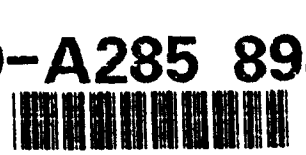

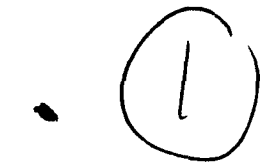

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Activity-Based Management Accounting for DoD Depot Maintenance

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Activity-Based Management Accounting
for DoD Depot Maintenance

Executive Summary

CURRENT SITUATION

Nondirect costs at maintenance depots are currently charged to job orders on the basis of direct labor hours. This traditional method of cost allocation can result in distorted product costs. This distortion is particularly egregious in two cases: first, between capital-intensive and labor-intensive products, and second, between high- and low-volume products.

Depreciation costs are nondirect costs and are therefore allocated to products on the basis of direct labor hours. Given two products, if one is produced on a capital-intensive line and the other is produced on a labor-intensive line, the latter will be allocated a higher cost for depreciation. Because depreciation pays for the cost of capital equipment, this allocation is clearly incorrect.

Depots repair many weapon systems components. Those components differ significantly in the number repaired per year; some are repaired in high volumes and some in low volumes. For example, at one depot 6 percent of the component lines repaired accounted for 95 percent of the workload. Because nondirect costs are allocated on direct labor hours, the high-volume components are allocated almost all the nondirect costs. This approach is incorrect because the costs of having the capability to produce a low-volume component and of setting up production to do so can be substantial – and these costs are all nondirect.

Distorted product costs are a problem for three reasons: First, it is difficult to improve the production processes at a depot and minimize costs if the costs of the processes and their outputs (i.e., the products) are not known. Second, if the prices charged by the depots for their products are distorted, pricing signals will be incorrect, leading to uneconomical decisions by the consumers of depot products. Third, accurate product costs are needed to make good decisions on the workload that should be competed, on the level of workload that should be retained in organic depots to retain an economic level of activity, and on the most efficient source for interservicing

The limitations of the existing depot accounting systems have been demonstrated both by special studies and test cases and also by the work-arounds to the current system devised by depot personnel to "force" the current system to produce more useful results. Those limitations are endemic to the current accounting system; work-arounds, no matter how creative, will not fully overcome them. A more robust solution is needed.

PROMISING SOLUTION

A promising approach to better product costing is Activity-Based Costing (ABC). In addition to its other benefits (e.g., the creation of information for process value analysis and strategic planning for overhead functions), ABC enables a manager to specifically *trace* nondirect costs to individual products rather than simply allocating those costs. By tracing those costs, ABC avoids the distortions caused by allocating nondirect costs to products on the basis of direct labor hours.

Activity-Based Costing has been successfully implemented in the private sector. Test cases applying ABC have been successful at the DoD maintenance depots, but implementation has been limited by the existing accounting systems.

Management must move beyond ***financial*** accounting systems, whose chief purpose is to make sure each dollar spent is traceable and accountable, to ***management*** accounting systems that make clear the cost consequences of management decisions.

Our analysis shows that ABC is a promising tool for instituting a management accounting system for DoD maintenance depots. The time to act is now – while depot accounting systems and information systems are being modernized. Ensuring that new accounting systems can support the ABC approach should be a top priority.

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Chapter 1

Introduction

This report describes the current financial accounting system used at the DoD maintenance depots, examines its shortcomings, and outlines a new approach that could be used to establish a new management accounting system for the depots.

The need for a new accounting approach was stated in a previous paper.[1] In that paper, we identified the difference between a financial accounting system that concentrates on appropriations tracking and integrity and a management accounting system that concentrates on giving managers access to the information needed to run a business. Also, the shortcomings of the current system were noted. For example, data connecting costs and resources to weapon systems are not collected in the financial accounting system making it difficult to connect changes in force structure to the changes needed in the support infrastructure. This and other examples show the need for implementing a management accounting system.

Serious questions face DoD concerning the support infrastructure and, in particular, the depot maintenance establishment. Two of the more global questions are: How big should it be? How much of it needs to be in the government and how much can be provided by contractors? In this report, we are concerned with the cost information needed to answer these questions and other more specific questions such as, what happens to costs at a depot when workload changes? A good management accounting system should provide the information needed to help answer such cost questions.

Organization of This Report

The current accounting system does not provide managers with the necessary information. That system cannot help answer questions such as, what happens to costs when workload changes, when depots are consolidated, or when product mix changes? This is because the system does not differentiate between costs that vary and costs that do not vary with respect to relevant decision variables. It also does not support product costing because nondirect costs are tied solely to direct labor hours, a convention that has outlived its usefulness and that can produce nonsensical results. These cost issues are developed in Chapter 2.

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[1] *Improved Management Accounting for the DoD Infrastructure*. Glass, Margolis, Wallace, and Wingrove, August 1993.

A possible alternative for a management accounting system is Activity-Based Costing (ABC). ABC links costs to activities and activities to products. By identifying the cost drivers for activities, it helps provide a better understanding of nondirect costs and what causes them to change. It also provides more accurate product cost information, which is essential as DoD moves to a reimbursement approach where economic behavior, in response to competition and prices, is relied upon to rationally allocate resources. Chapter 3 briefly discusses ABC, provides examples of how ABC has been used in the depots, and outlines how ABC could be applied in the future.

In Chapter 4, we consider whether implementing ABC in the depots would be worth the cost. Although no quantitative comparison can be made at this point, the probable benefits and costs are discussed.

THE DEPOT ENVIRONMENT

Physical

The DoD organic depots are government-owned industrial facilities located on military bases. They contain the facilities and equipment necessary to perform complex repairs and overhauls of military end-items and components. They range in size from Marine Corps depots with about 1,000 employees to Naval shipyards with over 9,000 employees. An average Air Force depot has about 6,000 employees along with facilities and equipment valued at about $1 billion. Taken together, the 33 major depots represent a significant government investment and over 100,000 jobs. (The Appendix lists the major depots and their employee populations.)

Organizational

Each Service has its own organization and command structure for its depots. The Army manages its depots through the Army Materiel Command and its subordinate the Industrial Operations Command (successor to the Depot Systems Command). The Navy controls its shipyards through the Naval Sea Systems Command (NAVSEA) and its Naval Aviation Depots (NADEPS) through the Naval Air Systems Command (NAVAIR). The Air Force depots report to the Air Materiel Command. The Marine depots report to the Deputy Chief of Staff for Installations and Logistics at Marine Corps headquarters. Some coordination is provided by the Defense Depot Maintenance Council, but the Services operate their depots, for the most part, autonomously.

Although merging the depots into a single agency or command has been suggested, the traditional separate organizations are still intact and providing day-to-day direction of depot activities. As a result, idiosyncratic decisions can be made about facilities and equipment. For example, the Army, Navy, and Air Force all maintain aeronautical depots and capacity for gas turbine engine

repair – even though workload is declining. As a response to a declining workload, the Navy is closing three of its six NADEPS. The Air Force is responding by shifting intermediate-level work to the depots and retaining all five of its ALCs.

Financial

Of the approximately $13 billion spent annually on depot maintenance in recent years, about $9 billion worth of service is accomplished in organic facilities and about $4 billion by contractors. All the depots are part of the Depot Maintenance Business Area in the Defense Business Operating Fund. The depots are required to submit financial reports to the OSD Comptroller. Their financial goal is to "break even" – that is, to match annual costs to annual revenues.

The depot's main customers are the supply systems of the Services, in particular, the stock funds for reparable items and the end-item managers for overhaul of major end-items. To the extent that these customers are free to use alternative sources for repair, the depots are open to competition. Currently, constraints exist on the workload that can be competed and the minimum levels of workload that must be retained in the organic depots.

The demands that the supply system responds to come from the final users of the products – the operating units (i.e., "customers"). Thus, a factor complicating the depot environment is the demand function of these operating units. Because all depot-level reparables are now stock funded [i.e., the operating units must buy the items from the stock fund using operations and maintenance (O&M) money rather than having those items free-issued to them] the demand function of these units may be elastic with respect to price. The customers respond not to the price charged by the depot for services but to the price charged by the supply system for an item.

The supply system price is often twice the depot repair price. Essentially, the price that the supply system charges for a reparable item includes not only the repair costs but also a surcharge (or recovery rate) that covers the costs of the supply system. This surcharge is often equal to or greater than the repair cost. The reason this is important for the depots is that the demand for their products is a result of the demand from operating units facing the supply system price.

If the operating units have alternatives to buying reparables from the supply system, such as repairing them at the local level, demand for depot level repairs may decrease. To the extent that there are significant fixed costs in the supply system and the depots (i.e., costs that are not related to volume changes), the per-item surcharges and repair costs will increase as the volume of items demanded decreases. This, in turn, results in even less demand for the items from the operating units.

The resulting spiral of decreasing demand and increasing prices could spell trouble for the depot system. It calls into question a pricing policy that charges the full system costs to each item as opposed to only the marginal costs. That point is beyond the scope of this report. However, in any discussion of depot costs, we must consider that the price to the final customer, not just the depot cost, is what will create the demand for a depot's services.

To determine the pricing policy that should be followed, requires first knowing each product's marginal and full costs. The current accounting system cannot tell managers the correct full costs for products and certainly not their marginal costs.

The ABC approach outlined in this report would, among other benefits, be a means for calculating meaningful product costs – a necessary first step in formulating a rational pricing policy.

CHAPTER 2

Cost Issues

INTRODUCTION

To understand the cost information being used by depot managers and reported to higher levels, we visited four Service-operated depots: Anniston Army Depot, Jacksonville Naval Aviation Depot, Oklahoma City Air Logistics Center, and Warner Robins Air Logistics Center. We believe that this sample, although limited, is sufficient to illustrate the relevant aspects of the standard Service depot cost accounting systems.

This chapter summarizes our findings. First, we discuss how direct and nondirect costs are calculated in the Service's "standard" cost accounting systems. Next, we note the efforts that depot managers have taken to refine the standard system to provide more accurate and usable information for management. Following those discussions, we also summarize our observations about the procedures used by the Services to calculate one particular nondirect cost: namely, the base operating and support (BOS) services that tenants (like the depots) receive from their host military installations.

First, we define several terms that we will use in the remainder of this report.

DEFINITIONS OF TERMS

Service maintenance depots have three organizational levels. Because the Services are not consistent in naming those levels (e.g., the Army and Navy use the term "production divisions" while the Air Force uses the term "production directorate" to refer to the same level of organization), we use the following terms:

- **The "directorate level."** The depot maintenance directorate level is concerned with the overall operation and management of the depot maintenance activity.

- **The "division level."** This organizational level is just below the directorate level. Each production division is responsible for one type of product (e.g., aircraft, vehicles, or engines) or a specific product line (e.g., P-3 aircraft maintenance, and avionics repair).

- **The "workcenter level."** Within each production division are individual workcenters (i.e., shops) that perform work on specific types of equipment (e.g., F-16 radars, tank turrets, or landing gear) or they perform special functions (e.g., plating or numerically-controlled milling).

These organizational categories are directly related to the cost categories used to classify depot resource expenditures:

- **"Direct costs"** are costs within a workcenter that can be easily and accurately identified to a job order number (JON) or a specific repair action.

- **"Production overhead costs"** are nondirect costs within a production division that cannot be directly attributable to a JON.[1] These costs must be allocated to each JON.

- **"General and administrative (G&A) costs"** are nondirect costs incurred by the Depot Maintenance Business Area (DMBA) that benefit more than one product division. These costs must also be allocated to each JON.

The accuracy of product cost reporting is determined by the level at which production divisions and workcenters are established and by the methods used to allocate production overhead and G&A cost to individual JONs.

DEPOT PRODUCT COSTING PROCEDURES

Each Service has developed its own management information systems to manage the operation of its depots. As a result of this independent development, each Service has taken a different approach. This section summarizes how each Service's standard system provides depot managers with product cost information. We first look at direct costs and then at nondirect costs.

Direct Costs

All three Services capture expenditures for direct material by JON. However, there are substantial differences among the Services in the treatment of direct labor costs. The Army and the Navy both operate an actual-hour accounting system where depot technicians record the actual time spent on each task. The NADEP at Jacksonville Florida, for example, has equipment that reads bar coded information on the technician's identification card so that actual touch time (in increments of 0.1 hours) per job order can be recorded against specific JONs. While both the Army and Navy use actual hour accounting methods, they use

[1]The Air Force and Army further divide production overhead into two categories: (1) shop indirect (Air Force) or within-shop indirect (Army) for those expenditures that occur within a workcenter that cannot be accurately or economically assigned directly to a JON, and (2) shop support (Air Force) or above-shop indirect (Army) for nondirect expenses that benefit more than one workcenter within the same production division.

different methods to cost those hours. On the one hand, the Navy charges each direct labor hour at the labor cost of the technician working on the task. On the other hand, the Army charges each direct labor hour at the average labor rate for the division. As a result, product costs will be distorted to the extent that dissimilar labor mixes exist among workcenters and among products.

The Air Force currently uses a standard earned hour procedure to distribute direct costs to individual JONs. In the Air Force system, actual direct labor hours and actual direct labor costs are accumulated by work centers. At the end of the month, those actual labor hours and labor costs within each workcenter are allocated to the JONs worked by that workcenter on the basis of the number of standard hours earned.[2] If a workcenter earned 10 standard hours for JON "A" and in total, earned 100 standard hours for all production during the month, then JON A would be allocated 10 percent of the total monthly labor hours and monthly labor costs for that workcenter.[3] One implication of this methodology is that production variations in one product line are spread across all items produced during the month. Consequently, this procedure limits the value of cost accounting information for managing costs within the depot.[4]

Nondirect Costs

Nondirect costs have two components: production overhead and G&A costs. Across all Service depots, these two components jointly account for approximately 40 to 45 percent of the total expenditures for organic depot maintenance. The depot organizational level that incurs the nondirect cost determines whether a specific cost is classified as a production overhead or as a G&A expense. [Consequently, some elements of expense (e.g., depreciation) are found in both components.] Because nondirect costs must be allocated to products, the methods used to allocate production overhead and G&A costs to individual JONs is crucial for the accuracy of product cost reporting.

Production Overhead

Production overhead costs are costs that occur within a production division (or for the benefit of a production division) that cannot be economically assigned directly to a JON. At all four depots we visited, production overhead costs are

[2]The standard hours required for a task is the estimated number of labor hours needed to complete that task (assuming standard conditions).

[3]Hours are earned only for completed tasks that have been "production-counted" during the month. If a workcenter works on a task and that task is not production counted by the end of the month, the actual labor hours and costs are captured in the month they were expended, but the earned hours are reported in the following month(s) (or in the month the task is production-counted).

[4]A new depot maintenance management information system (DMMIS) being developed by the Air Force will replace the earned-hour allocation of direct labor hours and costs with a direct hour reporting system similar to the one at NADEP-Jacksonville.

allocated to JONs on the basis of direct labor hours (i.e., direct actual hours for the Army and Navy and earned direct standard hours for the Air Force).

While the definition of production overhead is the same in all the Services, there are significant differences in implementation. The Air Force and the Army separate production overhead into two categories: shop indirect (or within-shop indirect) and shop support (or above-shop indirect).

"Shop indirect costs" are those costs occurring within a direct workcenter (e.g., the shop supervisor's labor) that cannot be directly identified to the specific items repaired at the workcenter. Shop indirect costs are allocated only to those items repaired within the specific workcenter.

"Shop support costs" are nondirect costs that occur within (or are incurred by other organizations on behalf of) the production division but above the individual direct workcenters. Examples of shop support costs include facility maintenance, depreciation on equipment owned by the production division, and utilities. Shop support overhead is allocated to all JONs within the production division based on labor hours. The Army system uses the same shop support overhead rate for all workcenters within a production division. The Air Force's standard system can develop unique production overhead rates for each workcenter. It distributes each element of shop support cost to only those workcenters that benefit from that expense. The Air Force develops unique shop support overhead rates for each workcenter in an attempt to minimize distortions in unit repair costs when heterogeneous workloads (having different requirements for shop support) are maintained by the same production division.

The Navy depot we visited does not subdivide production overhead. Instead, it attempts to minimize distortions in unit repair costs by defining production divisions for each specific product. For example, at NADEP-Jacksonville, distinct production divisions are separately designated for each type of aircraft needing repair. In contrast, at Oklahoma City, the aircraft production division repairs all types of aircraft located at that depot.

General and Administrative Overhead

The G&A overhead costs are nondirect depot costs that benefit more than one production division. In the standard systems, G&A costs are allocated to JONs on the basis of direct labor hours. The Army and Navy use actual labor hours. The Air Force first allocates G&A to workcenter overhead pools using direct actual labor hours and then allocates those overhead pools to JONs on the basis of earned standard hours. Because the standard systems use the same G&A rate per labor hour for all items repaired at a depot, the Navy and the Air Force have moved many expenses from G&A to production overhead in an effort to minimize unit repair cost distortions. For example, theArmy system treats utility expenses as a G&A expense. But in the Air Force and Navy systems,

utility expenses are treated as production overhead expenses; each production division is charged for the utilities it consumes.[5]

Overhead Cost Allocations

In addition to the distinction discussed earlier in the use of earned hours and actual hours, the Services also use different methods for determining the cost of overhead that is allocated to each JON. The Army and the Navy charge overhead to each JON on the basis of a budgeted rate. Each year, depots project their overhead costs and workload (in direct-labor hours) and develop overhead rates per direct-labor hour for each workcenter. During the execution of the budget, variances accumulate between the actual overhead costs incurred and the overhead costs charged to JONs (using the budgeted overhead rates). When those variances become large enough, the overhead rates are changed to reflect the actual overhead costs; however, work already completed is not adjusted for the new overhead rates. *As a consequence, the overhead costs charged to JONs may not necessarily equal the amounts reflected in the general ledger accounts.*[6]

The Air Force uses a different approach. It distributes the actual overhead costs each month to a JON. With this approach, there should be reasonable agreement between the costs distributed to the JONs and the costs entered into the general ledger accounts for the depot financial accounting systems.

Observations About Depot Overhead Accounting

Direct Labor Hours

The depot cost accounting systems operated by all the Services allocate overhead costs to JONs using some form of direct labor hours (either actual or earned hours). Much of the recent managerial accounting literature (discussed in Chapter 3) indicates that allocating overhead on the basis of direct-labor hours is a poor method for distributing overhead costs to products because it causes systematic distortions in product costs.

We observed that managers at the depots employ significant initiative and ingenuity to live with the "standard" systems and at the same time to develop valid product cost information than can be used to make competitive pricing decisions and to plan future workloads. The differences in how the Service depots account for utilities illustrate the range of approaches we found.

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[5] Differences in the way utilities are treated in the Service depots' accounting systems is discussed in more detail later in this chapter.

[6] This problem affects the quality of product cost information that is provided to OSD (Logistics) in the DoD Instruction 7220.9 Depot Cost Accounting Data maintained at the Defense Manpower Data Center.

Utilities

Anniston Army Depot spends considerable time and effort to determine the amount of the total utilities produced or procured by the host activity that should be charged to the depot maintenance mission. (The depot is one of several missions at this base.) A combination of techniques (e.g., engineered standards, metering, and square footage) is used to make these calculations. However, once an amount is determined, the depot treats utilities as a G&A cost, and the same utility overhead rate per direct-labor hour is used to distribute utilities' costs to all products at the depot.

At Oklahoma City, the maintenance depot can identify the utilities it consumes and thus pays for its utilities directly to the base host activity. Because many depot maintenance activities are located in one very large building, utility bills for that building are allocated to each production division using a combination of techniques similar to those used at Anniston (e.g., engineered standards, metering, and square footage). The object of this allocation is to approximate the amount of utilities each production division actually consumes. This share of utilities is then treated as a production overhead expense. Each production division has a unique overhead rate per direct-labor hour that is applied to all products produced within that division.

The NADEP-Jacksonville and Warner-Robins depots have defined their production divisions around major end-items. At these locations, depot maintenance functions are located in a number of smaller facilities. By design, many of these individual facilities are occupied by only one production division. As a result of metering each of those facilities, the cost of electricity consumed, for example, is visible by individual major end-item (e.g., the P-3, F-15, C-141, or J-52).

The overhead accounting actions taken by depots have improved the overall accuracy of product costing of the Services' standard systems by improving the accuracy of utility bills paid by the depots and by identifying utility costs more closely with individual products.

Special Efforts to Improve Product Cost Information

All the depots we visited have made an effort to move overhead costs closer to the individual products. Warner-Robins and NADEP - Jacksonville have made major efforts. NADEP - Jacksonville has undergone extensive process reviews of both direct production functions and many overhead support functions. The NADEP reports that these reviews have allowed them to trim G&A and production overhead costs by 15 percent and reduce direct costs by 25 percent on the J-52 engine without sacrificing customer satisfaction. These reductions resulted from improved processes and more accurate overhead allocation. Another benefit of these process reviews was the identification of the cost drivers for overhead functions. NADEP - Jacksonville now uses that information to "pass down"

budgeted overhead costs to the workcenters or production divisions that benefit from those support functions. Once these distributed overhead pools are established, the standard cost accounting system is used to develop workcenter-specific overhead rates per direct-labor hour.

Warner-Robins has taken a similar approach; however, because the Air Force's "standard" cost accounting system distributes actual incurred overhead costs to JONs, its system must allocate actual costs to overhead pools and then distribute those overhead pools to individual JONs. To do this, Warner-Robins creates pseudo-general ledger accounts within each standard general ledger account. In the standard Air Force depot cost system, general ledger account numbering can be as long as six digits. However, the actual numeric coding for GLAs is only five digits long. WR-ALC uses the "unused" sixth position to designate pseudo-general ledger accounts within each GLA. For example, the GLA code for printing and reproduction and illustrative pseudo-accounts are as follows:

General ledger account	56550	Printing/reproduction
Pseudo account	56550.1	Production division A
Pseudo account	56550.2	Production division B

Each pseudo account represents a production division or workcenter that benefits from that overhead expenditure. The expense in the general ledger is distributed to the pseudo accounts on the basis of the cost drivers for that resource. Warner-Robins can use any number of cost drivers to allocate general ledger accounts to pseudo accounts. (For example, the general ledger account "G&A office supplies" is distributed to pseudo accounts on the basis of the total number of personnel in each production division. Their rationale is that both direct and nondirect personnel in a production division benefit from this expense.) Distributing actual expenses to these pseudo accounts or overhead cost pools is a detailed and largely manual process that is performed each month by cost accounting personnel. However, once the distribution to the pseudo accounts is accomplished, the standard system then allocates these overhead pools to individual JONs using earned, standard-labor hours.

To the degree that workcenters perform homogeneous work, both the NADEP - Jacksonville and the Warner-Robins approach should produce reasonably accurate product costs for major end-items like aircraft and jet engines. However, for component repair activities (which is 40 percent of the total depot workload), it is impractical to establish workcenters for each of thousands of reparable items. Here, even these elaborate schemes may not preclude significant product cost distortions because the final allocations to JONs are still based upon labor hours. Chapter 3 examines why these distortions occur and what can be done to minimize their impact on unit repair costs.

BASE OPERATING AND SUPPORT COSTS

Service depots are located on military installations. Host military installations pay for the cost of operating their installation. Frequently, many of the BOS costs or "housekeeping" costs (e.g., motor pool, personnel and communications) are provided "free" to the tenants that benefit from the support. In some situations, tenant organizations (e.g., Service depots, DoD agencies and military units from other Services) reimburse the host for BOS.[7] The second objective of our base visits was to determine how the Services calculate reimbursements for BOS services provided to tenant organizations and then to use this baseline to determine if ABC techniques are applicable.

DoD Instruction (DoDI) 4000.19, *Interservice, Interdepartmental, and Interagency Support* specifies the support functions for which a host can be reimbursed for the services it provides to tenants. DoDI 4000.19 also *suggests* appropriate bases for calculating the amount of the reimbursement. The suggestions are intended to be used as guidelines; if more appropriate methods are available, then they are to be used. The guiding principle is that the amount of the reimbursement should reflect the cost of providing the service and the amount of that service consumed by the tenant.

We found a number of issues that need to be addressed. They are described in the paragraphs below.

Issue 1: Mission Costs

The algorithms suggested in DoDI 4000.19 for calculating BOS reimbursements, do not allocate all BOS costs to the missions at a military installation. For example, the cost of the Safety Office is reimbursed on the basis of the number of assigned personnel (military and civilian). DoDI 4000.19 suggests that the tenant's share of the cost be calculated as follow:

$$\frac{\textit{Tenant assigned personnel}}{\textit{Total assigned personnel}} = \text{Tenant's share of Safety Office.} \qquad \text{[Eq. 2-1]}$$

Because the total assigned population includes the military and civilian personnel providing BOS services, the above algorithm will not allocate all BOS costs to the missions at the installation. In other words, the BOS function is considered a mission of its own; some of the BOS is expended to support itself. The Navy and Air Force calculate BOS reimbursements using this approach. The Army, however, does not.

[7] For example, a Navy unit may be stationed on an Air Force base.

At the Army base we visited, we found a different approach. When Army installations calculate BOS reimbursements they use a slightly different algorithm. Again, using the Safety Office for illustration:

$$\frac{\textit{Tenant assigned personnel}}{(\textit{Total assigned personnel}-\textit{BOS assigned personnel})} = \text{Tenant's share of Safety Office. [Eq. 2-2]}$$

This formulation implies that BOS is not a separate mission. It exists only to support the direct mission organizations, both those of the host command and those of other commands located at this installation. All other things being equal, the per capita reimbursement will be higher using the Army method. In the case of Oklahoma City, using the Army method would result in approximately a 19 percent increase in G&A costs charged to the depot maintenance mission.

There are valid arguments for either calculation method. Deciding which is the proper approach to use is a interesting policy question that is, outside the scope of this report. As discussed in the next chapter, ABC can support either approach. It can separate BOS costs into those that are facility-sustaining (e.g., the minimum staffing required to have a BOS function) and those that vary with activity levels.

Issue 2: Utility Bills

All BOS costs at a base need not be allocated to customers. For example, at two depots we visited, depot electricity consumption is metered. The depot then directly pays the electricity bill (a procedure formally known as "direct cite" billing). No problems are evident from using this approach. In fact, DoDI 4000.19 encourages the use of actual costs (if available). However, all tenants do not have utility metering equipment; hence, they must pay their share of utility bills using reimbursement procedures. Here, we found a problem with the algorithm used to calculate the reimbursement. For example, if square feet of building space is used to calculate electricity reimbursements; the total square feet of building space used in the denominator includes the areas of the buildings occupied by the direct cite customers. Consequently, the reimbursements for nondirect cite customers is understated. The allocation algorithm should remove the area of buildings occupied by tenants who pay their electricity bills using direct cite procedures before reimbursements are calculated. Equation 2-3 shows the revised algorithm:

$$\frac{\textit{Tenant Sq. Ft.}}{(\textit{Total Sq. Ft.}-\textit{Direct Cite Sq. Ft.})} = \text{Nondirect cite Tenant's share of electricity cost.}$$

Issue 3: Data Capture and Structure

The two issues above raise a third issue related to how BOS data are captured in the accounting data reported to OSD and how those data are structured in the Futue Years Defense Program (FYDP). A previous LMI study shows that

the unreimbursed BOS expenditure remains in the major force program element of the host organization.[8] This practice distorts the costs reported to OSD. For example, the Army Training Program (Force Program 8) includes $680 million of support provided to nontraining missions located on Training Command bases. Other force programs provide approximately $180 million of support to training functions located at other Army installations. The net effect is that the apparent cost of Army training programs are overstated by $500 million.

Issue Summary

Improving the information reflected in the FYDP data base will require resolving the first two issues (i.e., 1 and 2). Some have suggested that BOS should be stockfunded. Making customers pay for BOS services would provide better visibility of the cost of each mission within the FYDP data base. OSD has put the issue of stockfunding BOS on the back burner. However, improved visibility can be obtained without stockfunding BOS. Using ABC, the proper amount of benefit can be calculated for each mission program. Then, memo entries for those amounts can be included in the system.

[8] LMI White Paper. *A Cost Methodology for Institutional Training*, David V. Glass, July 1993.

CHAPTER 3

Activity-Based Costing

INTRODUCTION

When indirect and G&A costs are viewed from the perspective of production volume changes, they often appear to be invariant or "fixed." Ironically, those so called "fixed" costs have been the fastest growing segment of corporate budgets. By the mid-1980s, the problem of high and rising overhead costs ranked only behind quality as the primary focus of manufacturing executives.[10] In response to this concern, academic researchers began rethinking how cost accounting systems should treat overhead costs. Eventually, this new approach became known as activity-based costing (ABC).

In this chapter, we examine what ABC is, its background and how it evolved, why ABC is applicable to the depot environment, and the experiences to date with ABC pilot programs in the depots.[11]

WHAT IS ACTIVITY-BASED COSTING?

In 1985, Miller and Vollmann published "The Hidden Factory." They were among the first to suggest that, ". . .the key to managing overhead is to control the transactions that drive (overhead)."[12] As the new approach matured, it has been referred to by several names such as: Transaction Accounting and Strategic Cost Management; however, the most common term used today is activity based costing.

Conceptually, ABC is very simple. Organizational operations are broken down into the fundamental activities that describe what an enterprise does: how resources are spent and the outputs of each activity. ABC is a significant departure from traditional accounting systems:

- Traditional accounting systems view an organization as a collection of general ledger resource accounts (e.g., salaries and travel). They focus on amounts spent.

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[10] Michael R. Ostrenga, et al., *The Ernst and Young Guide to Total Cost Management*, New York: John Wiley and Sons, 1992, p. 143.

[11] Our discussion will provide highlights of ABC. Among others, some useful references are the Ernst and Young guide (see footnote 1) or *An ABC Manager's Primer*. Institute of Management Accountants. Gary Cokins, et al. Montvale, New Jersey, 1993.

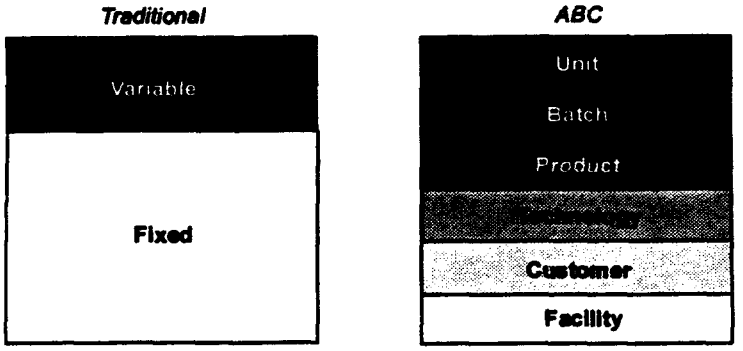
[12] Jeffrey Miller, and Thomas Vollmann. "The Hidden Factory," *Harvard Business Review*, September - October 1985.

- ABC is based on the principle that activities (e.g., moving materiel, placing orders) consume resources, whereas products consume activities. It views the organization as a collection of activities that consume resources. ABC focuses on *why* resources are spent.

Rather than accepting overhead costs as being independent of workload and simply allocating overhead costs to products, ABC assigns overhead costs to each product proportional to the benefit each product receives from each overhead function, resulting in more accurate product costs. Helping managers understand what causes overhead also helps them perform process value analysis and eliminate or reduce low value-added functions or make high-value functions more efficient.

Product Costing

Figure 3-1 contrasts the cost classifications used by traditional and ABC accounting systems. Traditional systems recognize only one cost driver: production volume. Typically, they classify all costs into two categories: those that can be directly associated with the number of units produced (i.e., variable costs) and those that cannot (i.e., fixed costs or overhead costs). The cost classification ABC uses is much richer. Costs are divided into the following six categories.



Source: Robin Cooper, *Journal of Cost Management*, Fall 1990, page 4.

Figure 3-1.
Cost Classification used by ABC and Traditional Accounting Systems

- **Unit.** Some costs vary directly with production unit volumes. These are the costs that traditional accounting refers to as variable. Note, however, that the true size of this category is much smaller than that assumed by the traditional accounting systems.

- **Batch.** Batch-related activities are also considered variable in traditional accounting systems; however, they are not driven by the total number of

units produced. Instead, they are driven by the number of production batches. Examples of batch-related activities include machine setups, material requisitions, and inventory shipments, which are all production overhead functions at the depots.

- **Product.** Product-sustaining activities are performed to produce a product. They include engineering activities such as preparing special orders, building bills of materials, and redesigned processes. These activities are either production overhead or G&A functions in the depots.

- **Technology.** Technology-sustaining activities are activities related to the types of technology used by the enterprise. Some examples include equipment maintenance, training, and software support for computer-aided equipment. These activities are shop support, production overhead, or G&A costs in the depots.

- **Customer.** Customer-sustaining activities are undertaken to ensure customer satisfaction. Some of these activities include expediting orders, resolving complaints, etc. In the depots, these activities are production overhead functions.

- **Facility.** Facility-sustaining activities correspond to the "fixed" costs in the traditional accounting approach. Those activities are undertaken to allow production to occur; they include heating the building, custodial services, and renting facilities. These activities are not related to changes in the level of the above activities. Once established, the level of these activities remains unchanged until management action is taken to change them. Consequently, these are often referred to as "discretionary fixed costs." As with the unit volume variable group, ABC systems usually find truly "fixed" costs to be much smaller than with traditional accounting systems. These are usually G&A functions in the depots, although some facility-sustaining functions (e.g., utilities) are treated like production overhead to better match their cost within the products that consume those functions.

As the amount of fixed costs has grown in relationship to variable costs, production costing in traditional systems has continued to rely on volume related measures (e.g., direct labor hours and machine hours) to allocate overhead costs to individual products. While these volume-related measures are readily available, they have little or no causal relationship with many overhead items and have been shown to systematically distort product costs. In the depots, even the distribution between fixed and variable cost is lacking. One is left to characterize direct costs as variable and nondirect costs as fixed.

ABC promotes a more complete understanding of activities that affect product costs (i.e., the cost drivers) by focusing on the activities that consume resources. That understanding, in turn, provides a rational basis for assigning overhead costs to individual products on the basis of their use of various activities.

Figure 3-2 illustrates how ABC assigns costs to individual products. Traditional systems must *allocate* all overhead costs to products. They rely on volume-related measures (for example, depots use direct labor hours – either earned or actual) that do not have a causal relationship with overhead. With ABC, most of what would be allocated in traditional systems can be directly *traced* to individual products by using activities to link resources to products.

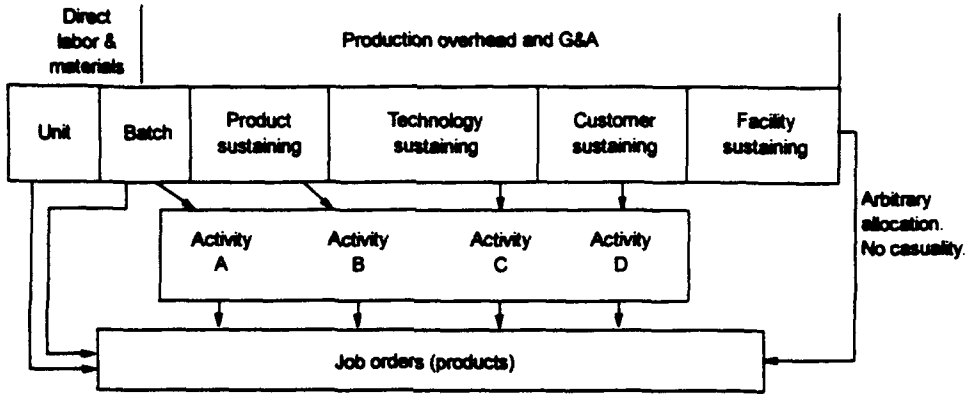


Figure 3-2.
ABC Uses Activities to Trace Overhead Costs to Job Orders

In activity based costing, direct costs are traced directly to individual job orders (JONs)[4] and **most indirect costs are *traced* to JONs on the basis of the cost of the overhead activities consumed by *each* product.** By focusing on the activities (e.g., the number of machine setups or the number of material orders) that each product consumes, product costs are obtained simply by summing the costs of activities, such as setting up machines or placing orders, consumed by each distinct product. Only facility-sustaining costs must be allocated to individual products because there is no causal link between these activities and individual products.[5]

Process Value Analysis

Thus far, we have discussed only one aspect of ABC: the assignment of costs to individual products. Another aspect – the process view – emphasizes the management of the individual processes or activities. The cost-assignment view

[4] In cases where direct-labor costs are minimal, they may be allocated like indirect costs. The logic is that the cost to collect the exact amount of labor is large relative to the potential error.

[5] The appropriateness of distributing "fixed costs" to individual products is the subject of much debate between practitioners and academia. While the substance of that debate is beyond the scope of this research, we should note that ABC provides better visibility of the costs that are truly "fixed" than do traditional accounting systems.

of ABC can be implemented without the process view; however, if managers find that the "real" cost of a product is too high, they will not know why it is too high nor will they know what to change. The process view of ABC gives management the information it needs to assess why a product costs too much, to determine what changes to make, and to monitor and evaluate the effect of those changes.

When the process view is implemented, ABC becomes a management tool that is compatible with business process analysis espoused by TQM. [When the two approaches are integrated, the term activity-based management (ABM) is sometimes used.] Managers can only change product costs by controlling or eliminating the cost-drivers of each activity consumed by a product. The process view of ABC provides managers with product specific information on the number of activities, the type of activities, the cost of each activity, and why each activity is being performed (i.e., the cost driver).[6] With this information, management can improve operational effectiveness by prioritizing cost-improvement efforts, eliminating low value-added steps or procedures, or redesigning or reengineering corporate processes (both on the shop floor and above the shop floor in the "hidden factory"), and then measuring performance against realistic cost-reduction goals and/or realistic operating budgets.

ABC Facilitates Strategic Planning for Overhead Functions

ABC provides information about *current* workloads performed using *existing* processes and policies that can be used for both product costing and for process value analysis. *However, if both the cost assignment* and process view aspects of ABC have been integrated, it can also be a valuable tool for strategic planning and budgeting of overhead activities by providing resource information for *programmed* workloads using *revised* processes and policies.

Detailed planning systems already build the direct labor and materials budgets for individual workcenters on the basis of the programmed workload by product, the labor-hour content for each product, and the bill of materials for each product. If both the cost assignment and process views of ABC have been implemented, then detailed links between products and overhead functions have also been established. In effect, these links are the "bill of activities" for overhead functions. They describe the amount of each overhead activity required for each product. By reversing the process, different workload mixes (either programmed or anticipated) and alternative process changes (either approved or planned) can be input to the ABC information system. Using procedures similar to those used to estimate workcenter requirements for direct labor and materials, ABC will also estimate overhead resources by overhead support function (e.g., process engineering department, or shipping department).

By comparing a support function's forecast level of resources with its current level of resources, ABC can calculate resource imbalances for overhead

[6] Experience from actual ABC projects indicates that one of the more insidious root causes of low value-added cost-drivers stems from inappropriate or obsolete policies, procedures, and performance measurements.

support functions. In the depots, any imbalances in overhead functions must be addressed during the budgeting cycle as special cases; there is no "automatic" adjustment to workload changes.

How does ABC Compare with Traditional Cost Accounting Systems?

There are substantial differences between product costs obtained using traditional cost accounting procedures and those calculated using ABC. The differences are the result of a systematic bias in traditional cost accounting systems that rely on volume-based allocations (e.g., labor hours and machine hours) to allocate overhead costs to products: those *volume-based allocations systematically under cost low-volume products and systematically over cost high-volume products.*

The problem with using volume-based measures (e.g., direct labor hours, machine hours, or even multiple volume-based measures) is that many overhead costs do not vary directly with production volumes.[7] The diversity and complexity of the organization, not its magnitude, drives the size of overhead functions. Support departments expand to cope with the additional complexity of more products, leading to increased overhead. A manufacturing firm producing 1,000 units each of 100 different products will have more requirements for overhead activities than a firm producing 100,000 units of 1 product. Low-volume products create more transactions (e.g., shipments, inspections, set ups, and orders) *per unit* than do high-volume products.[8] Those transactions, in turn, drive the size of support departments (e.g., purchasing, shipping and receiving, and scheduling).

When volume-based allocations are used, the cost of the additional overhead services is distributed to all products within a workcenter. If the workcenter has only one product or if it has a mix of very homogeneous products, such allocations may have a minimal effect on product costing. However, if the workcenter is responsible for a nonhomogeneous mix of products, then volume-based allocations will systematically distort reported unit production costs: low-volume items will appear to cost less and high-volume items will appear to cost more than their actual production or repair costs. As we noted earlier, this effect can be substantial.

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[7] Multiple allocation bases allow for products that do not have the same mix of labor materials and capital.

[8] *Accounting and Management: Field Study Perspectives.* William J. Burns, Jr., and Robert S. Kaplan, eds. Boston: Harvard Business School Press, 1987. Chapter 8, Cooper and Kaplan. *How Cost Accounting Systematically Distorts Product Costs.* p. 219.

ABC Application in a Depot Environment

The current cost accounting systems within DoD rely on a two-stage cost allocation scheme similar to accounting practices in many commercial firms. In the first stage, overhead costs are assigned to workcenter overhead pools; in the second stage, those overhead pools are allocated to individual products.

The four Service depots we visited use a variety of allocation techniques to perform first-stage allocations (i.e., assign depot maintenance overhead costs to workcenters). Despite the relative care taken by some depots in making those first-stage allocations, all the depots perform second-stage allocations on the basis of direct-labor hours (either actual or earned standard). This is a situation largely dictated by the requirement to use Service-standard accounting systems.

To minimize product cost distortions, both NADEP-Jacksonville and Warner-Robins Air Logistics Center have structured their production divisions around homogeneous aircraft and engine repair workloads. "Back shops" supporting these workloads also have been organized so that each workcenter performs homogeneous functions (e.g., computer-controlled grinding functions are in one workcenter and routine grinding functions are in a separate workcenter). For these easily identifiable homogenous workloads, unit repair costs are probably not too biased by the use of volume-based second-stage allocations. However, between 35 and 50 percent of the depot workload is for component repair.

For component repair, we believe that using volume-based second-stage allocations will seriously affect product costs. This workload is far from being homogenous. It is comprised of thousands of different types of items and it requires a wide range of technologies (ranging from archaic vacuum tube designs to the latest state-of-the-art microelectronics). Furthermore, just a few items account for most of the total component repair workload. (Personnel at NADEP-Jacksonville estimate that 100 of the 1,800 types of components repaired each year account for nearly 95 percent of the total component repair workload at their depot.) Other studies have shown that in the commercial world, overhead can be misallocated by several hundred percent between high- and low-volume products when volume based allocations are used.

Distorted product costs are a problem for three reasons: First, it is difficult to improve the processes within a depot if the costs of the processes and their outputs, the products, are not known; it is difficult for depot managers to minimize costs if they do not know the costs. Second, if the prices charged by the depots for their products are distorted, decisions made by customers on the basis of those prices will also be distorted. Pricing signals will be incorrect, leading to uneconomic decisions by the consumers of depot products. Third, accurate product costs are needed to make good decisions on the workload that should be competed, on the level of workload that should be retained in organic depots to leave an economic level of activity, and on the most efficient source for interservicing. For example, an interservicing decision could be made on the basis of defective product pricing (caused by volume-based second-stage allocations

where high-volume workloads cross-subsidize low-volume workloads). If depot "A" gained a high-volume workload from depot "B" and depot B cannot reduce its overhead by the amounts implied in the proposed unit repair cost, then DoD will likely spend more for depot maintenance.[18] Clearly, this would be an uneconomic decision. Ironically, the overhead costs from the retained workload will be allocated disproportionately to the remaining high-volume workloads making them appear even more costly and hence, more vulnerable – a process some have described as a "death spiral" into extinction.

If DoD wishes to pursue competition, the cost accounting systems that Service depots use must be improved to provide information that will ensure that competition results in economic decisions for DoD. Such information is not readily available now.

How ABC Has Been Used in Service Depots

Three of the four depots we visited have some experience with ABC. They all agree that a major byproduct of ABC is that, by focusing attention on processes, management has a much better understanding of the cost structure at the depot.

Anniston Army Depot

Anniston has completed a pilot study of ABC. That study illustrates some of the unreasonable consequences of the current cost-allocation scheme. For example, the small arms shop is being charged depreciation for an automated storage and retrieval system that it does not use. While management thought that ABC was useful, they also felt that ABC could not be implemented beyond the scope of their pilot study because the information needed about cost drivers is not available in the standard depot reporting systems.

Naval Aviation Depot - Jacksonville

Naval Aviation Depot - Jacksonville is enthusiastic about ABC. All the personnel we interviewed agree that they have a much better understanding of the cost structure at the depot as a consequence. Many of the changes made at NADEP - Jacksonville are consistent with published TQM and ABC literature; however, they say that many of the more significant changes (e.g., process reviews and G&A distribution based on benefit) were made before they became aware of the ABC literature. Management simply applied management and industrial engineering principles to a specific task. By viewing the cost of

[18] This will almost certainly be the case because too much overhead was mistakenly allocated to the high-volume product and too little was allocated to the low-volume product. Consequently, revenues earned by the remaining product mix will fall short of overhead charges incurred.

individual processes they were able to pinpoint areas needing more in-depth analysis.

While the management at NADEP - Jacksonville has benefited from ABC, the cost accounting system, *per se*, has not been changed to reflect ABC. NADEP - Jacksonville must use the Navy's standard depot accounting system. ABC principles are used to develop overhead pools (see discussion in Chapter 2); however, to interface with the standard system, those overhead pools are converted to overhead rates per direct-labor hour. Each JON receives its share of overhead on the basis of the number of direct labor hours it consumes.

Because they cannot collect cost driver information within the cost accounting system or use that information to distribute overhead costs to JONs, NADEP - Jacksonville personnel are forced to perform labor-intensive, off-line strategic planning for new workloads, for altered workload mixes, or for changed repair processes. The level of effort needed to support strategic planning for just a small number of issues (competing one or two products each year) is already stretching manpower resources thin. The level of effort needed to compete with commercial firms for many product workloads may not be sustainable.

Warner-Robins Air Logistics Center

Depot personnel noted that they too have performed process improvements consistent with TQM and ABC literature. They have obtained significant reductions in both direct and overhead costs and still maintained the quality and timeliness of their products. WR-ALC is required to operate the Air Force standard depot cost accounting system. Like NADEP - Jacksonville, they also have made refinements to their Service-standard system on the basis of their ABC experiences. (See discussion of the use of pseudo-general ledger accounts in Chapter 2.)

As a result of using the standard system, all second-stage allocations are still made using earned, direct standard labor hours. However, the Depot Maintenance Management Information System (DMMIS), being developed to replace the Air Force's standard depot information systems, will be able to make second-stage allocations on the basis of numerous schemes. DMMIS will use many of the off-line procedures currently used by WR-ALC and could bring ABC closer to fruition than does any other Service-standard system. However, our impression is that the second-stage allocation schemes that will be used within DMMIS are still primarily volume-based measures. Without the ability to collect and use transaction data to trace production overhead and G&A overhead pools to individual JONs, a cost accounting system like DMMIS will not harness many of ABC's potential benefits.

CONCLUSIONS

The Service depots are very complex industrial operations with the ability to repair thousands of different end items that require a wide array of repair technologies. This complexity and diversity in both products and technologies places extra demands on the overhead support functions.

Traditional cost accounting systems that rely on volume-related measures (such as direct-labor hours) to allocate overhead costs do not allocate those costs to products proportionately with the demands that individual products place on overhead support functions. These volume-related methods systematically distort the cost of low-volume workloads by falsely attributing the relatively large support burden that these workloads generate to high-volume workloads.

Depot cost accounting systems must be able to accurately relate the cost of overhead support functions to products in a manner that reflects the benefit each product receives. ABC has been shown to be a major step forward in calculating product cost information that reflects the burden each workload places on overhead support functions. To trace overhead support costs to individual items, ABC uses activities that the support functions perform (e.g., the number of material orders) and that products then consume.

Accurate product cost information is especially essential as DoD continues to downsize, explores alternative logistics support structures, and rethinks contract versus organic workload. DoD is currently studying standard information systems for use within the depots and the Air Force is nearing completion of the DMMIS. To obtain the information needed to make sound economic decisions, these new information systems must be fully capable of supporting ABC.

CHAPTER 4

Implementing Activity-Based Costing

INTRODUCTION

In the past, maintenance depot cost accounting information has been primarily used to help determine the stabilized rates to be charged for depot products. In addition, financial accounting was used to keep track of whether these industrially-funded activities were "breaking even," (that is, if costs were matching revenues).

More capability is now required of cost accounting systems in the maintenance depots. Depots must develop product costs that can be used to determine the most cost-effective source for interservicing. Higher headquarters must be able to assess the cost of excess capacity in the depot system and the savings available from reducing it. Depot customers, particularly their ultimate customers the operating units, are now price-sensitive. Therefore, to send the correct economic signals, depot prices must be accurate. In short, for correct economic decisions to be reached concerning depot capacity, operations, and products, better cost information is now a necessity.

The environment that the depots operate in has changed. New cost information is needed. We have discussed how ABC can provide a way to develop the necessary cost information. We now consider what the benefits and costs of implementing this new approach might be and the steps that a strategy might take to achieve implementation.

THE BENEFITS OF BETTER PRODUCT COSTING

Interservicing and Competition

Interservicing and competition are ever-growing concerns at the depots. Accurate cost information is needed to identify the most efficient source of depot services, to identify the workloads that should be sent for interservicing, and to determine whether or not it is truly economical for the government to award the workload to the winner.

To put together an accurate bid for a given workload, an organic depot must be able to determine the costs it will incur to perform the work. We have shown that there are some difficulties in doing this using current cost information. Most depots have to resort to laborious manual calculation methods to come up with a bid that properly reflects expected costs. One benefit of employing an

ABC approach would be to make those calculations less laborious and more accurate by showing current product costs, including nondirect costs.

Another benefit of ABC would be to show what the cost consequences would be if workload is transferred. This calculation should take into account not only volume-variable costs but also product – or customer – variable costs if the workload involves the elimination of an entire product line or customer. Accounting for changes in all these costs would help identify the costs to the government of losing a large workload. A recent Army Audit Agency report found that the several depot competitions resulted in larger overall costs to the Army because indirect costs remained in the organic depots when workloads were lost; this offset the savings from the lower direct costs for the competed workload.[1]

Before competitions were entered into, the ABC approach would give a better indication of the workloads that should be competed. This would result from the more accurate distribution of overhead costs between high-and low-volume workloads. As we have noted, traditional volume-based approaches have tended to assign too high a share of overhead to high-volume products and too low a share to low-volume products. If high-volume products are competed, the depots could be bidding too high using conventional costing methods. This could result in losing a large workload and very little overhead. Conversely, if low-volume workloads are competed, if someone else wins the bid, it may be possible to eliminate a relatively large amount of overhead costs. An ABC approach would make it more likely to compete workloads of interest to the depot and have the results of that competition be economical for the government.

Pricing

Incorrect pricing for depot services will send incorrect signals to the purchasers of those services and cause incorrect decisions to be made. With the new emphasis on stock funding depot-level reparables, sending the correct economic signals becomes increasingly important.

The idea behind stock funding is to give local commanders information about how valuable these assets are and to give them the option of using O&M money to buy those assets or to take some other action to further their unit readiness. If the price paid for an item is too high, they may make nonoptimal decisions and unit readiness may suffer. Another possibility is that although commanders' local budgets may be better off, as a consequence of their decisions, the Service may end up paying more. This could be the case if local repair is chosen over depot repair for one of two reasons: first, because local costs, such as military personnel or equipment, might be provided free to the local commander; or second, because the price charged includes a large

[1] Review of *Defense Management Report Decision 908 (Consolidation of Depot Maintenance)*, Information Memorandum NR 92-R3. U.S. Army Audit Agency, Alexandria, Va, 7 February 1992.

percentage of costs that do not change with volume, and they would have to be paid by the Service regardless of demand.

Although, by itself, pricing depot services correctly cannot solve the problem of sending incorrect signals to the final customer, it is a necessary first step.

Other Benefits

At the depots themselves, an ABC approach should help the local managers in two significant ways. First, by utilizing the process view, ABC promises to improve maintenance process overhead activities. Second, ABC makes budgeting for overhead costs more automatic and allows "what-if" scenarios to be analyzed with much less manual effort than is now the case.

At higher levels, ABC should help provide the information needed to reach economic decisions on depot closures and consolidations. Referring again to Figure 3-1, the ability of ABC to provide information about the costs that vary with each aspect of depot maintenance, whether the unit, batch, product, technology, customer, or facility variable, makes it invaluable for such decisions. Consolidating workload makes economic sense only if there is a great disparity in direct costs or if overhead can be eliminated as a result. It is difficult now to readily analyze how overhead is affected by the many policy decisions of interest; ABC can provide this needed capability.

Costs

The major costs of ABC implementation will be training; the initial determination of activity cost drivers; and the subsequent design, installation, operation, and maintenance of automated systems to collect activity data. The pilot ABC efforts at Anniston, Jacksonville, Cherry Point, and other depots have shown that the determination of cost drivers can be accomplished relatively quickly. Collecting the data is a more complicated problem. The actual calculation of new overheads and other information can be readily performed by off-the-shelf commercial systems.

The major barrier to collecting the cost-driver data is that the current systems simply do not do it and redesigning those systems is fraught with problems and institutional roadblocks. On the positive side, the Joint Logistics Systems Center is planning to replace the current standard systems with a new one. The possibility of including an ABC capability in that new system should be vigorously pursued before its design is frozen. If an ABC capability could be included as part of the new standard system, the cost of implementing an ABC approach could be considerably reduced.

CONCLUSIONS

If better management accounting within the depots is to be a success, the economic environment within which the depots operate must be rational. That is, even a system that provides 100 percent accurate product costs within the depots will not lead to economic decisions for DoD if the larger environment is sending incorrect economic signals. For example, if depot product costs and repair costs are correct but the surcharge added by the supply system is not item-specific or economically sound, the final consumer may be led to make poor economic decisions that will, among other things, decrease demand for the depots' products. This particular problem will be exacerbated if local commanders do not understand the full costs of their actions; for example, if they treat military labor and capital equipment as free goods.

On a larger scale, if the Defense Business Operating Fund is recovering prior year losses through the rates charged for current depot repairs, uneconomic decisions might ensue. An interesting policy question involves the extent to which attempting to exactly match costs to revenues in every accounting period should take priority over providing good economic signals.

To determine whether implementing ABC in the depots is worthwhile may require an understanding not only of the costs and benefits for the depots, but it also requires an understanding of the financial environment in which depots are operating. This might argue for a method of management accounting within the total defense enterprise that considers the changes in the DoD system as it moves to funding infrastructure operations through reimbursements rather than through direct appropriations.

To the extent that an ABC approach enables the depot managers themselves to better manage their operations, the costs of implementing ABC may be justified in its own right. To the extent that the benefits will only accrue if the larger system is rational, implementation might await the resolution of larger scale DoD economic and accounting policy issues.

Appendix

Major Service Depots and Employee Populations

Table A-1.
Major Service Depots and Employee Populations

Depot	Civilians	Military	Total
Anniston	2,554	6	2,560
Corpus Christie	3,037	11	3,048
Letterkenny	1,348	16	1,364
Red River	1,827	2	1,829
Sacremento	0	2	2
Tobyhanna	2,642	20	2,662
Tooele	789	3	792
Army total	12,197	60	12,257
Alameda	2,383	28	2,411
Cherry Point	3,144	70	3,214
Jacksonville	2,693	26	2,719
North Island	3,282	31	3,313
Norfolk	2,803	26	2,829
Pensacola	2,385	36	2,421
Naval Aviation depots	16,690	217	16,907
Charleston	4,019	52	4,071
Long Beach	2,964	28	2,992
Mare Island	4,254	134	4,388
Norfolk	6,120	108	6,228
Pearl Harbor	3,260	50	3,310
Philadelphia	4,180	60	4,240
Portsmouth	4,031	67	4,098
Puget Sound	9,306	190	9,496
Naval Shipyards total	38,134	689	38,823
Crane	393	0	393
Louisville	1,372	0	1,372
Keyport	1,057	0	1,057
Naval Warfare Centers	2,822	0	2,822
Navy total	57,646	906	58,552
Oklahoma City	6,240	82	6,322
Ogden	4,970	132	5,102
San Antonio	7,057	69	7,126
Sacremento	5,218	62	5,280
Warner-Robins	6,374	74	6,448
AGMC	775	8	783
AMARC	576	0	576
Air Force total	31,210	427	31,637
Albany	1,073	10	1,083
Barstow	1,108	10	1,118
Marine Corps total	2,181	20	2,201
DoD total	103,234	1,413	104,647

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13. ABSTRACT (Maximum 200 words)

The current financial accounting system used in DoD maintenance depots is described, its shortcomings are examined, and a new approach that could be used to establish a management accounting system for the depots is described.

The current accounting system does not provide the information to answer questions such as: what happens to costs when workload changes, when depots are consolidated, or when product mix changes? It does not differentiate between costs that vary and costs that do not vary with respect to relevant decision variables. It also does not support product costing because nondirect costs are tied solely to direct labor hours.

A possible alternative management accounting system uses Activity-Based Costing (ABC). ABC links costs to activities and activities to products. By identifying the cost drivers for activities, it helps provide a better understanding of nondirect costs and what causes them to change. It also provides more accurate product cost information, which is essential as DoD moves to a reimbursable environment. ABC is briefly discussed. Examples of how ABC has been used in the depots are given. Also, how ABC could be applied in the future is described along with its probable benefits and costs.

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