

July 1988

INVENTORY MANAGEMENT

Practices of Selected Private Sector Companies



RESTRICTED—Not to be released outside the General Accounting Office except on the basis of the specific approval by the Office of Congressional Relations.

1
2
3
4

5



United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-222859

July 11, 1988

The Honorable Pete Wilson
United States Senate

The Honorable John Glenn
Chairman, Committee on
Governmental Affairs
United States Senate

As you requested, we reviewed several areas pertaining to inventory management. This briefing report discusses private sector inventory management practices. We visited seven private sector companies to identify their inventory management practices and to obtain their views on such practices. In addition, we sought measurement data showing how well the companies managed their inventories. However, we were unable to obtain data on the levels of inventory accuracy because the companies considered such information proprietary data.

Private Sector Inventory Management

The private sector's view of inventory management has changed in the 1980s. Companies are focusing their attention on reducing overall investment in inventory while maintaining levels of sales and customer support. Top managers—Chief Executive Officers and Chairmen of the Board—have established goals to significantly lower inventory, thereby forcing their companies to rethink the way they do business. To accomplish this, companies have formed multidisciplinary planning groups since inventory affects many aspects of company operations.

To meet the goals of reducing inventory while maintaining customer service levels, these companies are using just-in-time¹ inspired techniques for improving the flow of inventory. According to the companies, some of the common techniques include the following: understanding and simplifying the inventory handling and decision-making processes; automating the processes where appropriate; integrating the processes both between the company and its suppliers, carriers, and customers, and within the company itself; and establishing controls in systems and operations. Appendixes I and II provide greater detail on these techniques.

¹Just-in-time is a philosophy of minimum inventory that calls for the production and delivery of the right material, at the right quality level, in the right quantity, at the right time, and to the right place, using a minimum of facilities, equipment, materials, and human resources.

The accounting and financial management systems within the companies provided management support for and control over inventory operations. For example, financial statements and other financial reports provided management with a separate record of performance from that derived from the stock records alone. Standard costing and variance analysis provided measures to gauge performance. According to the companies, closer integration of accounting and inventory stock systems allowed for the timely use of financial reports, and improved record accuracy and sound internal controls increased the reliability of the inventory records. Appendix III discusses management systems that provide support for inventory control.

DOD Differences and Opportunities

Although there are inventory management differences between the private sector and the Department of Defense (DOD), DOD still has opportunities to improve inventory management by instituting private sector concepts and procedures.

The basic difference is that the reason for holding inventory and the strategy for managing it differ between DOD and the private sector. The military services hold inventory to support missions with no-fail objectives. Thus, the military perspective is the more inventory DOD has, the more sustained military capability it has—i.e., with more safety stock, it will be better able to meet its no-fail objective. The private sector holds inventory in support of future sales with a profit objective. Since inventories can also be a drain on profits, the seven companies we visited have established goals for reducing inventories to a minimum and eliminating safety stocks to improve profits.

The Office of the Secretary of Defense has encouraged the military services to utilize the inventory management expertise available in the private sector. For example, the Navy, following congressional hearings in 1986, met with officials from DuPont, Ford, Sears, and Touche Ross. Officials from these companies reviewed Navy inventory management practices in such areas as receipt-in-transit. The Navy has identified 33 observations (recommendations) for improving their inventory practices stemming from, or reinforced by, exchanges with these companies and is addressing 27 of them. The Navy is continuing its liaison with the private sector and plans to meet with officials from these and other corporations in the future.

We believe that such interaction is a step in the right direction. As part of our continuing work in this area, we plan to look at the applicability

of private sector practices to DOD and inventory management affordability issues.

The results of our work are presented in greater detail in the appendixes. The seven companies we visited reviewed a draft of this report and we have incorporated their comments where appropriate. We also discussed this report with Office of the Secretary of Defense officials and have included their comments as appropriate.

As arranged with your Offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from its issue date. At that time, we will send copies to the Chairmen, House Committee on Government Operations, and the House and Senate Committees on Appropriations and Armed Services; the Secretaries of Defense, the Army, Navy, and Air Force; and the Director of the Office of Management and Budget. We will make copies available to other parties upon request. If you have any questions, please call me at 275-8412.



Martin M Ferber
Senior Associate Director

Contents

Letter		1
Appendix I		6
Inventory Management: The Basis for Competitive Corporate Strategy	View Towards Inventory Is Changing Task Forces to Manage Change Integrating Accounting and Inventory Records Changing Physical Inventory Techniques	6 7 8 9
Appendix II		12
Inventory Management: Techniques for Improving Inventory Flow	Simplifying the Inventory Cycle Automated Data Processing Improved Coordination Monitoring Performance	12 13 14 17
Appendix III		19
Inventory Management: A Financial Perspective	Unit-Level Financial Statements and Other Reports Standard Costing and Variance Analysis Integration of Inventory Records With Other Accounting Systems Internal Controls Used to Ensure Inventory Record Accuracy Observations on Accounting's Continuing Role in Inventory Management	19 20 21 23 24
Appendix IV		25
Objectives, Scope, and Methodology		

Abbreviations

DOD	Department of Defense
GAO	General Accounting Office

Inventory Management: The Basis for Competitive Corporate Strategy

Corporate America's view of inventory management began to change in the late 1970s and early 1980s as it recognized the significant productivity improvement potential offered by inventory management. Companies are focusing on inventory management to strengthen their competitive positions in the marketplace. Top managers—Chief Executive Officers and Chairmen of the Board—have established goals to significantly lower inventory, thereby forcing their companies to rethink the way they do business.

View Towards Inventory Is Changing

Inventory management in the private sector has undergone fundamental changes in the 1980s. A significant change is the view that inventory should be maintained at the lowest possible level consistent with the operation it supports. In manufacturing and assembly operations, this means zero or near zero inventory. In retail, service, and support operations, it means the minimum amount necessary to maintain the operation. To achieve this objective, companies are eliminating various contingency stocks maintained in the past.

One of the concepts contributing to today's changing inventory management environment is just-in-time. This concept calls for the production and delivery of the right material, at the right quality level, in the right quantity, at the right time, and to the right place, using a minimum of facilities, equipment, materials, and human resources. Just-in-time requires substantial reduction in setup times, improved material flow, and improved quality.

Just-in-time entails minimum inventory. When the part is needed on the production line, it arrives just in time, but not before it is needed. Although the seven companies have not adopted all elements of just-in-time, they have adopted several of its characteristics, most notably inventory reductions and improved product quality.

Companies that have adopted the philosophy of minimum inventory believe that inventory exceeding the minimum amount is contrary to good business since it may mask operational inefficiencies; it is a hindrance to good capital investment policy; and it is a cost that reduces profit. Excess inventory increases carrying costs and potential write-offs for obsolescence and damage, and therefore, can reduce both current and future profits. However, companies are quick to point out that reduced inventory levels do not just happen, nor do they occur in isolation.

All seven companies we visited have inventory reduction goals. For example, one company had set a goal of 50 percent reduction in inventory over the next 5 years. The operating unit within this company had set a 2-year goal of reducing inventory by 20 percent in 1987 and another 10 percent in 1988. This unit stated it had actually reduced inventory by about 13 percent over an 8-month period ending in March 1987.

Two consistent factors seemed to characterize companies that were striving for significant and enduring reductions in their levels of inventory. First, top management was dedicated to and persistent in bringing about operational change. Second, the companies were managing change by focusing on the entire business or operation cycle. The officials addressed such basic questions as "What is our business?" and "How can we improve our business?" All the companies were old-line companies and the changes they were and are making are dramatic—i.e., traditional concepts of business management are being challenged. No longer do the companies view decisions from a functional or single manager perspective, but rather in the context of a company as a whole.

Task Forces to Manage Change

These companies each used a similar approach to bring about change in inventory management. Typically, upper management mandated the need for change in response to competitive pressures. For example, at two companies, the Chief Executive Officer or Chairman of the Board sets inventory reduction goals at a level that would require fundamental changes in the company's or operating unit's operations. Most companies emphasized that such inventory reduction goals and inventory management changes should be a continuous process, not a one-time program.

Five of the seven companies have planned changes through multidisciplinary task forces. The specific role of these task forces varied from company to company. At three companies, corporate headquarters' inventory reduction task forces played more of a facilitator role, selling process improvement to subsidiaries or presenting techniques for improvement. In another company, the corporate headquarters task force developed a detailed strategic plan for the entire business, including inventory management.

In one of the companies, corporate headquarters played the facilitator role and operating units employed a multidisciplinary task force to devise means to reduce inventories. This task force developed the means

for reducing inventory in that operating unit. This company developed a structured process guide, which the operating units use to analyze their own inventory management practices and identify potential areas for improvement.

Another company brought together various experts, such as information specialists, engineers, and financial managers, to form a corporate planning group. This multidisciplinary group developed a technique to measure operating unit processes using time as the baseline. This group also developed a means to show the cost contribution of each step in the process to the total cost. The group used these techniques to show operating unit managers the inventory savings—both physical units and investment reduction (facilities and dollars)—that the company could gain by reducing the cycle time. In addition, the company used the cost model to target areas for improvement that offer the greatest potential for cost reduction.

Most of these companies believe that inventory reduction goals and inventory management improvements should be continuously challenging to ensure continuous process improvement. Five of the seven companies have some form of continuing process improvement organization. Three of these companies had ongoing corporate inventory management committees. In one of these companies, the ongoing corporate inventory management committee makes policy decisions and establishes short- and long-term goals. This multidisciplinary committee relies on operating units to carry out actions needed to meet those goals. Two companies created an ongoing inventory management improvement program by establishing corporate offices that serve as agents for change.

Another company emphasized continuous process improvement for the entire business, not just inventory management. It operates under a philosophy it calls "Total Quality Control." This philosophy focuses on continuous process improvement with perfection as the goal. Everything, including inventory management, is considered a process, and improvement is attained by applying scientific methods and by universal participation.

Integrating Accounting and Inventory Records

The companies acknowledged that financial measures play a crucial support role in management's desire to attain minimum inventory levels. Top managers use dollar amounts to set inventory reduction goals and then use financial measures like the amount of inventory investment, inventory turnover, and return on investment to judge performance.

These measures are produced from accounting system records to provide management with unbiased, consistent information regarding the results of operations. The measures are more timely with the integration of accounting and the inventory stock records.

Integrating the accounting and inventory stock records has aided performance measurement in the inventory management area. All the companies immediately update inventory stock records after a transaction affecting inventory takes place, such as the receipt of inventory at a receiving location.

This basic change in philosophy—from separate accounting and property systems to a more integrated approach—has meant that management relies more heavily on the controls over the property system. In most cases, the accounting records and the resulting financial statements are now supported by the same source documents that support the property records. Accurate property documents are essential if interim financial statements are to be useful and relied upon by top managers.

Changing Physical Inventory Techniques

In order to attain the lowest possible level of inventory, management officials said they must strive for 100 percent accuracy for each item in the inventory. Consequently, inventory accuracy has become a day-to-day concern for operating managers, and companies are counting inventory throughout the year, rather than only once annually.

Although physical inventory-taking continues to be a significant accounting activity for financial reporting purposes, it has also become essential to operations. Consequently, the techniques of physical inventory-taking are changing.

Instead of closing down an operation to conduct wall-to-wall inventory counts of all items at a specific time, some companies are emphasizing cycle counting. Cycle counting is a physical inventory technique performed throughout the year rather than annually. A company counts a portion of the inventory each day or week. Typically, the company counts every inventory item at least once a year, with more frequent counts for selected items. The companies use cycle counting not only to verify accuracy, but also to expose transaction and human error patterns.

Companies performing cycle counts that show a very high level of line item accuracy may not take or may limit their year-end inventory counting. For example, one company, about 2 years ago, implemented a cycle count program designed to exempt those field office inventory locations maintaining a high level of inventory accuracy from having to conduct a year-end wall-to-wall count. The company's computer control system automatically selects locations for each month's cycle counts. The company exempted inventory locations meeting stated accuracy levels and also passing a year-end statistical sampling test from the wall-to-wall count. In 1987, 45 of 49 inventory locations within one region of the company met the cycle count and statistical test criteria and the company exempted them from conducting a wall-to-wall count.

This company's accuracy standards, which the cycle counts must meet, include the following: (1) a 2-percent or less net value (dollar) variance, (2) a 5-percent or less gross value variance, and (3) a less than 5-percent record (line item) variance. The company also takes a year-end statistical sample, using the same accuracy criteria, before exempting the location from the wall-to-wall count. We were told that the average net variance in the region for the first half of the current year was less than 0.5 percent. Data provided to us for the area office we visited showed that, for the same 6-month period, inventory locations in total had a -0.2 percent net variance, a 0.8 percent gross variance, and a 1.8 percent record variance. The record variance for the entire region was 3.0 percent. In other words, amounts counted matched the records 97 percent of the time.

Company officials told us that the implementation of cycle counting has produced benefits in addition to the increase in inventory accuracy. The monthly cycle counts locate inventory discrepancies sooner, thus making the reconciliation process easier. Also, selecting several items to count and verify on a monthly basis, rather than curtailing operations for a yearly physical inventory, saves the company money because it can continue to function while the cycle counts occur. We were also told that keeping the company service stocks up-to-date has improved tremendously since cycle counting because company personnel are much more aware of the amount of inventory being carried. Up-to-date service stocks are essential to maintain the high customer service goals of the company.

At another company, we were told that cycle counting is being performed throughout the year in some of its operating units. Moreover, we

Appendix I
Inventory Management: The Basis for
Competitive Corporate Strategy

were told that headquarters and operating unit levels are discussing the possibility of relying on the cycle count results and eliminating the year-end physical inventory.

Inventory Management: Techniques for Improving Inventory Flow

To meet the goals of reducing inventory while maintaining customer service levels, the companies used the just-in-time concept to improve the flow of inventory. Some of the common techniques included simplifying the inventory handling and decision-making processes; automating processes where appropriate; integrating processes both between the company and its suppliers, carriers, and customers, and within the company itself; and establishing controls in systems and operations.

Simplifying the Inventory Cycle

Three companies stressed the importance of simplifying the inventory handling and management processes. They emphasized that simplification must take place before automation. Current trade literature notes that automation is not a cure for inefficient operations, but rather mirrors operations whether they are efficient or inefficient. Simplifying the inventory cycle involves analyzing the many day-to-day decisions affecting inventory levels. These companies have also studied the physical movement of inventory to eliminate unnecessary steps.

The assembly operation division of one company eliminated or reduced several inventories. For example, at the end of each day, it has no stock at the receiving dock, little or no work-in-process inventory, and no finished goods inventory. The operation now involves two shifts—a fully-staffed daytime shift and a skeleton shift in the evening. The division schedules assembly operations to be completed at the end of the day shift. The evening crew ships the finished assemblies and clears the receiving dock of parts received but not checked in.

The division has also substantially reduced storage of parts. Under the previous inventory management philosophy, the division ordered parts based on forecasted demand. It received and stocked the parts; then, when it received orders, the division picked parts and placed them in kits for assembly. Today, the division orders parts only when the customer notifies the company it needs a product replaced. When the division receives the parts and checks them for quality, it directly places them into kits. The division schedules assembly only when all parts for a kit or set of kits have arrived. This approach has almost entirely eliminated stocking and retrieving inventory for one of its assembly lines. Plans are underway to implement this “dock-to-kit” concept for its remaining assembly lines.

Automated Data Processing

These companies noted that automated data processing produces benefits in the areas of control, day-to-day management, and accuracy. All the companies have developed some type of integrated inventory management system, which could support such functions as purchasing, receiving and incoming quality control, warehousing, transportation, and requirements planning. Nearly all the companies are increasingly automating material handling functions.

One customer parts operation we visited was highly automated and centrally managed. The operation is worldwide and has approximately 250,000 items in inventory, and the parts range from small bin items to large bulk items. The centralized computer system forecasts requirements, determines procurement orders, and places orders with vendors who are electronically on-line. The same centralized inventory management system determines transportation arrangements and storage locations for procured parts, and tracks parts movements. The system also records sales and maintains a real-time availability file for every part in the system that is accessible to its U.S. and Canadian dealers.

Computers also assemble, route, and control picking operations; determine shipping modes for priority orders; and control the automated material handling equipment. Although the operation improvements are still underway and will not be completed for several more years, this operating division reported that it has reduced its inventory investment by \$300 million and expects to reduce its annual operating costs by about \$80 million. Officials of this company believe centralized inventory control is vital to an operation of this size.

Today's automation and communication technologies help to centralize the requirements determination function. In two companies, centralization of this function has led to lower stocking levels. Requirements determinations are now based on support of the company's total end-items rather than on the amounts needed to support portions of the end-items at various remote locations the company may maintain.

The companies determined initial stocking levels based on such factors as marketing estimates, engineering estimates of failure rates, customer service goals, and customer locations. Several companies commented that these estimates are merely hypotheses and will never be entirely accurate; thus the key is being able to quickly obtain actual data and adjust stocking levels accordingly. Increased automation provides near real-time data to management, allowing them to adjust stocking levels as soon as actual data become available.

Companies have also automated inventory replenishment processes. For example, one company's order module component of its inventory control system automatically determines replenishment orders by first reviewing on-hand inventory and requirement projections. Second, it compares this data with predetermined minimum/maximum inventory levels. Third, the system transmits any necessary purchase orders to suppliers.

Another company's computerized inventory system reviews on-hand inventory, takes into account the current week's activity, and calculates the minimum quantity needed by evaluating demand rates, lead times, and desired service levels. It then compares stock position to minimum levels by considering material on hand, plus any on-order stock minus all back-orders. The system then calculates the economic order quantity using a standard formula and generates either a suggested order or the actual purchase order. The computer automatically generates about 30 percent of all reorders without human intervention. Another company told us that its computer makes about 80 percent of replenishment orders without human intervention.

Private sector firms we visited are improving their material handling functions (receipt, storage, and issue) through automation, where practical. For example, most companies are maintaining computer terminals on their receiving docks. This allows immediate input of receipt data either through key operation or barcodes, acknowledges receipt of material, and eliminates extensive paper flows with the associated error potential.

Some companies have also automated their material issue process. Pickers use computer-generated pick tickets, and in one company, pickers used hand-held computers that store their picking assignments. The computer automatically sequences the picking by locations to minimize travel time and distances walked. Two companies have implemented automated parcel routing systems, which automatically determine the best mode of transportation for outgoing shipments. These systems maintain data on specific carriers, including their delivery times and charges. One system also takes into account the priority of the shipment before selecting the transportation carrier.

Improved Coordination

Companies have found that one key technique to improve inventory flow is better coordination of inventory management functions within the company and between the company and its suppliers, carriers, and

customers. All the companies have ongoing efforts to improve external and internal coordination of inventory management functions. The efforts are improving relationships with suppliers, carriers, and customers; implementing formalized integrated planning within the company; and clearly assigning responsibility for inventory levels within the company. These efforts to improve external and internal integration are discussed below.

Closer Relationships With Customers and Suppliers

Inventory management based on the just-in-time concept requires companies to manage inventory receipt and delivery through the formation of business information sharing partnerships. A company needs to know something about its customers' operations in general and, in particular, needs customers' short-term planning and/or utilization data to plan its work load. In turn, the company must then share its planning information with its suppliers so they can support its work load. The third party link to both these product flow processes is transportation—the movement of products from suppliers to the company and from the company to customers. This link also requires sharing of information in order for the company to receive products when they are needed and to deliver products to the customers when the customer needs them.

Most companies are establishing more partnership-like relationships with suppliers by offering them longer term contracts. These contracts are for product availability over a given period of time and also include clauses regarding such factors as prepackaging, delivery performance, product quality, and penalties for nonconformance.

Two of the companies certify suppliers based on superior performance. Certified suppliers are those who have proven over time that they can consistently deliver quality products in the correct quantities at the stated times. The benefit to the company of having certified suppliers is that they no longer have to check these products for quality and quantity upon receipt. However, if the company later finds discrepancies with these shipments, it can take appropriate actions, which are usually stated in the contract.

According to a 1984 National Council of Physical Distribution Management study of such management, some companies have implemented programs whereby they share individual supplier performance data, such as on-time delivery, and order accuracy, completeness, and quality, with the supplier. Companies have found that providing this type of feedback has improved supplier performance. Similarly, one company

we visited has started a supplier development program aimed at improving inventory management at the supplier level. According to this company, it has reduced lead times by 11 days through its improved supplier relationships.

All seven companies have implemented or plan to implement an electronic data interchange program with their suppliers so orders can be transmitted electronically. Use of this technology has reduced administrative procurement lead times.

Integrated Planning and Responsibility

Operations managers seek to reduce inventory while maintaining or improving service levels. Since inventory is affected by decisions of various functional managers in the areas of manufacturing, engineering, marketing, finance, and accounting, each of the companies has established integrated planning processes to minimize inventory levels while maintaining its operating service goals. Generally, the process is a formal one that routinely brings together the separate functional managers to plan for the future. Each of the companies we visited used integrated planning to some extent to improve inventory management. For example, one company has instituted a "tollgate" system that requires manufacturing, engineering, marketing, and finance divisions to sign-off on new product introductions.

To ensure coordinated planning and continued interest in inventory levels, one company has also shifted responsibility for these levels to those groups whose decisions have the greatest impact on the inventory. For example, one operating unit now holds the marketing manager responsible for the levels of end-item inventory and holds the engineering manager responsible for the levels of support inventory. The marketing group is held responsible for end-item inventory because it determines the levels of market share the company expects to obtain. Similarly, the engineering group is held responsible for the levels of support inventory because its estimates of failure rates are the primary input for determining support levels.

In the past, this operating unit assigned overall responsibility for end-item inventory to the manufacturing component. This company noted one instance before the change in which its marketing group introduced a new product while the manufacturing group still had the older version in its inventory. As a result, demand for the older version diminished to the point where the product became obsolete.

Monitoring Performance

In order to provide operating discipline and to hold individuals and groups accountable, the companies rely on, among other things, exception management and performance measurement. These companies carefully measure performance and productivity of individuals and groups within the company as well as the performance of vendors and carriers.

Exception Management

In order to lower inventory levels and even their flow, the companies determined that they needed to make more frequent inventory management decisions. In order to make the many routine decisions that are required under a just-in-time concept, the companies acknowledged that timely information is critical. Systems must be able to provide this information both to warehouse managers, and to managers at other levels and functions, sometimes with the same timeliness. The integrated inventory management systems used by these companies enhance the ability of managers to automate routine decisions and allow the managers to concentrate on exceptions.

In the retail operations we visited, for example, routine reorder decisions were completely automated. Retail management in one company was then able to concentrate on fast-selling and slow-selling items.

Performance Measurement

All of the companies regularly measure the performance of individuals and groups. One company measures the performance of individuals daily in terms of their contribution to moving inventory, and uses this information as a basis for making assignment, pay, and award decisions. At the corporate level, typical performance measures include return on investment and profit/loss. However, in the operating units, and sometimes at the corporate level, companies use more program-oriented standards to judge the effectiveness of those organizations. For example, some companies' parts group used order fill rates to judge the effectiveness of the program.

Other examples of performance measures mentioned by these companies include volume handled per staff-hour, order cycle time, inventory turnover, and months of supply. In one service organization, management concerned itself with such measures as back-orders and open orders, since its objective was to meet the equipments' up-time requirements guaranteed in the sales agreement. It is this type of performance measurement and exception management that brings discipline to the operating environment.

Performance Measures

These companies used many measures to monitor the performance of their materials flow process. These measures include dock-to-stock time, inventory turnover rate, and order fill rate. Dock-to-stock time is the amount of time it takes to receive incoming material, count and inspect the material, and move it to its storage location. Inventory turnover rate refers to the total inventory sold in a period divided by the average inventory on hand during the period. The order fill rate is the number of orders filled as a percentage of all orders.

The companies told us that dock-to-stock times ranged from less than 1 day to 2 days, but 1 day was mentioned the most often. One firm stated that its goal is to cut its dock-to-stock time from an average of between 1 to 2 days to an average of 4 hours. The companies told us about techniques that have improved their dock-to-stock time, including use of barcodes, terminals on the receiving docks, and scheduled incoming deliveries.

Inventory turnover rates varied among the organizations and also among the activities within the organizations. For example, one organization had an annual inventory turnover rate of 2 while another reported an annual turnover rate of 12. Within one organization, annual turnover rates varied from .75 to 12 depending on the particular activity. Inventory turnover rates are primarily influenced by the type of inventory held.

The companies that provided us data on order fill rates had rates ranging from approximately 78 to over 99 percent, with most organizations having fill rates above 90 percent.

Inventory Management: A Financial Perspective

The companies we visited shared some common management strategies and techniques with regard to accounting for and financial management over inventories. The common practices include use of unit-level financial reports, use of standard costing and variance analysis, integration of inventory records with other accounting systems, and use of sound internal controls to ensure inventory record accuracy.

Unit-Level Financial Statements and Other Reports

The companies have found that the use of financial statements subject to an annual audit introduces discipline to the financial reporting process because the audit process confirms the reliability of the information in the financial statements and other reports used by management. Moreover, the financial statements and the accounting records, which are the basis for the statements, aid management in providing monetary control over inventory, and in monitoring and contrasting the results of inventory operations among its various operating units.

In the seven companies, operating units, such as assembly plants, distribution centers, warehouses, and retail outlets, were each provided financial statements and other financial reports, based upon accounting records, on the results of their operations. One company produced reports daily for such financial indicators as sales, out-of-stock items, and inventory turnover, while other companies produced financial reports on a weekly or monthly basis. The companies developed the reports using standard charts of accounts to allow meaningful review and comparison of operations by management.

Inventory accounting plays a crucial role in management's responsibility for maintaining control over its inventory by providing management unbiased, consistent results of inventory operations from which to base decisions. Management used the inventory accounting records to monitor performance and to hold unit managers responsible for inventory control. Some ratio and variance analyses used are shown in the following examples.

- One company produced monthly financial reports for each operating unit. A company official said that this provides unit managers with a "scorecard" of how they are doing. Also, with the aid of a standard general ledger and chart of accounts, the company can compare and contrast the results of operations among various operating units. This provides management with a means of identifying and evaluating differences so that it can reward effective and efficient operations. This company uses the dollar investment in inventory to indicate effectiveness,

which shows the amount of capital tied up in inventory and to some extent the risk of inventory obsolescence.

This same company further controls the dollar value of inventory by making inventory control the responsibility of the operating unit manager. For example, when a regional office requests inventory in support of its units' operations, the company immediately charges the region with the dollar value of the inventory requested. When the company developed the monthly financial statements for the region, it monitors the value of inventory. Headquarters' management also monitors the value of inventory used to support similar operations.

- A second company considers its regional directors responsible for the amount of inventory held. Not only does headquarter's management monitor inventory turnover and dollar of inventory investment, but it also charges the regions for the financing costs associated with inventory.
- A third company, routinely produces financial reports from the accounting records. These reports highlight the results of operations at various organization levels. The reports focus on sales, gross profit, inventory levels, expenses, and return on inventory investment. Headquarters' management uses these reports to monitor actual performance against an operating unit's plan and its last year's performance. Reporting was primarily monthly and included year-to-date information. This company also produces supplemental inventory reports on daily sales and weekly commitments to assess current trends.

Standard Costing and Variance Analysis

The companies believe that standard costing is the building block of a budget and feedback system. Standards represent predetermined target costs and help management to build budgets, gauge performance, and establish product costs. Setting standards, analyzing the resulting variances, and establishing responsibility are all important management tools in assuring effective cost control. As work is performed—for example, the purchasing of goods for inventory—actual costs are compared with standard costs to reveal price variances. Management can then investigate these variances to determine how it is meeting stated objectives, and analyze them to determine what changes need to implement to better meet the standards.

Six of the seven companies used standard costing to account for inventory, though not necessarily in the operating unit that we visited. The decision to use standard costing was, in some cases, dependent on the

nature of the operations carried out by the particular unit. Examples of the companies' use of standard costs follow:

- One company used standard costing throughout its entire diversified operations. The company enters inventory quantity information into the computer system upon receipt and uses a computerized pricing module to convert the quality data to standard costs. In addition, the company updates all standards at least annually; however, it may review and adjust standards for new products more frequently until management is satisfied that the standard is realistic.
- Another company uses standard costing in each of its operating divisions. One division emphasized labor and material variances due to the nature of its operations. However, at the corporate level, the focus changes. Instead of paying close attention to particular variances, management is more concerned with overall investment levels and ratio analysis. Specifically, it monitors changes in the absolute dollar value invested in inventory, as well as trends in the inventory turnover ratio.

All of the companies using standard costing reviewed the standards at least annually.

Even the one company that did not indicate the use of standard costing still performs various analyses based on the information in the accounting records. For example, the company compares accounting information to budgeted estimates in such areas as sales, inventory levels, inventory turnover, gross profits, expenses, and return on investment.

Integration of Inventory Records With Other Accounting Systems

The companies have found that integrated financial and inventory systems provide an added measure of financial control over inventory. Properly integrated systems facilitate the necessary matching of quantity and other information in the accounting and logistics records and minimize the numbers of errors occurring when data have to be handled manually.

The seven companies appear to be moving towards the integration or the automated interface of the accounting and detailed stock records. These companies immediately update the detailed stock records when the transaction affecting inventory takes place, such as the receipt of inventory at the receiving dock. In most cases, the company uses the same source documents that are used to update the inventory records or the inventory records themselves to update the accounting records.

Although none of the companies had completely integrated accounting and inventory systems, the systems were sufficiently integrated through files or detailed transaction codes to allow for daily, weekly, or monthly updating of the accounting records. Generally, the companies update the accounting records based on an entry into the detailed stock system. The following are examples of system integration at the seven companies:

- One company has a highly integrated accounting and inventory control system. An operator enters each receipt, sale, or movement of inventory between accountable locations into a central computer system using either a terminal or a barcoding device. This entry immediately updates an on-line inventory control file. At night, operators make copies of the control file so that various systems—such as general ledger accounting and accounts payable—can be updated.
- At a second company, loading dock employees enter part and quantity information into the detailed stock records through an on-line inventory control system terminal. The inventory control system accumulates the inventory information, and after performing certain control edits to validate the accuracy of the information entered, this information updates the accounting system database each night.
- A third company has not integrated its accounting and detailed stock record systems. Generally, all the interfaces between the two systems take place manually through multiple copy forms or hard-copy reports prepared monthly in the stock system and then entered into the accounting system. However, this company has, as part of a larger overall modernization plan, recognized the need for systems integration, and plans to incorporate such integration into its future systems design.

Some of the companies we visited indicated that inventory records are integrated with other information systems, such as accounts payable, purchasing, receiving, and accounting. For example:

- One company makes payments based on the stated quantity on an approved receiving report, without regard to the invoice. Operators keypunch quantity information into the inventory system at the point of receipt and then use the information to update the accounts payable system. According to a division controller, if there is a discrepancy between the quantity on the receiving report and the invoice quantity, it is the vendors' responsibility to challenge the payment.
- One company enters suppliers' original invoices in its accounts payable file as received. The company then lists these invoices on one of three invoice statements per month, per receiving location, usually well in advance of the release of payments to the suppliers. The receiving

points reconcile the invoices listed on the statements to a combination of duplicate copies of invoices and receiving reports. Staff note any discrepancies in either cost or quantity on one copy of the invoice statement, return it to accounts payable where staff adjust the discrepancy and reflect it on the next payment statement to the supplier. Although the company said that these discrepancies are generally insignificant, it views the reconciliation process to be a necessary control. Currently, the company plans to develop an invoice matching system, which will provide an automated match between the invoice and the confirmed receipt prior to issuing a payment.

Internal Controls Used to Ensure Inventory Record Accuracy

According to the companies, the effective management of inventory requires reliable and accurate inventory records in both quantities and dollars. If records are inaccurate, a company may order unnecessary inventory, or inventory may not be available when required. Inaccurate financial data may lead to the payment for goods not received and may also fail to provide management the cost information it needs to make informed decisions concerning inventory management.

Two factors that aid inventory accuracy are sound internal controls over inventory operations and adequate review and evaluation through counts of the inventory on hand. Inventory operations include purchasing, receiving, storing, shipping, and accounting. Two internal controls associated with these operations are the separation of such duties as custodial record-keeping and physical control over assets, and limited access to certain controlled areas.

Counts of the inventory on hand provide the results of its internal control program to management. Auditing the physical inventory and inventory procedures introduces discipline, enhances oversight, and helps assure financial integrity by confirming the accuracy and reliability of the information in the financial statements and other reports.

In one company, the corporate audit staff and the independent accountants make inventory reviews in addition to the facility personnel. Each of these groups decides the extent of its involvement. The size of the facility's inventory, past history of adjustments, and the date of the last audit review determine the detail of the audit review. To facilitate its reviews, the company furnishes the external auditors tapes of on-hand inventory, including costs.

Management for the seven companies indicated that record accuracy is of the utmost importance in managing inventory and that they made improvements in this area. The increased use of automation contributed to these improvements. For example, the use of barcodes and computer terminals at receiving locations has improved record accuracy by reducing human errors.

Record accuracy and inventory-taking complement each other. Timely and accurate inventory records allow for a decreased emphasis of the annual physical inventory, which is time-consuming and disrupts operations. At the same time, the frequent counting of inventory as a part of the ordinary operations acts as a check of the inventory records and thus contributes to the increased accuracy and reliability of the records.

One company implemented a number of procedures to verify the accuracy of stock records on a continuing basis. These procedures include (1) a test count program that statistically selects samples of the entire inventory to be counted each year, (2) a discrepancy count program that verifies questionable stock record quantities by means of a physical count, and (3) a documentation sampling program that samples and tests the documents used to record additions or deductions to the inventory for accuracy both as to part number and quantity.

Observations on Accounting's Continuing Role in Inventory Management

The accounting and financial management systems within all the companies provided management support for and control over inventory operations. For example, financial statements provided management with a separate record of performance from that provided by the stock records alone; standard costing and variance analysis provided measures to gauge performance; closer integration of accounting and inventory stock systems allowed for the timely use of financial reports; and improved record accuracy and sound internal controls increased the reliability of the inventory records.

Accounting and financial management systems, therefore, continue to play a vital role in management's efforts to manage its assets.

Objectives, Scope, and Methodology

Our objectives were

- to identify practices in the private sector used to manage inventories and improve control,
- to determine whether these practices might be applicable to DOD, and
- to obtain measures showing the levels of inventory accuracy being attained in the private sector.

To identify inventory-management practices used in the private sector for reducing inventory and/or improving control over inventory, we conducted a literature search covering the period from January 1982 through October 1986. We found 78 companies that we believed had improved their inventory management. We judgmentally selected 10 corporations from this list, based on sales volume and variability of business, to visit. Seven companies, each with inventory of over \$1 billion, except one company with almost \$1 billion, agreed to participate, and we visited them during 1987.

To encourage participation of private companies, we pledged confidentiality by agreeing not to identify operating units visited or associate corporate names with specific data we reported. We also gave each company the right of first review over data reported on that company. The seven participating corporations were the following:

- Caterpillar,
- General Electric Company,
- General Motors Corporation,
- Hewlett-Packard,
- J.C. Penney Company, Inc.,
- Sears, and
- Westinghouse Electric Corporation.

Regarding the applicability of private sector practices to DOD, we found that Office of the Secretary of Defense officials had encouraged the military services to utilize the expertise in the private sector and that the services were doing so. For example, the Navy, following the hearings in 1986, began utilizing the expertise in the private sector to improve its management of inventory. Companies like Touche Ross & Co., DuPont de Nemours EI & Co., Ford Motor Co., and Sears are sharing inventory management practices with the Navy in such areas as receipt-stow-issue, security, receipt confirmation, and material-in-transit.

The Navy has prepared 33 observations/recommendations stemming from, or reinforced by, these exchanges with private sector companies and is addressing 27 of them. The Navy is continuing its liaison with the private sector and plans to meet with officials from these and other corporations during 1988. Since the services are dealing directly with private sector companies to learn about and take advantage of practices to improve their inventory management systems, we felt it would be inappropriate at this time to assess this cooperative process.

We were unable to obtain measures to show levels of inventory accuracy in the private sector because such information was not made available to us. We requested measures to show dollar, line item, and location accuracy attained by management of operating units within the companies. However, companies considered information at this level of detail to be proprietary and would not provide the requested data. Although we were unable to obtain specific data on inventory accuracy, we did obtain information during our visits that indicates the level of importance companies are placing on inventory accuracy.

Our work at the participating companies included discussions with corporate and operating unit officials and tours of the operating units' facilities. We obtained an understanding of the headquarters role from corporate officials in determining organization, strategy, goals affecting inventory management, and the role of financial management in maintaining and controlling inventory.

At the operating units, we talked with managers to understand how they managed their business, and to obtain their views on improved inventory management practices. In addition, we toured the warehouse operations and observed the physical and, in some cases, the administrative functions of inventory management being performed. We also reviewed studies by trade and management associations. We conducted our study from September 1986 to December 1987 in accordance with generally accepted government auditing standards.

Requests for copies of GAO reports should be sent to:

U.S. General Accounting Office
Post Office Box 6015
Gaithersburg, Maryland 20877

Telephone 202-275-6241

The first five copies of each report are free. Additional copies are \$2.00 each.

There is a 25% discount on orders for 100 or more copies mailed to a single address.

Orders must be prepaid by cash or by check or money order made out to the Superintendent of Documents.

**United States
General Accounting Office
Washington, D.C. 20548**

**Official Business
Penalty for Private Use \$300**

**First-Class Mail
Postage & Fees Paid
GAO
Permit No. G100**
