DLA-91-P00060

Cost to Establish and Maintain a National Stock Number

OPERATIONS RESEARCH AND ECONOMIC ANALYSIS OFFICE

DEPARTMENT OF DEFENSE

DEFENSE LOGISTICS AGENCY

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DLA-LO

FOREWORD

Concurrent with the diminishing resources and increased budgetary control being experienced throughout the Defense Logistics Agency (DLA) comes the increased need for highly accurate and defensible measures of system performance. Two such measures are the costs to enter and maintain a National Stock Number (NSN) in the DLA system. Management must have realistic figures for making timely and sound decisions relating to these important processes. As explained in some detail in the accompanying report, existing cost figures for these NSN processes are deemed to be incomplete or are otherwise unacceptable for current use.

Consequently, the Engineering Programs Division of the Directorate of Technical and Logistics Services requested that the DLA Operations Research and Economic Analysis Management Support Office identify the costs to enter and maintain an NSN in the DLA system.

The study found that the marginal direct costs were approximately $50 to enter an NSN, and $250 to maintain an NSN in the DLA system for one year, based on FY89 data.

The cost data in this study can be of use in assessing item reduction studies as well as determining what level of resources should be applied to duplicate item research. The present value of removing an NSN from the DLA system would approximate $832 in direct costs, assuming an otherwise remaining life of four years. Preventing the entry of a new NSN would amount to $50 in entry costs, plus the present value of $250 for each year of the expected life of an NSN, for a total of $2283.

The study further recommends that these factors be updated periodically for inflation and major changes in productivity. Also, the accounting systems for contract management and payment should be refined to allow better tracking of costs to functional parameters (organizational, functional and category of customer support).

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I. INTRODUCTION

A. Background

With increased budgetary control being applied at virtually all levels of government operation there comes a greater need for more accurate and realistic measures of system performance. One such measure is the cost incurred when a new National Stock Number (NSN) enters the Defense Logistics Agency (DLA) system. Another indicator is the cost required to maintain an existing NSN in the system per year. This latter measure can also be of use when assessing savings from the elimination of unnecessary NSNs.

DLA decision makers need rational defensible values for assessing costs resulting from the item entry and NSN maintenance processes. Many figures from a number of studies are available. Managers hesitate, however, to use the existing cost values for a number of reasons. First, the costs vary quite widely among the reports, and second, the relationship between the entry and maintenance costs reverse themselves from study to study. That is too say, the entry cost is the larger of the two costs in one study and the smaller of the two in the next.

This difference is expected, however, as project scope, accounting method and cost definition change depending on the purpose of the study. For instance, NSN entry costs will surely differ if the scope is limited to DLA as opposed to DoD-wide item entry functions. Further, different studies include different factors and categories of cost. One study may include the impact of storage cost while the next does not. The objective(s) of the study and the purpose to which its costs will be used, to a high degree, establish the definition of study cost terms and other variables.

The Engineering Programs Division of the Directorate of Technical and Logistics Services (DLA-SE) concluded that existing NSN process costs were unacceptable for their purpose. DLA-SE requested that the Operations Research and Economic Analysis Management Support Office (DLA-DORO) define and identify DLA's NSN entry and maintenance costs.

For the purpose of this report the NSN entry and NSN maintenance costs are defined as follows:

Entry Costs are those direct costs, as opposed to overhead or indirect costs, which are incurred by DLA work units in carrying out the tasks necessary to process new NSNs into the DLA system. Item identification and supply support request responsibilities generate a large proportion of these costs.

Maintenance Costs are those direct costs which are incurred by DLA organizational units to maintain existing NSNs in the DLA system. Item management, the physical storage of items and the administration of contracts are the three primary activities generating direct NSN maintenance costs. The Defense Supply Centers (DSC), the DLA depots and the Defense Contract Management Districts (DCMD) of the Defense Contract Management Command (DCMC), respectively, perform these activities.

B. Problem Statement. System performance in the area of NSN entry and NSN maintenance processes cannot be satisfactorily measured, because accurate item entry and maintenance costs for DLA NSNs do not exist.

C. Objectives

1. To identify the cost to enter an NSN into the DLA system.

2. To identify the cost to maintain an NSN in the DLA system.

D. Scope

The focus of this report is confined to the DLA system and its organizational subunits and does not include those related processes and/or costs occurring within or between the military services, other civil agencies or private sector contractors or consultants.

All NSN costs are budgeted Operation and Maintenance (O&M), direct (labor and nonlabor) costs and, as such, do not contain stock fund, indirect, overhead or general costs. All data used in the study relate to Fiscal Year 1989 (1 October 1988 - 30 September 1989), unless otherwise noted. The cost to maintain an item in the DLA system is not applicable to bulk fuels.

The study purpose suggests the use of a marginal or incremental approach since this method is designed to measure the costs of adding or maintaining one more unit, or a relatively small number of units, to an existing system. Inversely, the marginal approach is not appropriate for large changes in the number of units (NSNs) handled which may cause overhead structural changes. Large increases in NSNs processed may well require increased facility space, computer capacity, supervisory and clerical staff and other overhead expenses. A marginal cost analysis on large quantity changes will produce a distorted cost impact.

II. METHODOLOGY

A. Source of Data. The data used in this study came primarily from three sources: a data call to the four hardware supply centers; the Office of the Comptroller, Programs/Budget Division (DLA-CB); and the DLA Integrated Data Bank (DIDB). When study data comes from another source, they will be so noted.

1. Supply Center Data Call. A data call was made to the four hardware supply centers only. The personnel support and fuels supply centers were considered so dissimilar to the other supply centers in their operations and costs that they were excluded in calculating average NSN entry and maintenance costs. The Directorates of Technical Operations (DSC-S) at the hardware centers provided the FY89 cost data for entering DLA NSNs into the DLA system.

2. DLA Comptroller Data Call. DLA-CB provided cost data for three types of DLA Primary Level Field Activities (PLFA), namely, the supply centers, the depots and the DCMDs. With the exception of the DCMDs the cost data provided were in the form of unit cost reports for FY89. The DCMDs' data were provided as gross obligations.

3. DIDB Data Used. The DIDB data source contains historical data from DLA's supply centers, DCMDs and depots. Counts of NSNs used for these DLA units, number of contracts, commodity group, and contract type were taken from the files contained in the DIDB.

B. Development of Cost Estimates

In simplest terms the NSN entry and maintenance costs are averages, wherein the direct cost of the process is divided by the number of NSNs processed to yield a per unit cost.

The working definition of direct costs was defined as any NSN entry or maintenance costs, labor and non-labor, that vary in direct proportion to changes in the volume of NSNs entered or maintained. These costs can be obviously and physically traced to the NSN entry or maintenance function. Direct costs are proportional in that cost per unit added is constant regardless of the number of units handled.

Overhead costs were defined as any costs which do not vary directly as a result of fluctuations in the quantity of NSNs entered or maintained. These costs include those that are fixed and those that may change due to large changes in NSN volume, for example, costs associated with management, facilities and clerical support.

It is important to note that given these two cost definitions, Defense Logistics Services Center (DLSC) management and technical personnel (with the concurrence of DLSC comptroller staff and DLA-S) ruled out the inclusion of any DLSC cost in development of NSN entry and maintenance costs. DLSC maintained that "...changes in NSN entry or maintenance volume do not significantly and directly impact DLSC operating costs."[1] And, "...any DLSC operating costs that might vary with NSN entry and maintenance changes are an insignificant part of DLSC overall operating costs, less than one percent (0.01) of the total." Further, it was agreed that even if these costs could be identified "...the relationships involved are so indirect that costs could not be allocated between NSN entry and NSN maintenance."

1. Average NSN Entry Cost. Average NSN entry costs were calculated using the DSC-S data call information. The data was obtained by means of a spreadsheet with a report format developed jointly by DLA-DORO, DLA-SE and the Defense Construction Supply Center's Directorate of Technical Operations. The four hardware Defense Supply Centers' Directorate of Technical Operations were required to identify all cost

1 All quotes in this paragraph are from the Minutes of DLSC NSN Entry and Maintenance Costs Meeting, 16 February 1990, Battle Creek, MI., signed by representatives of DLA-DORO, DLA-SE and DLSC Directorate of Logistics Data Management.

account codes (and their associated FY89 expenses) under the Directorate's budget. It was determined by DSC-S management and other subject matter experts what portion of each cost account codes' total cost met the direct cost definition (See Paragraph II.B.). The DSC-S staffs then determined what part of this total direct cost met the entry cost definition and what part met the maintenance cost definition (See Paragraph I.A.). Additional information on NSNs entered, as well as training, supply, and travel costs were also included in the cost reports. The entry costs from all codes and Centers were summed and then divided by the total number of new NSNs entered at the four hardware centers.

2. Average NSN Maintenance Cost. Direct NSN maintenance costs were generated in three organizational areas: the supply centers, which perform NSN management functions; the contract management districts, which are responsible for NSN contract administration; and the depots, which store the physical inventory. Therefore the cost to maintain a DLA NSN was derived from three separate costs: the cost to manage the item, the cost to manage contracts and the cost to store. The total average NSN maintenance cost is derived by summing the three average maintenance costs.

a. Cost to Manage an NSN. The DSC unit cost data for the hardware centers was provided by DLA-CB and was used to determine the total direct operating cost. This total was then reduced by the total direct cost to enter NSNs (See Paragraph II.B.1) in order to eliminate double counting. Since total direct supply center dollar expense was taken to be composed of two parts (entry and maintenance) the removal of all of one type will identify the other. The resultant total NSN maintenance cost was then divided by the average number of NSNs maintained by the four hardware centers in FY89 to yield the average NSN maintenance cost for the hardware centers.

b. DCMC Cost to Manage DLA Contracts

To determine the contract administration cost per NSN required a different approach from that of the supply centers. This was necessary because, unlike the supply centers, the DCMDs perform contract administration functions for organizational units outside of DLA; namely, the Military Services, civil agencies and others. This means that DLA's contract administration costs are a subset of total DCMC costs. Since DLA contracts differ greatly from other DCMC contracts, simple relationships could not be used to derive these costs.

DCMC direct labor costs for DLA contracts were available by type of contract (large, small, automated) and commodity group (construction, electronics, general, medical, clothing and textiles, and industrial).[2] DCMC direct labor cost per DLA contract was not available for the fuels or the subsistence commodities. Since the number of DLA contracts handled by DCMC can be similarly categorized, it is possible to calculate total DLA direct labor costs attributable to contract administration by multiplying the cost per contract type times the number of contracts in each category.

2 See Synergy, Inc., Dec 1989, Final Report, Multiple Cost Study, and DLA-LO, Aug 1985, Development of DCAS Variable Cost to Order for Department of Defense Instruction 4140.39.

To add the direct non-labor cost to the direct labor cost, the relationship between total direct cost and total direct labor cost was identified. This was possible using the DLA-CB provided DCMC cost data. The implicit assumption here is that the direct labor to total direct cost percentage is the same for DLA DCMC contracts as it is for all DCMC contracts. Associated Defense Finance Center (DFC) contract payment direct costs were then identified and added in to produce a total direct cost value.

Once a total direct cost (labor plus non-labor) for DCMC administration of DLA contracts (minus fuels and subsistence) was computed the total number of DLA NSNs in the construction, electronics, general, medical, clothing and textiles, and industrial commodity groups was determined. Total direct cost was then divided by this NSN count to compute the average DCMC contract administration cost per DLA NSN.

c. Cost to Store. The DLA-CB unit cost reports were used to determine total depot direct labor and non-labor costs for the (then) six DLA depots in FY89. Once total direct cost was determined it was divided by the number of NSNs that could possibly be stored in the depots. The bulk fuels commodity was excluded because no DLA depot stores bulk fuel. The result of the division was the average cost per NSN to operate the DLA depot system.

III. RESULTS

A. Entry Costs. The average marginal DLA cost to enter a new NSN into the Federal Catalog System in FY89 was $51.00. The total NSN direct entry cost for the four hardware centers was, $5,618,699. This total was divided by the 110,169 new NSNs entered by the four hardware centers in FY89 to yield the marginal DLA entry cost per NSN.

$$\frac{\text{Hardware Center Direct Entry Costs}}{\text{Hardware Center New NSNs Entered}} = \frac{\$5,618,699}{110,169} = \$51.00 \text{ Per NSN}$$

B. Cost to Maintain. Each of the primary NSN maintenance cost components are discussed in turn. The number of NSNs used to compute these NSN averages changes from component to component. This change is required to insure that each of the three costs to maintain components are divided by the number of NSNs that actually generated, or are associated with, those specific costs. For example, the total annual direct cost to maintain NSNs used in this study reflects the total maintenance costs incurred by the four hardware centers, not all six DLA supply centers (See Paragraph II.A.1.). Thus in the calculation of the average supply center NSN maintenance cost, the total cost is divided by the number of NSNs managed by the four hardware centers and not by the number of NSNs managed by all six DLA supply centers.

1. Hardware Center Marginal Maintenance Average Cost Per NSN. In FY89 total direct operating costs for the four hardware centers were $354,531,000. This value was reduced by that part of total direct operating expense incurred by DLA in performing center NSN entry tasks namely, $5,618,699. The remaining expense, $348,912,301, is the total direct operating costs incurred by the hardware centers in fulfilling their NSN maintenance duties. The number of NSNs managed by the construction, electronics, general and industrial supply centers for FY89 was 2,714,295.

$$\frac{\text{Hardware Center NSN Maintenance Cost}}{\text{Hardware Center Managed NSNs}} = \frac{\$348,912,301}{2,714,295} = \$128.55 \text{ Per NSN}$$

2. DCMC Average NSN Maintenance Cost for DLA Items

To determine the DLA share of DCMC total direct operating cost required the following steps. First, the total number of DLA (DCMC administered) contracts was multiplied by the DCMC direct labor cost associated with each type of DLA contract. This yielded $94,250,780 or that share of DCMC's direct labor cost to administer contracts for DLA items. It is important to note that because of the unavailability of per contract direct labor costs for subsistence and fuel NSNs, these costs were not included.

Second, since the DCMC cost for administering DLA supply contracts calculated above does not include direct non-labor expenses, it had to be adjusted. This adjustment was derived by establishing the relationship between total DCMC (for all agencies) direct cost ($569,718,000) and total DCMC direct labor only cost ($549,579,000). This equates to a factor of 1.037 and the result of applying this factor to DLA's direct labor cost was $97,738,059.

One more step in calculating DLA's total NSN maintenance cost was necessary because during FY89 a portion of DCMR Los Angeles and Defense Construction Supply Center contract payment functions was performed by DFC. The direct labor and non-labor expense associated with this activity was $5,415,812. Unfortunately, present DFC accounting information systems are unable to distinguish between DCMC and DSC contract payment costs. This causes a slight overstatement of DCMC cost but it is negated when the three average NSN maintenance costs are combined. Adding the DFC contract payment costs to DLAs share of DCMCs contract handling expense resulted in a total DLA NSN administration expense of $103,153,871. The total number of DLA NSNs, equals 2,804,125 excluding those assigned to subsistence and fuels since costs for these commodities could not be estimated.

$$\frac{\text{DLA NSN Contract Administration Maintenance Cost Less Subsistence and Fuels}}{\text{DLA Managed NSNs Less Subsistence and Fuels}} = \frac{\$103,153,871}{2,804,125} = \$36.79 \text{ Per NSN}$$

3. Depot NSN Maintenance Average Cost. The total depot NSN direct operating cost for the six DLA depots was $243,773,000 in FY89. The depot direct operating cost per NSN managed is calculated by dividing the depot direct cost by the number of NSNs managed less bulk fuels since the depots do not store bulk fuels.

$$\frac{\text{Depot NSN Direct Operating Cost}}{\text{DLA Managed NSNs Less Bulk Fuels}} = \frac{\$243,773,000}{2,838,424} = \$85.88 \text{ Per NSN}$$

4. Annual NSN Marginal Maintenance Average Cost Components. The average annual cost to maintain one DLA NSN in FY89 is the sum of the three preceding cost component averages, namely: the average annual center NSN maintenance cost, $128.55; the average annual DCMC NSN maintenance cost, $36.79; and, the average annual depot NSN maintenance cost, $85.88. The total of these costs is $251.22 and is identified as the average annual NSN marginal maintenance cost for DLA in FY89.

C. Usage of NSN Entry and Maintenance Costs

1. Cost Avoidance from Eliminating an Existing NSN

The cost to DLA to maintain one NSN in the system during FY89 has been calculated to be approximately $250 (rounded from $251.22). It is realistic to conclude that at any time a given NSN will have some number of years left in the system. When an NSN is deleted the Agency avoids the cost to maintain that NSN. Since that NSN would, had it not been deleted, have remained in the system for some future number of years it is appropriate to account for the avoidance of those future maintenance costs.

Since an average annual NSN maintenance cost is known all that is required to identify total remaining NSN life cycle maintenance cost is the number of years that the NSN would have remained in the system and the present value of those future costs. Statistical analysis of the age of DLA NSNs reveals an average NSN age of approximately sixteen years. Previous research estimates that given an age of sixteen years, an NSN will have four to five more years left in the system.[3]

Discounting the average annual NSN maintenance cost of $250 over the next four years of its expected life in the system ($250 x 3.326) gives a total present value cost avoidance of $832 accruing from the elimination of an NSN from the DLA system.[4]

3 DLA Economic Retention/Returns Limits Study, September 1986.

4 All discount factors come from DLA Manual 7041.1, Appendix C.

2. Cost Avoidance for Preventing a New NSN Entry. If a potential new NSN is screened out prior to incurring any entry expense DLA will avoid the one time cost to enter the NSN of approximately $50 (rounded from $51) as well as the average annual maintenance cost ($250) over each of its expected average twenty years in the system. Combining the NSNs average age with its expected remaining life produces an average NSN total life span of twenty years The discount factor for twenty years is 8.932 and when applied to the $250 cost is $2233. Adding the $50 entry cost to this gives a total cost avoidance resulting from denying a potential new NSN entry into the system of $2283.

IV. FINDINGS

A. Average cost to enter a representative DLA NSN into the Federal Catalog System (FCS) in Fiscal Year 1989 was approximately $50.

B. Average cost to maintain a DLA NSN in the DLA system in Fiscal Year 1989 was approximately $250.

C. Total (remaining life cycle) cost avoided as a result of the elimination of an NSN from the system was approximately $832.

D. Total cost avoidance (remaining life cycle) accrued by denying the entry of a potential new NSN into the DLA system was approximately $2283.

V. RECOMMENDATIONS

A. Study cost data be used in item reduction studies.

B. Cost factors in this report be used to determine the level of effort for research into duplicate items.

C. Study cost factors be updated periodically for both inflation and major changes in productivity.

D. Accounting systems for contract management and payment be refined to better track costs back to functional parameters (organizational, functional, customer support).

VI. BENEFITS. An immediate benefit, and one that is in keeping with the increased awareness of system costs, is the ability of management to make cost beneficial decisions relative to the level of resources which should be applied in any given item reduction study. Other benefits of the study include increased understanding of DLA's NSN entry and NSN maintenance process cost components and therefore increased management ability to control these costs. Lastly, the study information provides a starting point for assessing the impact of large scale changes in DLA NSN quantity in that all the direct costs of such changes have been identified requiring only additional analysis of the related overhead expenses to yield a complete cost impact analysis of a large scale change in NSN quantity.

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13. ABSTRACT *(Maximum 200 words)*

With increased budgetary control being applied at virtually all levels of government operation, there comes a greater need for more accurate and realistic measures of system performance. One such measure is the cost incurred when a new National Stock Number (NSN) enters the Defense Logistics Agency (DLA) System. Another indicator is the cost required to maintain an existing NSN in the system per year. This latter measure can also be of use when assessing savings from the elimination of unnecessary NSNs. System performance in the areas of NSN entry and NSN maintenance processes cannot be satisfactorily measured, because accurate item entry and maintenance costs for DLA NSNs do not exist. This study found that the marginal direct costs were approximately $50 to enter an NSN, and $250 to maintain an NSN in the DLA system for one year, based on FY 89 data.

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