases in the RO may result in a requirement to cancel procurements in process. However, it may not be possible or economical to do so. Training would not improve this issue.

Additionally, current incentives reward behavior that support supply material availability. Changing the incentives, refresher training on basic procedures, and implementation of control systems to monitor performance would be highly beneficial in resolving the latter problem.

E. CONCLUSIONS

The following table summarizes the results of comparing McCaskey's model with the causes of excess inventories.

CAUSE	FACTOR/SOURCE OF PROBLEM	WOULD TRAINING HELP?	IF SO,TYPE OF TRAINING
CHANGES TO THE RO	BOTH CONTEXTUAL AND DESIGN/ POLITICAL, ECONOMIC, SOCIAL, & LEGAL	YES	BASIC SYSTEMS & PROCEDURES
LACK OF ASSET VISIBILITY	CONTEXTUAL/DoD STRUCTURAL, POLITICAL, & TRADITIONAL RELATIONSHIPS	NO	N/A
LACK OF CONFIDENCE	CONTEXTUAL/PURPOSE, POLITICAL, LEGAL & DoD STRUCTURAL	NO	N/A
FORCE MODERNIZATION	CONTEXTUAL/POLITICAL, ECONOMIC, & LEGAL	NO	N/A
CLOSURES	CONTEXTUAL/POLITICAL LEGAL	NO	N/A
SUPPORT OF ALLIES	CONTEXTUAL/POLITICAL & LEGAL	NO	N/A
DEMILITARIZATION	CONTEXTUAL/POLITICAL & LEGAL	NO	N/A
IM INCENTIVES	DESIGN/CONTROL & MEASUREMENT SYSTEMS & REWARDS	NO	N/A
INCREASED LIFE CYCLES	CONTEXTUAL/POLITICAL & ECONOMIC	NO	N/A
ECONOMIC AND ENVIRON	CONTEXTUAL/POLITICAL, ECONOMIC, & LEGAL	NO	N/A
MANAGER CONTROLS	DESIGN/CONTROL & MEASUREMENT SYSTEMS	YES	BASIC SYSTEMS & PROCEDURES

Table 8-1. Causes of Excess and Potential Impact of Increased Training

F. SUMMARY

Training represents the use of formalized instructional programs that establish and standardize in people the requisite skills and abilities for particular jobs in organizations. Organizations train their people to increase the efficiency of human resources and achieve a competitive advantage. Transition training can further be used as a method to achieve change in values, norms, and behavior. Both organizational culture and outcomes are closely related. Managers work through 5 design factors that are shaped by contextual factors to influence culture. Their degree of success is directly related to the degree of control. In almost every case, the causes of Army excess inventories are contextual factors and beyond organizational control. Training would not resolve these issues. However, increased training could help to reduce the frequency of errors at the retail level caused by the use of outdated technical manuals, poor preventive maintenance procedures, inadequate catalog, unit status, or reconciliation measures, and poor execution of request for turn-in procedures. Training could also help in the implementation of new control measures to monitor item manager performance. Additionally, the implementation of controls to insure the accountability of inventories at the distribution points could help to reduce the incidence of unaccountable stock. Finally, the Army has implemented a number of initiatives such as JTAVS and GCSS to improve the inventory management system.

IX. CONCLUSIONS AND RECOMMENDATIONS

This chapter draws conclusions and recommendations from the previous chapters as to the impact of training in commercial logistics practices to improve inventory management of secondary items in the Army. This chapter is divided into two sections. The first section provides the author's conclusions, while the second section provides the author's recommendations.

A. CONCLUSIONS

Training in commercial logistics practices would not improve inventory management of secondary items within the Army. There are a number of reasons why:

1. Current Training Meets the Intended Objective

Generally, the causes of excess inventory are unrelated to training. Inventory managers participate in formal training programs that provide the necessary skills and abilities to achieve the desired performance. There are just two areas where training might prove beneficial. Additional training at the retail level could help reduce the frequency of errors caused by the use of outdated manuals; poor preventive maintenance procedures; inadequate catalog, unit status, or reconciliation measures; and poor turn-in procedures. Additional training could also help supervisors better regulate item manager performance.

2. Current Incentives Promote Effectiveness

Performance measures tend to promote high levels of inventory and reflect the traditional emphasis on maximum organizational effectiveness. DoD's objective has been to maintain combat readiness. It was not designed to be efficient.

3. Training is Unrelated to the Causes of Excess Inventory

Generally, the causes of excess inventories are unrelated to training. These excess inventories result from external influences relating to the political, social, economic, and legal environment in which the Army Supply System operates. These external influences are called contextual factors. Contextual factors are beyond the control of the organization. Consequently, training in commercial logistics practices is of little significance.

4. Training Alone Cannot Change Culture

Organization culture arises from the interaction of five design factors. These design factors are people, tasks, formal structure, level of technology, and process/systems. The design factors and how they interact are shaped by the contextual factors. Managers work through these design factors to influence culture. The managers ability to influence culture is directly related to his/her ability to exert control over the design factors. Training alone cannot achieve the desired results.

5. Commercial Practices are Inappropriate for Use in the Army

There are numerous differences between the Army and the private sector. Differences involving predictability of demand, purchasing procedures, competitive environment, level of automation, geographic dispersion, and stock out costs preclude implementation of commercial logistics practices. Many of these factors are not changeable from within the organization.

B. RECOMMENDATIONS

1. Joint Total Asset Visibility and Global Combat Support Systems

DoD should continue with its current initiatives to provide total asset visibility throughout the DoD supply system. Systems such as the JTAVs and GCSS are essential to restoring customer confidence and improving inventory management efficiency. DoD should also develop associated accounting support systems and doctrine.

2. Measures of Performance

DoD should revise the current measures of inventory manager performance to reflect methods that reduce the emphasis on material availability. Supply material availability attributes to high inventory levels and leads to ambiguity of objectives.

3. Performance Appraisal System

DoD should revise the current performance appraisal system. The Total Army Personnel Evaluation System (TAPES) used for evaluating civil service employee performance leads to inflated appraisals that tend to normalize inventory managers among peers. Federal hiring regulations further make it difficult to remove poor performers. DoD should realign the system to be more rational and train supervisors how to use the evaluation system.

4. New Weapon System Procurement

DoD should shift some of the inventory burden to the contractor. DoD should establish a system similar to the Air Force that requires contractors to assume responsibility for spare parts procurement for the first five years of a new weapons system's life cycle.

5. Authority, Procedures, and Policies for Inventory Management

DoD should centralize authority for inventory management and standardize definitions, procedures, and policies. DLA and each of the service components have different definitions, procedures, and policies for inventory management.

6. Coordination Between Program Managers and Wholesale Activities

DoD should emphasize the importance of better coordination between the weapons systems program manager and wholesale activities in current training programs. It is extremely important that program managers keep the item managers informed of design changes that might affect current procurements. These changes must be identified within sufficient time to allow adjustments and avoid excess inventory.

7. Inventory Accounting

DoD should establish standardized procedures that require activities to conduct periodic inventories. DoD should then hold the accountable officers responsible to insure these inventories are completed.

8. National Stockpiles

DoD should conduct a comprehensive review of assets and disposition alternatives for material stored in the National Stockpiles. National Stockpiles were created years ago to ensure sufficiency during wartime, yet many of these items are no longer required.

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APPENDIX A. PRINCIPAL CAUSES OF EXCESS INVENTORIES

CAUSE	EXPLANATION	EXAMPLES
<p>Changes to Requirements Objective (RO)</p>	<p>The predominant cause of excess which encompasses the complete forecast for material and supplies. Forecasting methods at the ICP's may vary however, in general use variations of both the weighted moving average/exponential smoothing and economic order quantity models to determine a forecast of demand. Variability in the procurement cycle is reduced by consideration of other factors designed to compensate for safety, repair cycle, administrative lead times, production lead times, war reserves, and contingency & economic retention points. The result is called the requirements stack (series of all the procurable elements of inventory) which leads to the Requirements Objective or RO. Inventory levels exceeding the RO are considered excess or as DLA calls it, <i>"Material for Potential Reutilization."</i></p>	<p>1) At the retail level, causes encompass a wide range of activities resulting from outdated technical manuals, poor preventive maintenance procedures, faulty quality assurance, poor execution of request turn-in procedures, inadequate catalog/status/ reconciliation measures, training, and more. The following examples are provided.</p> <p>(A) Failure of the unit to turn-in items in a timely manner causes the system to replenish unnecessarily.</p> <p>(B) When units order the wrong part, it later becomes excess.</p> <p>(C) Poor Prescribed Load List (PLL) management by the PLL clerk.</p> <p>(D) Improper ULL's processing (e.g. failure to update the catalogue, not receiving or updating daily status, failure to pick up parts routinely and processing their receipt).</p> <p>(E) Lack of quality assurance checks. The system allows PLL clerks to initiate multiple requests against open/due-in and/or unauthorized parts.</p> <p>(F) Unserviceable parts returned to the vendor may result in the ordering of new parts. The parts may later be determined serviceable and the new items then become excess.</p> <p>(G) Limited capacities at the DS/GS repair levels can result in the item being procured from the wholesale activity versus repair.</p> <p>(H) Restrictive measures on the number of items authorized for turn-in may cause other units in need of the part to requisition new items.</p> <p>(I) Units order repair parts based on anticipated need versus demand history. Funds are the opportunity to get well on current maintenance problems.</p> <p>(J) After requests are passed to the wholesale activity as a dedicated due-in/due-out, there is no method to permit a turn-in to be issued against that requirement and a cancellation of the original requisition to be submitted. Consequently, the item may be on-hand but unissuable.</p> <p>(K) Inaccurate stock location data files.</p> <p>(L) Failure to properly reconcile the monthly reconciliation report provided by the Direct Support Unit. Many units do not work the report in a timely manner, if at all. When they don't work the report, they do not know what is being received, released for issue, or still open, so they may be ordering parts already on order. If a substitute item shows up on the report, they order the part again, thinking it was an error, without checking the AMDF.</p> <p>(M) Requisitions are placed in the system for anticipated requirements (e.g. training, deployments) that don't materialize. Items may be later turned in as excess.</p>

CAUSE	EXPLANATION	EXAMPLES
<p>Changes to Requirements Objective (RO) (cont)</p>		<p>(N) Expiration of shelf life of an item prior to issue causes the item to be re-ordered and the old items now become excess.</p> <p>(O) Off-line requisitions are too easily accessible at the lower levels of supply. Automated requisitions are being processed through normal channels while the same is being ordered through off-line channels (e.g. local purchase, high priority call-ins, manual; walk-through).</p> <p>(P) At the end of each FY, it is a normal practice to hold requisitions due to resource constraints. The increase in the order ship time (OST) will cause stockage levels to increase. This will result in the expenditure of funds to fill the RO. When OST returns to normal, the RO drops and the items become excess.</p> <p>2) Changes in retail demand; any of the factors relating to safety, repair cycle, administrative lead times, production lead times, war reserves, and contingency & economic retention points; and to the National Military Strategy can effect inventory levels. Cancellation of procurements may not be economical or possible.</p>
<p>Lack of Asset Visibility</p>	<p>Refers to the inability to see inventory assets either laterally (across military components e.g. DLA, NAVICP, AMC) or vertically (from the depot/distribution activity to the user level). Created by stovepipe systems which are tailored meet the specific needs of the individual users. There is a black hole between the ASL and PLL. These systems do not interface. They don't use common data elements. The lack of asset visibility limits the ability to match assets with requirements. Leads to a large number of multiple use items/redundancy in procurement actions.</p>	<p>1) Many DLA weapon system support items are multiple use. -Army 43% -Navy 21% -Air Force 34% -Marine Corps 73%</p> <p>Without knowing the total assets and requirements, the ability of DLA to provide timely weapon system support in a crisis is at risk. Redundancy occurs. For example, filters needed to support one component may be sitting in another components warehouse. However, new filters will be procured to support the requirement. DLA cannot see the filters are sitting on the shelf within the other activity.</p> <p>2) 69 Modular radio transmitters owned by the Army and stored at Warner Robbins AFB valued at approximately \$14,000. The Air Force had made no attempts to get disposition authority from the Army.</p> <p>3) Inhibits the ability to match excess inventories previously sold to DRMO with current requirements. For example, wiring harnesses previously sold to DRMO may later be required due the extended life of systems.</p> <p>4) Loss of accountability of in transit assets at all levels. For example, in the Army, assets (turn-ins and receipts) are processed and become redistributable daily. At this point visibility and accountability are lost. Items on hand are dropped from the DS/SARRS ABF files for turn-in to the next higher level and due-ins are not established at that level. Another request may be received which causes either a passing action or replenishment requisition. A unit ordering a part or an authorized stockage list (ASL) replenishment document will not have the opportunity to capture an issue from an in transit asset. Requisitions in turn go the wholesale activity and new parts are procured. When the in transit parts are received, they become excess to the needs of the division or installation.</p>

CAUSE	EXPLANATION	EXAMPLES
<p>Lack of customer confidence</p>	<p>Caused by undue Command influence stemming from a philosophy of "Readiness At Any Cost." The emphasis at the unit level is on readiness. The "Firstest With The Mostest" is the winner concept. Individual Commanders are rated on readiness, so their policies lean toward quick inspections and inflated demand. Customers do not trust the system to provide what they need. Material availability plays a significant role in readiness capability. Procurement specialists may over-order and hoard supplies (just in case inventories). The result is bottlenecks, procurement delays, and new excess material.</p> <p>Additionally, the current system of credits for turn-in of repairables at the retail level serves as a disincentive. Many items do not receive full credit. The users incentive is to retain the item.</p>	<p>1) Order three to insure one. During Operation Desert Storm, lessons learned indicate the 24th Infantry Division was provided three weeks notice prior to deployment of the first combat units. The emphasis on material availability resulted in procurement specialists placing orders two and three times to insure receipt of the item. The resulting strain on the supply system was sufficiently great to severely impede the ability to support later deploying units. The problem was compounded as other units repeated the process. By the time the system was able to recover, over 40,00 Sea land Containers were delivered to Saudi Arabia. Only about half of these containers were ever opened.</p> <p>2) Generally, users have a low opinion of and little confidence in the logistics system. Therefore, they plan on self sufficiency.</p> <p>1) In some cases, it may be more advantageous for retail procurement specialists to hide material versus turning items in for credit. Why turn an item in and receive 80% credit when you know you will be ordering it again in the near future.</p>
<p>Force Modernization, Product Modification, and Life of Type Buys.</p>	<p>During initial procurements, sometimes the contractor makes the wrong guess on the number of lines to support system. MTBF may vary from the estimates. The contractors incentive is to maximize the Interim Support List (ISL). The greater the number of lines on the contractors ISL, the greater the profit.</p> <p>Design instability of new weapons systems may result in product modifications. Modifications may render the initial spares obsolete.</p> <p>Life of Type Buys refer to the procurement of all the spares necessary to support the weapons systems during its projected life cycle. The goal is to ensure DOD's capability to maintain support for the system long after the contractor production facilities have shut down. Many of these spares may never be used.</p>	<p>1) The first two years of a new weapon system are basically an engineers best guess. The defense contractor for the B-2 bomber recommended 6,000 line items to support the initial procurement of spares for the aircraft. Of these 6,000 items on the contractors ISL, only 400 have been used to date.</p> <p>2) 13 modernization kits for the P-3C aircraft valued at \$4,480 each and stored at the Fleet Industrial Supply Center, Norfolk, Virginia have been in storage since 1978.</p> <p>3) There are 7 obsolete clutch assemblies previously used on the M125 10 ton Prime Mover and valued at \$5,334 stored at the Defense Supply Depot, New Cumberland, Pennsylvania</p> <p>4) Results in an attitude that if you can't buy it back cheaply, don't dispose of it. There's a lot of private junkyards that will be happy to sell it back to.</p> <p>5) Aircraft vanes and blades can be repaired for a while. However, when they finally need replacement, there's no demand in the system.</p> <p>6) DLA's goal is an 85% supply material variability rate for major weapons systems support.</p>

CAUSE	EXPLANATION	EXAMPLES
<p>BRAC consolidation & closings</p>	<p>Research indicates consolidation and closings always identify inventory not on the accountable records. Therefore, inventories may exceed the Requirements Objective. Items at a BRAC'd base stratify to excess after 2 years.</p> <p>Loss of trained IM personnel.</p>	<p>1) DLA closings at Memphis, Utah, & Columbus resulted in excess.</p> <p>2) Letterkeny states the lack of people/ manpower has pre-empted their ability to conduct a full inventory since 1986. <i>"We'll find a lot of inventory we didn't know we had when we close down."</i></p> <p>1) At the US Army, Training and Doctrine Command installations, the drawdown resulted in a number of inexperienced item managers taking the exit bonus and leaving the federal workforce. New/inexperienced item managers (GS-5) entered the workforce. Training is dependant on funding and priorities. Still further, DLA indicates they have received no interns within the last 5 years. About 2/3's of their workforce will retire within the next ten years.</p> <p>2) At the Defense General Supply Center, Richmond, the number of lines item managers manage doubled, while the number of managers declined.</p>
<p>Support of Allies</p>	<p>DOD's requirement to support Allies (Foreign Military Sales or FMS) results in the retention of unnecessary or obsolete equipment. Wholesale activities must be able to support requisitions for FMS spares NLT 330 days after submission.</p>	<p>1) The Army began replacing the Commercial Utility Tactical Vehicles (CUTV) with High Utility Mobile Vehicles (HUMMV) during the early 90's. CUTV's were turned in (on a one for one basis) to the supply system as the vehicles were fielded. These vehicles currently are sitting at the Defense Depot Distribution Center, Letterkenny, Chambersburg, Pennsylvania in anticipation of future FMS contracts.</p> <p>2) Approximately 100 short barrel, towed, 105mm howitzers left over from the Vietnam War await disposition at the Defense Depot Distribution Center, Letterkenny, Chambersburg, Pennsylvania in anticipation of future FMS contracts.</p> <p>3) FMS sales of Patriot Missile Batteries requires DoD to maintain 5 variations (w/supporting spares) of the equipment.</p> <p>4) South Korea makes 155mm howitzer ammunition which they sell to foreign countries. However, their support for internal defense of the country comes from the US. Their soldiers defend over 3/4's of the line separating the North from the South.</p> <p>5) G-Grant: Refers to the concept of giving inventory away to Allies that cannot afford to pay. For example, the recent fielding of obsolete aircraft to Jordan. The US will retain a certain amount of spare part inventories to support future requirements for these aircraft.</p> <p>6) There are 2 electric pumps costing \$45,000 each for destroyer class ships no longer in service retained at the Fleet Industrial Supply Center, Norfolk, Virginia.</p> <p>7) There are 3 obsolete equalizers assemblies costing approximately \$75,000 for the F4 aircraft reconnaissance system retained at the Warner Robbins Air Logistics Center, Warner Robbins Air Force Base, Georgia.</p>

CAUSE	EXPLANATION	EXAMPLES
Decreasing dollars	Units tend to focus on readiness and training issues. Dollars for demilitarization and to repair excess take a backseat. Can also tend to prolong the life of programs (by extending procurement time and delaying replacement). Units may attempt to hold on to items indefinitely to seek alternative uses.	<p>1) There are 65 housings for air cylinders used on an electric generating unit retained at the Defense Construction Supply Center, Columbus, Ohio.</p> <p>2) There are 3,032 riot control dispersers (condition code f) retained the Defense Distribution Depot, Letterkenny, Pennsylvania. The cost for storage is estimated at \$13,390 annually.</p> <p>3) 4 large, obsolete distillation units costing \$72,140 each previously used to distill water on Navy ships have been stored at the Fleet Industrial Supply Center, Norfolk, Virginia since 1968.</p>
Contracting Regulations	<p>Selection based on Competition in Contracting Act (CICA). May not be the best source. Contractors ability to deliver may be stretched, leading to delays.</p> <p>Requirement to use UNICOR (Federal Prison Industries). Procurement lead time (PLT) is long and they dictate PLT versus the customer. UNICOR is in a very embryonic stage of DVD.</p> <p>Focus on competition goals versus best source (DLA is 33%).</p> <p>The 60/40 Rule refers to a Congressional mandate that says no more than 40% of military activity functions may be contracted out. The reason is Political leaders do not want to give up the military installations which provide jobs for their districts.</p>	<p>1) For the procurement of wire and cable harnesses, DLA is required to use UNICOR. However, UNICOR will not maintain stock to support Just In Time inventory management or long term contracting. UNICOR always requires a minimum lead time of 282 days.</p> <p>2) Long term contracting saves money by reducing inventory and avoiding quarterly contract negotiations. However, the small business community is concerned about exclusion.</p>
IM Incentives	Item managers say, <i>"The worst thing that can happen to an inventory manager is to run out of stock."</i> Supervisors look at monthly activity reports reflecting material availability, number of back orders, and supply response time. Primary focus is on material availability.	<p>1) Item Managers are graded on reducing stock and maintaining stock availability. These two are in conflict.</p> <p>2) What is the goal? Reduce stock = Drop inventory Support Customers = Keep inventory</p> <p>3) If stock availability is counted by the percent of requisitions filled, the depots will fill lots of little orders and delay big orders.</p>
Life Cycles	Longer life cycles of weapon systems have forced item managers to retain excess items for which there has been no demand history.	1) C-141 wing boxes. No one ever expected the C-141 to be in service past 20 years. Therefore, items for which there has been no demand history and were considered excess are now required for the aircraft.

CAUSE	EXPLANATION	EXAMPLES
Economic and Environmental Issues	Certain items can have an adverse impact on the environment or economy.	1) The Defense Distribution Center, Letterkenny, Pennsylvania retains stockpiles of various ores (e.g. asbestos, lead, nickel, TALC, and zinc) which have not been disposed of. There are both environmental and economic issues to be addressed. For example, sales on the open market would have an adverse impact on the market price. The Depot has approximately 137,967.9 tons of the material occupying some 1.1 million square feet of open storage space.
Ineffective DOD Item Manager Controls	DOD Item Managers sometimes prematurely and unnecessarily purchase wholesale inventory of consumable items and do not always make the most prudent decisions. Controls should focus on: verification of requisition demand coding, analysis and evaluation of demand trends, development of acquisition lead times for consumables, and improvement of controls over reevaluating purchase decisions	1) A DoD Inspector General report dated 9 November 95 indicates ICP's were prematurely and unnecessarily ordering wholesale inventories of consumable items. The reports states the conditions occurred because management controls were ineffective and did not ensure that inventory managers always made the most prudent decisions. The report concluded that of the \$1.06 billion of consumable items that ICP's were in the process of ordering (contracts not yet awarded in April 1994), consumable material valued at \$126.6 million (11.9 percent) exceeded current requirements. Of this amount, approximately \$88.9 million was premature and \$37.7 million was unnecessary. Therefore, the avoidable cost associated with carrying the inventory was placed at \$59.6 million.
AMC/DLA ALT/PLT Leadtime Reduction Efforts	As wholesale activities reduce the administrative and procurement leadtimes through improved efficiency, the quantity of safety inventories required to reduce variability decreases. Failure to adjust the mathematical models for the CCSS and SAMMS would result in excess inventories. The average cycle time for the Army procurement cycle is 23 days. The Army is implementing a number of initiatives to reduce cycle time to 3 days.	1) DLA and AMC reductions in ALT/PLT have resulted in procurements exceeding the RO.

APPENDIX B. SUMMARY INTERVIEW QUESTIONS

1. Activity overview (mission and subordinate activities)?
2. Organization structure and number of personnel employed?
3. Activity sources of funding?
4. The role your activity plays in managing secondary items?
5. Customer base (wholesale and retail)?
6. Who maintains the inventories, where are they maintained, and how is the information tracked (include level of automation and management information systems)?
7. How are procurement decisions made (by whom, how often, quantities, and EOQ models)?
8. How frequently do you review demand history and adjust inventory levels?
9. What are the measures of performance used for inventory management of secondary items? (fill rates, inventory turnover, range and depth, and other indicators).
10. How do you determine what inventory is excess (e.g. low demand rates)?
11. What is the current value of excess inventory?
12. What are some of the current on-going initiatives to reduce the levels of inventory and cycle time?
13. What kind of training do inventory managers receive (curriculum, duration, frequency, location, attendance, refresher courses)?
14. What kind of performance would place an inventory manager on the fast track for promotion?
15. What kind of performance would place an inventory manager's job in jeopardy?

APPENDIX C. ACTIVITIES VISITED

ACTIVITY	LOCATION	DESCRIPTION	CONTACTS	TITLE	DSN PREFIX	COMMERCIAL
DEPARTMENT OF DEFENSE, OFFICE OF THE J4	PENTAGON, WASHINGTON DC	LOGISTICS PLANNING	LTGEN JOHN CUSICK	J4	227	AC 703, 697-4121
			DIANA CLARK	J4 SECRETARY	227	AC 703, 697-4121
			LTC BLICKLEY	J4 STAFF	227	AC 703, 695-2308
			CDR BEN VIELLEUX	J4 STAFF	227	AC 703, 695-2308
			LTC ANDY RANGLES	J4 STAFF	227	AC 703, 695-2308
LETTERKENNY DEFENSE DEPOT	CHAMBERSBURG, PA	US ARMY/AMC DISTRIBUTION ACTIVITY	LTC STEPHEN WHEELER	COMMANDER	570	AC 717, 267-5101
			RON SNYDER	ADMIN SUPPORT	570	AC 717, 267-5192
DEFENSE GENERAL SUPPLY CENTER	RICHMOND, VA	DLA ICP AND DISTRIBUTION ACTIVITY	IRENE LACKEY	COMMANDERS SECRETARY	695	AC 804, 279-5862
			BARBARA PATTERSON	MANAGER PRODUCT CTR II	695	AC 804, 279-5364
			LISA OAKLEY	SUPPLY SYS ANALYST	695	AC 804, 279-5831
			DON LOVE	SYSTEMS & PROCEDURES	695	AC 804, 279-5363
			CDR STEVEN WAITE	WEAPONS SYSTEMS	695	AC 804, 279-4835
			JULIE JACOBS	EXCESS MGT	695	AC 804, 279-3155
			TIM MOOREFIELD	FINANCE	695	AC 804, 279-3695
			MAUREEN MOORE	FINANCE	695	AC 804, 279-3206
			JIM STANSBURY	TM LDR, CORPORATE CONTRACTS	695	AC 804, 279-3819
			VICKI NIXON	ITEM MANAGER	695	
TRADOC	FT MONROE, VA	ARMY TRAINING AND DOCTRINE COMMAND	KATHERINE TULLY	SUPPLY POLICY, DOL	680	5163
			JIM FREEMAN	DOL	680	
			TOM DEHAVEN	COMBAT DEVELOPMENTS	680	
DCSLOG	PENTAGON, WASHINGTON DC	US ARMY, LOGISTICS MANAGEMENT	COL GENTEMANN	TEAM CHIEF, SECONDARY ITEMS	227	AC 703, 697-3123/3122
CORPORATE LOGISTICS	PENTAGON, WASHINGTON DC	ADVISOR, DUSD (L)	LUCIEN CHAKER	ADUSD (LOG INTEGRATION)	227	AC 703, 697-9023
ARMY MATERIAL COMMAND (AMC)	SPRINGFIELD, VA	US ARMY WHOLESALE INVENTORIES, CMD HQ	LUAREN REYES	REQUIREMENTS ANALYST	787	AC 703, 617-3566/3171
COMMUNICATIONS & ELECTRONICS CMD (CECOM)	FT MONMOUTH, NJ	US ARMY COMMUNICATIONS & ELECTRONICS EQUIP, WHOLESALE	BOB SOPER		992	AC 908, 532-4187
			TOM CASTRO	S.A.B.	992	AC 908, 532-0698
			JAMES LAMORE	S.A.B.	992	AC 908, 532-0590
			GARY WEBBER	S.A.B.	992	AC 908, 532-4794
			WALT LACY	LOG READINESS CTR	992	AC 908, 532-0538
			KITTY McCAFFREY	S.A.B.	992	AC 908, 532-4806
			ANNA MARIE	CMD INITIATIVES	992	AC 908, 532-5844
			JOYCE GLASBY	FMR ITEM MGR	992	AC 908, 532-6155
			AL TRAPENENSE	BRANCH CHIEF, EQUATE	992	
			JEFFREY KAMEN	ITEM MGR, ELEC SHELTERS	992	
ED OBRIAN	ITEM MGR, SPARES	992				
COMBINED ARMS SUPPORT COMMAND	FT LEE, VA	US ARMY SUPPORT DOCTRINE	JIM O'DONNELL	VELOCITY MGT	687	AC 804, 734-0040
HEADQUARTERS, DEFENSE LOGISTICS AGENCY (DLA)	FT BELVOIR, VA	DOD WHOLESALE INVENTORIES MANAGEMENT	JAMES SANCHEZ	DEFENSE DISTRIBUTION INVENTORY SYSTEM	297	AC 703, 767-2553

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