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13. ABSTRACT

A model is developed to measure productivity of DARCOM's central procurement offices. The model incorporates the concept of measuring the procurement function by other than the total number of procurement actions. The amount of man-effort to award a PWD is explained as a function of the dollar amount, and method of procurement. Similarly, a number of contractual type documents are weighted to explain the amount of man-effort needed to administer these documents. The total number of weighted PWD's and weighted contractual documents together account for the output of the P&P Directorates. This weighted output in the two areas of procurement operations and contract administration lends more credibility to the productive output of a P&P Directorate than simply total number of procurement actions.

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MEASURING PRODUCTIVITY IN DARCOM'S - CENTRAL PROCUREMENTS OFFICES

by

Charles A. Correia

Frank Kelsey

FEBRUARY 1978

Information and data contained in this document are based on input available at time of preparation. Because the results may be subject to change, this document should not be construed to represent the official position of the US Army Materiel Development and Readiness Command unless so stated.

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EXECUTIVE SUMMARY

A. BACKGROUND. The US Army Materiel Development and Readiness Command (DARCOM) Comptroller has developed a composite efficiency index to measure the efficiency of the commodity commands and depots within DARCOM. Basic data elements from the four functional areas of supply, maintenance, base operations, and procurement are used to develop productivity indices of dollars and manpower. These indices are then combined into a composite efficiency index measuring each activity over time against itself.

B. PROBLEM. Currently, the output measure for the workload of the procurement and production directorate of an activity is given in terms of procurement actions and procurement line items processed. The input measure is given in terms of manyears and cost expended identified in the Army Management Structure Code by PE 721113 to include manyears and cost expended in procurement operations, contract administration, and quality assurance. The DARCOM Procurement and Production Directorate has always felt that neither procurement actions nor procurement line items processed are the proper output measures to be compared with the input incurred under contract administration and quality assurance. In addition, it has been pointed out that the output of a central procurement office is being measured in gross numbers so that the amount of man-effort required for different types of procurement actions is not taken into consideration. There is a need to refine current productivity measurement criteria to account for different types of procurement actions and reflect other realities of the actual procurement work requirement.

C. OBJECTIVES.

1. Develop a productivity index taking into consideration the amounts of man-effort expended in connection with different methods of procurement and types of contracts.

2. Develop an appropriate output measure for the man-effort involved in contract administration.

D. RECOMMENDATIONS. The productivity model developed in this report should be used by the DARCOM Comptroller to measure the productivity of the functional area for procurement at the commodity commands. The model has been developed so as to be easily assimilated into the Comptroller's Composite Efficiency Index.

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CHAPTER I

INTRODUCTION

A. Background.

In FY 72 Comptroller DARCOM established a productivity measurement system by developing an efficiency index with data extracted from the CAOMAF/Budget (Command Analysis of OMA Funding) system and other selected functional reports. In addition, Methods and Standards (M&S) Program data (formerly Defense Integrated Management Engineering System, DIMES) were also included to obtain a composite score reflecting how available resources are used by each manager. This measurement of efficiency was developed into a composite efficiency index for the depots and commodity commands within DARCOM. Five basic data elements (OMA dollars, workload, manyears, work standards, actual timed work) from the four functional areas of supply, maintenance, base operations, and procurement were used to develop productivity indices of dollars, manpower, and M&S performance efficiency. These indices were then combined into a composite efficiency index which measured each activity over time against itself and automatically weighted each functional area to the total resources of the activity. Effective in FY 76, the M&S data was eliminated from the system.

The composite index compares like activities with respect to a base year to determine which activities are low in terms of efficiency improvement. Once these activities are identified, an attempt is made to

determine the strengths/weaknesses which may be reinforced or improved to increase the activity's productivity. This concept has been working well at the depots and in several of the functional areas in the commodity commands. However, the procurement directorates of the Major Subordinate Commands (MSC's) have not felt the present productivity index relating their output to input is a true measure of the performance of the central procurement offices.

B. Problem.

The output measure for the workload of the procurement and production directorate of an activity is given in terms of procurement actions and procurement line items processed. The input measure is given in terms of manyears and cost expended identified in the Army Management Structure Code by PE 721113 to include .1, .2, and .3 categories; that is, manyears and cost expended in procurement operations, contract administration, and quality assurance. Herein lies the problem as judged by the procurement activities.

The output of a central procurement office is being measured in gross numbers so that the complexity of the output (a procurement action) is not taken into consideration. If a M&S Performance Efficiency Index had been or could be developed for the procurement activities, then perhaps some work standards for different methods of procurement might have been introduced. However, as it is yet not developed and there is some question as to the feasibility of its ever being developed, the present procurement productivity index does not take into consideration the amount of man-effort required for different methods of procurement nor different dollar thresholds.

Secondly, it is felt that neither procurement actions nor procurement line items processed are the proper output measures to be compared with the input incurred under contract administration and quality assurance. There is a good deal of administration after contract award which cannot be charged against the procurement action. Additionally, since quality assurance is a product assurance function, it should not be included with the procurement workload.

C. Objective.

The objective of this report is then to develop a productivity index taking into consideration the amount of man-effort expended for different methods of procurement and dollar thresholds; and to examine ways of measuring the output associated with the amount of man-effort involved in the administration of a contract.

D. Scope and Method.

In late 1970 Senator William Proxmire urged the Comptroller General to evaluate the possibilities for measuring productivity in the federal sector of the economy. As a result of that request, a study was conducted resulting in the publication of a report, "Measuring and Enhancing Productivity in the Federal Sector." It was found that several Federal Government agencies were making extensive use of quantitative measurement, although not in the framework of overall productivity measurement.

As usually happens whenever Congress or the public sector bring pressure to bear on Government agencies, much is tried and done that is not always useful and is sometimes detrimental to the functioning of an agency. When

this occurs, it is worth the time and effort to re-examine the use of the concept being tried to see that it really satisfies the needs of the agency and improves its management.

Productivity measurement lends itself considerably easier to the private sector than the federal sector simply because private sector indices are computed from market prices for goods or services, whereas government services have no market price. Essentially, productivity is the ratio of output (goods and services) to one or more inputs (such as labor and capital) associated with that output. While a dollar value can be assigned to the output in the private sector, this can at best be only imputed in the federal sector. This is not to say that an attempt should not be made to measure productivity in Government; however, it must be remembered that what works in the private sector may not be applicable to the federal sector. Therefore, different innovative output measures must be examined, tried and tested as to their reliability as performance indicators.

It is important to realize that, as with any single labor productivity measure, output per man-hours does not imply that labor or manpower alone are responsible for increases in productivity. A new measurement technique alone will not necessarily increase productivity. But, it may measure changes in productivity more precisely, alerting management to areas which need improvement.

Whenever a significant change occurs in a productivity index, management should check the work count associated with the output to see if an actual change has occurred, or if a different counting method is being used.

For example, when the Commodity Command Standard System (CCSS) was introduced into the procurement directorates in DARCOM, several commands showed a marked decrease in their workload output measure without any significant decrease in workload. An investigation of the problem showed that the batching of PWD's of direct delivery type requirements (MILSTRIP Requirements) by commands on the CCSS system was causing a significant difference in their workload count from CCSS. During the pre-CCSS period, requisitions from the field normally created PWD's on a one-for-one basis. These were batched by type of item and placed on a contract. Under CCSS, the batching is accomplished by CCSS for all requirements for the same item prior to receipt by procurement. This condition tends to show inflated performance prior to CCSS and deflated performance after CCSS implementation. Hence, there appeared to be a direct decline in the number of PWD's processed once CCSS was implemented when there was actually little or no change in the amount of work effort performed.

In addition, it is very important to insure that the accounting system, operated by the Comptroller, has charged the manpower hours relating to input to their appropriate categories. For example, one command's productivity index was adversely affected by erroneous time accounting to the proper Army Management Structure program element and sub-element accounts. The accounting error had repeatedly been made for a considerable length of time but was never discovered until a significant continual decrease in producitivty occurred. As a consequence the functional directorate (P&P) was made the victim of

improper decisions made by an element of the command in which P&P had no control nor responsibility.

Once the statistical data has been verified then management may seek ways to increase productivity. This may be done by workload and resource adjustments; capital expenditure; personnel training; automation; and/or human motivation techniques. It is worth the time and effort to continually re-examine the use of a productivity concept to see that it really satisfies the needs of the agency and improves its management.

However, management must recognize that a productivity measure is evaluating its own agency over time and not comparing it to another agency. One major reason for discouraging comparison is that a base year performance is seldom if ever equal between activities. Whereas in Agency A, a base year may have been characterized by a very efficient operation (or a lighter than usual workload), in Agency B a very inefficient operation (or a heavier than usual workload), may have occurred. Therefore, the likelihood exists in the future for a much bigger increase in the B's productivity than A's. Hence, A has much less opportunity for productivity improvement. A second reason is the simple inherent variability between agencies, which is especially true of the procurement directorates in DARCOM.

The AMCRP-127 central procurement workloading report presently records procurement work directives (PWD's) as to method of procurement prior to award. Since AMCRP-127 is already in existence and provides a source for reliable procurement productivity data, the productivity model has been developed around this central procurement workloading report.

Although time standards have been considered for different methods of procurement, none are presently being used as established work standards. Since traditional work measurement methods do not appear to apply, a different, more subjective approach has been considered. Assuming it is possible to subjectively weight the PWD's recorded in the AMCRP-127 report as to amount of man-effort necessary to award, then a meaningful output measure, functionally oriented to the procurement workload, may be considered.

Someone with years of varied experience in procurement may have some feeling as to the degree of man-effort needed to accomplish the award of a PWD and assign weights to PWD's commensurate with the amount of work involved. The weighted PWD's rather than simply total number awarded will then account for the output of a procurement and production directorate. A survey of 45 experienced contracting officers (those in grades GS-12 and above with at least 10 years experience in procurement) and various procurement analysts with extensive staff experience in procurement and the CCSS system was made to estimate the respective weights of the PWD's. After a statistical analysis was performed on the weights assigned by the contracting officers who participated in the survey and further analysis done on the weights assigned by procurement analysts, the delphi technique was applied to the average weights to minimize the variability inherent in the survey. Since established work standards are not available for different methods of procurement and dollar thresholds, actual manhours per type of PWD are not directly measurable outputs. But, this does not mean that an estimated weight according to amount of man-effort required cannot be assigned.

In the case of identifying output for contract administration, the AMCRP-127 central procurement workloading report may again be used. The 127 report has a section which tracks the number of contractual type documents being administered for production and contract administration actions. If weights are assigned to each type of document (contracts, Board of Awards and Purchase Orders) then the total number of weighted documents may be considered as output to correspond to the input provided by the .2 category of PE 721113, contract administration.

This concept of weighted PWD's and types of contractual documents as output measures and PE 721113.1 and .2 as input is used in this report to determine the procurement productivity index.

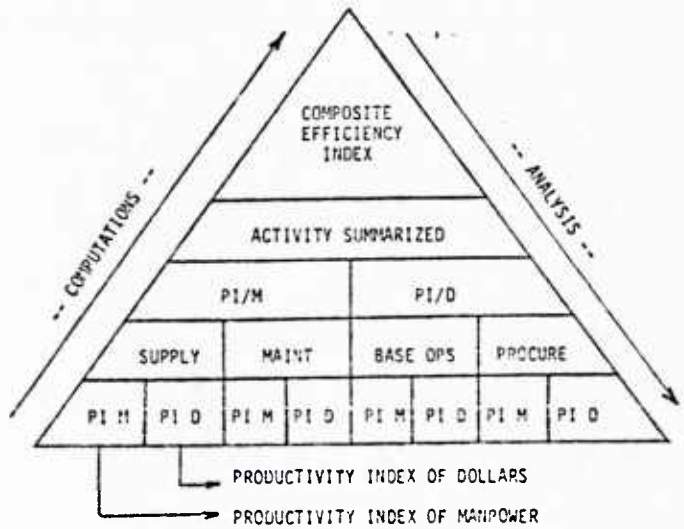
CHAPTER II

MEASURING PRODUCTIVITY

A. Present.

1. Composite Efficiency Index. Productivity measurement within DARCOM is the responsibility of the DARCOM Comptroller. Productivity is the relationship between accomplished workload and manpower, and between workload and expended dollars compared to some base period. The comparison results in an index reflecting how well manpower and dollars are being utilized in relation to the base period.

Presently, a composite efficiency index is used composed of four functional areas: supply, maintenance, base operations, and procurement. Figure 1 shows a pyramid display which the DARCOM Comptroller has found useful to illustrate this efficiency measurement concept.[1] Two efficiency indices are determined



EFFICIENCY MEASUREMENT CONCEPT

Figure 1

[1] Sears, Lederman, Shelby, "Measuring Efficiency and Effectiveness in Army Material Command Depots and Major Subordinate Commands", A Presentation to the Benefit/Output Mini-Symposium, 28 Nov 73.

for each functional area, the productivity indices of dollars and manpower which are further averaged into a composite efficiency index. The composite efficiency indices from the functional areas are then averaged to obtain the overall efficiency of the activity.

2. Procurement Indices. This report is concerned with the index in the functional area of procurement which is the average of the dollar and manpower indices. The first input factor is manyears expended under the Army Management Structure Code PE 721113 to include the .1, .2, and .3 categories of procurement operations, contract administration and quality assurance, respectively. Appendix I is the section from AR 37-100-FY which explains central procurement activities. The constant (inflated) dollars expended for the 721113 code by an activity is the other input measure.

The output measures are procurement actions and procurement line items processed. What constitutes a procurement action is defined in Appendix I under the performance factor for procurement operations but essentially they are procurement work directives (PWD's) which have been awarded. Procurement Line Items Processed (LIP's) are the summation of the number of PWD's awarded, PWD's cancelled, and PWD's transferred.

Essentially, five steps are involved in the computation of the index:[2]

a. Identification of outputs and inputs.

b. A workload relationship of line items processed to procurement actions given in percentages (such as 40/60, 50/50, 30/70) which each command assigns itself.

---

[2]These steps and other subsequent formulas and examples were developed from explanations of the computational procedures used by Comptroller personnel in arriving at the index.

c. Computation of the weighting factor where the base year inputs (manyears expended or constant dollars) are divided by the base year outputs (workload in terms of LIP's and PA's) to obtain manyears per action or similarly dollar per action.

d. The outputs of each year are then multiplied by the relationship of LIP's to PA's and by the weighting factor in manyears which were both computed in the base year.

e. The weighted outputs for each year are then divided by the actual inputs (manyears expended and constant dollars). The mathematical form of the present procurement performance indicator is illustrated in Figure 2.

$$PI = \frac{(\text{LIP's})\left[\text{Relationship of LIP's to PA's}\right]\left[\text{Weighting Factor in Manyears}\right]}{\text{Manyears}} +$$

$$\frac{(\text{PA's})\left[\text{Relationship of LIP's to PA's}\right]\left[\text{Weighting Factor in Manyears}\right]}{\text{Manyears}} +$$

$$\frac{(\text{LIP's})\left[\text{Relationship of LIP's to PA's}\right]\left[\text{Weighting Factor in Dollars}\right]}{\text{Dollars}} +$$

$$\frac{(\text{PA's})\left[\text{Relationship of LIP's to PA's}\right]\left[\text{Weighting Factor in Dollars}\right]}{\text{Dollars}}$$

PRESENT PROCUREMENT INDEX

Figure 2

The example in Figure 3 uses the mathematical relationship of Figure 2 to explain the computations involved in arriving at a procurement productivity index for a major subordinate command. The outputs for each succeeding year after the base year are multiplied by the weighting factors established in the base year 72. The weighted outputs for each year are then divided by the actual inputs to arrive at productivity indices for manpower and dollars. The manpower and dollar indices are then averaged to obtained the procurement index. The procurement index is equal to one for the base year and then will be greater than, less than, or equal to one in the following years, indicating an increase, decrease, or no change, respectively, in procurement productivity. The same procedure is used to calculate indices for the functional areas of supply, maintenance, and base operations. These indices are then combined into the composite efficiency index. Note that although a weighted output is computed, it is not weighted to the amount of man-effort involved as to the method of procurement or dollar thresholds employed to arrive at a procurement action. In addition, there is a double counting involved since the procurement line items processed includes PWD's awarded which are already included in procurement actions.

The present method employed by Comptroller to arrive at a productivity index may work well for depot maintenance operations. The operations are greatly conducive to M&S usage they are production line type operations, which provide meaningful data down to the component/subassembly level. On the other hand, the major subordinate commands procurement operations measure only summary level data; i.e., number of procurement actions and number of line items processed. In addition, some of the input used to arrive at the procurement

Inputs	Base Year			
	72	73	74	75
1. Manyears .1,.2,.3	900	800	750	700
2. Dollars	15,500	15,000	13,500	13,000

Outputs	Base Year			
	72	73	74	75
3. Workload				
Line Items Proc.	17,000	18,000	16,000	15,500
Procurement Actions	5,500	9,500	9,000	11,000
Relationship	.5			

4. Weighting Factor

   a. Myrs: LIP 900/17,000 = .05294

   PA's 900/5,500 = .16364

   b. Dols: LIP 15,500/17,000 = .91176

   PA's 15,500/5,500 =2.81818

5. Weighted Output					
a. Myrs:	LIP	450	476	424	410
	PA's	450	777	736	900
	Total	900	1,253	1,160	1,310
b. Dols:	LIP	7,750	8,206	6,154	7,066
	PA's	7,750	13,386	12,682	15,500
	Total	15,500	21,592	18,836	22,566

6. Productivity Indices

Manpower (Wt Output/Manyrs)	$\frac{900}{900}$ =1.000	$\frac{1,253}{800}$ =1.566	$\frac{1160}{750}$ =1.547	1.871
Dollars (Wt Output/Dollars)	$\frac{15,500}{15,500}$ =1.000	$\frac{21,592}{15,000}$ =1.439	$\frac{18,836}{13,500}$ =1.400	1.736

7. Procurement Index	$\frac{1+1}{2}$	$\frac{1.566+1.439}{2}$	$\frac{1.547+1.400}{2}$	$\frac{1.871+1.736}{2}$
	= 1.000	= 1.503	= 1.474	= 1.804

EXAMPLE COMPUTATIONS OF PROCUREMENT INDEX

Figure 3

productivity index does not correspond to the proper performance factor. The input used under the .2 and .3 codes (contract administration operations and quality assurance for central procurement activities) have "contracts requiring production action" and "dollar value of material inspected and released for shipment", respectively, as their performance factors, not procurement actions and procurement line items processed.

Therefore, in order to be fair to the central procurement activities a new procurement productivity index should be employed which relates the proper output to the input provided by the .1, .2 and .3 codes of AR 37-100-FY and measures the man-effort employed by each different method of procurement which M&S has been unable to do.

B. New Method.

1. Introduction. This report concentrates on the reliability and quality of the output measure. Output should be able to be easily counted consistently year after year. It should be mutually exclusive of any other output so that double counting will be avoided. It should be the final product (or an intermediate product contributing to the final product) of a significant group of workers whose time and costs can be directly identified with the output. In a service organization it is often difficult to identify with the final product. For example, in a maintenance hangar it is easy to identify the final product as a repaired aircraft; however, it is more meaningful to distinguish between aircraft such as bombers, fighters, trainers, and helicopters. Each different type aircraft requires more or less time and skill, hence, an attempt should be made to differentiate and weight the output according to the effort needed to produce it. This concept holds true for the workload in a procurement directorate as well as in a maintenance hangar.

Not all procurement work directives (PWD's) entail the same amount of manhours to award. The amount of manhours to award a contract or process a PWD may be explained by the distinction of such complexity factors as the dollar amount and the method of procurement applied for the proposed award. Therefore, the use of total number of PWD's processed as an output measure fails to differentiate as to the quantity/quality of man-effort required for each type of PWD.

2. Procurement Operations. The performance factor which is felt to be more representative of the workload output to a central procurement office is procurement line items processed. Procurement line items processed are made up of procurement work directives processed to award, cancelled and transferred. These PWD's essentially cover the entire workload area for procurement operations.

a. Procurement Work Directives Awarded. While a PWD which has been awarded is not equivalent to a procurement action, a procurement action does consist of a PWD or PWD's awarded. Therefore, PWD's awarded may be used instead of procurement actions to explain some of the work accomplished in procurement offices. However, just as gross numbers of procurement actions by themselves do not explain work involvement neither do gross numbers of PWD's explain the amount of work involved in each individual procurement work directive. Currently, AMCRP-127 Central Procurement Workloading Report (Appendix II), Part I, Section A, lists the number of PWD's awarded which are under and over $10,000 by methods of procurement. A program change by the

Army Logistics Management Systems Agency (ALMSA) is planned in the current report of the Procurement and Production Subsystem of the Commodity Command Standard System (CCSS) to delineate the dollar thresholds to $10,000 and under; over $10,000 to $99,999; $100,000 to $999,999; $1 million and over.

There are no generally established standards for the number of manhours required to award a PWD; therefore, manhours per type of PWD do not exist. However, this does not preclude the possibility of subjective weighting of PWD's according to the amount of man-effort felt to be involved in their award. A survey was made up geared to the AMCRP-127 report. Eight methods of procurement were listed in the survey categorized by dollar value. Experienced personnel throughout DARCOM were asked to weight the different methods of procurement according to dollar size. Ten percent of the weights are excluded - five percent at each end of the distribution. After a statistical analysis of the data, the delphi technique was used to refine the average weights so as to minimize the variability inherent in any survey of this type. (Appendix IV shows the weights resulting from the survey).

b. Procurement Work Directive Cancelled. Oftentimes a PWD requires a great deal of man-effort but does not result in an award. That is to say, a requirement is given to procurement personnel for a particular item, and the personnel proceed to procure the item. After all the necessary work has been

done and all that is left is to sign a contract, the requirement is cancelled for reasons which are no fault of the procurement personnel (lack of funds or the requirement itself is cancelled). The amount of man-effort expended never results in award, but is still part of the procurement workload. Naturally all PWD's do not proceed in time up to the point of award before they are cancelled, but may instead be cancelled after 5%, 25%, 50%, or 75% of the total man-effort to award has been expended.

Cancelled PWD's may represent a significant amount of a procurement directorate's workload. An obvious answer to the problem of cancelled PWD's is to better manage the requirements and budgeting of funds. However, the control of these functions is external to the procurement directorate and it is not appropriate to measure a procurement directorate for something over which in most cases they have no control. By the same token it would be inappropriate to allow the total number of cancelled PWD's to be converted as output if only 5%, or 25% of the amount of man-effort needed to award is expended. Hence, based on a review of cancelled PWD data and perceptions of command personnel, a figure of 50% is used to balance the expenditure of the time between those cancelled PWD's requiring less and those requiring more man-effort. If up to that point in time until a PWD is cancelled, the amount of work involved in each is still determined by the complexity factors of the method of procurement and dollar value, then each cancelled PWD should be weighted equivalently to the one which is awarded. However, only 50% of those PWD's reported as cancelled with a designated method of procurement and dollar value will be counted as a weighted output.

The current AMCRP-127 Central Procurement Workloading Report (Appendix II), Part I, Section E, lists the number of cancelled PWD's with a designated dollar threshold of $10,000 and under, over $10,000, plus the method of procurement. A program change is planned to expand the dollar thresholds.

c. Procurement Work Directives Transferred. The third category of procurement line items processed are procurement work directives transferred either as Military Interdepartmental Purchase Requests (MIPRS) to other services or other similar documents utilized to transfer the procurement requirements to other commands, installations, or activities. In some commands the number of PWD's transferred make up a significant portion of their workload. The greater the dollar value the more monitoring is required. Although the amount of man-effort required is not as great as that necessary for award of a PWD, time and effort are expended and hence should be weighted accordingly in the output portion of a procurement productivity model. Those commands whose workload contain a significant amount of transferred PWD's were consulted for comparison between PWD's awarded and transferred. Their comments were evaluated and weights were assigned employing the delphi method to include personnel external to the commands consulted. (See Appendix IV for weights). The current AMCRP-127 Central Procurement Workloading Report (Appendix II), Part I, Section F, lists the number of PWD's transferred by dollar threshold.

2. Contract Administration. A great deal of man-effort is expended by a procurement directorate in the area of contract administration. In the present productivity model, this man-effort has been credited to the procurement directorate in the form of input; i.e., it is recorded in the .2

category of the Army Management Structure Code PE 721113, and used along with the man-effort expended in the .1 and .3 categories. However, the output performance measure used to explain the .2 input is the same as that to explain the .1 input for procurement operations; i.e., procurement line items processed and procurement actions. A great deal of work is expended after the award of a contract which is not explained by present performance measures. If any procurement productivity model is to be meaningful, an attempt should be made to incorporate a reliable performance factor which credits that percentage of the procurement directorate's workload dealing with contract administration to the output portion of the model. If this cannot be done, then the .2 category of PE 721113, Contract Administration, should not be included as input as is presently done.

A performance factor for the .2 category is defined in AR 37-100-FY (Appendix I) as "contracts requiring production action", but it is not used in the present model. However, if it is used, the same argument exists here as did for procurement actions. All contracts do not require the same amount of work and, hence, should not be treated simply in terms of gross numbers. There are some simple documents to administer such as purchase orders, delivery orders, basic ordering agreements (BOA's), and then there are contracts such as production versus R&D. The amounts of man-effort involved in administering these documents will differ. Therefore, it is logical to weight each type of document depending on the expenditure of man-effort required to administer. The AMCRP-127 Central Procurement Workloading Report, (Appendix II), Part II, Sections A & B list the number of purchase orders,

delivery orders, BOA's, and contracts both in productions actions and contract management actions taken. Definitions of what constitute a production and contract management action are found in Appendix III. Weights for each type document were solicited from contracting officers and procurement analysts throughout DARCOM. Their comments were recorded, evaluated and then subjected to the delphi technique. The weights assigned to the various contractual documents are found in Appendix IV, Table III.

3. Quality Assurance. The man-effort expended under the .3 category of PE 721113 should not be evaluated by the performance factor for procurement operations or contract administration. The opinion of this report is that any input expended in the .3 category of quality assurance should be accountable by the Directorate for Quality Assurance and not Procurement and Production, since quality assurance is a product assurance function. In addition, the P&P Directorate does not have functional control over quality assurance personnel, and no output measures to account for their input. Hence, quality assurance should not be included with the procurement workload.

4. Potential Input Measurement Improvement. An effective productivity measure should be developed according to the following criteria: understandability, validity, data reliability and availability, consistency, usability, motivational impact, and expense. The procurement output measures established in this report were done with the above criteria in mind.

Productivity input measures are usually labor (direct and indirect expressed in manyears, manmonths, etc.) and dollars (constant dollars expended by an activity). A common input measure for labor uses the manyears of all employees

without any differentiation as to rank. That is to say, one manyear provided by a low skilled employee has the same value as that provided by a higher skilled employee. A better labor input measure is one which does distinguish between rank/grade, or skill (assuming the skill of employees increases as their rank/grades increase). However, in a large organization it may be difficult to account for the time expended by different grade levels. Theoretically, man-effort expended by grade is possible and might be done by time cards and data processing. However, the expense which may be incurred, the question as to the reliability of the data, and the immediate introduction of the concept into the system may prevent it from being presently feasible. Therefore, the quality of input is not considered in this report.

C. Differences Between Present and New Method.

The primary difference between the new method for measuring productivity and the present is the use of weighted PWD's awarded, cancelled, and transferred in place of total line items processed, and the use of weighted contractual type documents instead of total procurement actions. In addition, the only input which will be used in the productivity model, both in manyears and dollars, will be that provided in the .1 and .2 categories of PE 721113. The quality assurance input, .3 category, will be dropped, and there will be no further need for any relationship factor of LIP's, to PA's as there is in the present indicator (recall figure 2). The proposed performance indicator will take on the form in figure 4, where $PWD's_A$, $PWD's_C$, $PWD's_T$, are procurement work directives awarded, procurement work directives cancelled, and procurement work directives transferred, respectively; and KD is the number of contractual documents having production and contract management actions applied thereto.

$$\frac{\left[\sum \text{Wt PWD's}_A + \sum \text{Wt PWD's}_C + \sum \text{Wt PWD's}_T\right]\left[\text{Weighting Factor in Manyears}\right]}{\text{Manyears}} +$$

$$\frac{\left[\sum \text{Wt KD}\right]\left[\text{Weighting Factor in Manyears}\right]}{\text{Manyears}} +$$

$$\frac{\left[\sum \text{Wt PWD's}_A + \sum \text{Wt PWD's}_C + \sum \text{Wt PWD's}_T\right]\left[\text{Weighting Factor in Dollars}\right]}{\text{Dollars}} +$$

$$\frac{\left[\sum \text{Wt KD}\right]\left[\text{Weighting Factor in Dollars}\right]}{\text{Dollars}}$$

PROPOSED PROCUREMENT INDEX

Figure 4

The example in Figure 5 illustrates the new methodology of the proposed procurement index. Note that it is now possible to separate and analyze output and input with respect to procurement operations and contract administration; in addition, the dollar breakout is much more visible. Consequently, if desired, separate productivity indices may be kept on procurement operations and contract administration and be used by management in the P&P Directorates.

Inputs		Base Year 72	73
1. Manyears			
a. Proc. Ops.		400	300
b. Cont. Adm		200	300
	Total	600	600
2. Dollars			
a. Proc. Ops.		1,000,000	800,000
b. Cont. Adm.		500,000	500,000
	Total	1,500,000	1,300,000
Outputs			
3. Workload			
a. Proc. Ops.			
$\sum$ Wt PWD's$_A$		10,000	9,000
$\sum$ Wt PWD's$_C$		5,000	4,000
$\sum$ Wt PWD's$_T$		500	400
	Total	15,500	13,400
b. Contract Adm.			
Wt KD		50,000	60,000
4. Weighting Factor			
a. Myrs: Proc. Ops.		400/15,500 = .0258	
Cont. Adm.		200/50,000 = .0040	
b. Dols: Proc. Ops.		1,000,000/15,500 = 64.5161	
Cont. Adm.		500,000/50,000 = 10.0000	
5. Weighted Output			
a. Myrs: Proc. Ops.		400	(13,400)(.0258) = 346
Cont. Adm.		200	(60,000)(.0040) = 240
b. Dols: Proc. Ops.		1,000,000	(13,400)(64.5161) = 864,516
Cont. Adm.		500,000	(60,000)(10.0000) = 600,000
6. Productivity Indices			
a. Manpower			
(Wt Output/Myrs)		(400+200)/600 = 1	(346+240)/600 = .9767
b. Dollars			
(Wt Output/Dollars)		$\frac{(1,000,000)+(500,000)}{1,500,000} = 1$	$\frac{(864,516)+(600,000)}{1,300,000} = 1.1266$
7. Procurement Index		$\frac{1+1}{2} = 1$	$\frac{.9767 + 1.1266}{2} = 1.0516$

EXAMPLE ILLUSTRATION OF NEW PROCUREMENT PRODUCTIVITY INDEX

Figure 5

Apart from serving as input to the Comptroller composite efficiency index, this model may be used by the P&P Directorate action officers as a tool in the management of their respective objectives. The AMCRP-127 report maintained by personnel in the P&P Directorate serves as the primary data base for the model. Only input data for the dollar productivity index requires data provided by the Comptroller Approved Operating Budget, CSCFA-218 Report. All other data for both manpower and dollar indices is provided by AMCRP-127. The following Table I explains where the data is found in the 127 report and what portions are presently in the CCSS system. In addition, the model will make readily available the distribution of workload as to procurement operations (broken out as to PWD's awarded, cancelled, and transferred) and contract administration (production and management).

Table I

DATA SOURCE

OUTPUT				INPUT		
Procurement Operations - 721113.1 (In ALPHA System)		Contract Administration - 721113.2 (Not in ALPHA System)		Manpower (Not in ALPHA System)	Dollar	
PWD's		Contractual Documents				
Awarded	127 Part I, Section A, Lines 4 & 10; columns a through h	Prod	127 Part II, Section A, Line 3; columns a, b, c, and d	Proc Oper - 127 - Part IV 721113.1 Section A	Proc Oper 721113.1	CSCFA-218
Cancelled	127 Part I, Section E, Lines 20, 21, 24, 25; columns a through h	Contract Mgmt	127 Part II, Section B, Line 7; columns a, b, c, and d	Cont ADMIN - 127 - Part IV 721113.2 Section B	Cont Admin 721113.2	CSCFA-218
Trans-ferred	127 Part I, Section F, Lines 28 and 31; columns a and b					

CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

A. General.

In recent years there has been a strong move to measure productivity in the federal sector. Productivity measurement, however, is not as easily done in Government as it is in industry because of the absence of market price and profit. This is not to say productivity measurement is not possible in Government. However, different innovative work measurement may be necessary to succeed in measuring productivity in the federal sector.

This report has attempted to find a different way of measuring productivity in central procurement at DARCOM's major subordinate commands (MSC's). This was done by examining the AMCRP-127 Central Procurement Workloading Report for the data which was readily available to be used as output in a productivity model. AMCRP-127 lists the workload in both procurement operations and contract administration, the two essential categories of any procurement directorate. To measure only the work done in procurement operations is misleading because this work is the driver for what will be done in the future for contract administration. A decrease in workload in procurement operations does not mean a decrease in productivity of a procurement directorate since there is still work to be done in the area of contract administration. If there is no output measure associated with contract administration, then there may appear to be an apparent decrease in a procurement directorate's workload. This will be misleading since work must continue in contract administration. However, due to the time lag between the award of a contract and

the administration of it this workload is not always apparent. This report attempts to correct this oversight by measuring productivity in terms of both procurement operations and contract administration.

B. Conclusions.

1. The output measures for the present productivity index do not differentiate between dollar threshold and methods of procurement. Simple gross numbers of procurement line items process and procurement actions do not measure the amount of man-effort involved in the award of a PWD. There is a double counting of output since procurement line items processed include PWD's awarded as do procurement actions.

2. The present productivity index includes as input the manpower expended in the PE 721113.1, .2, and .3 categories but uses output measures represented only by .1, procurement operations. Input expended in the .3 category of quality assurance and its performance factor, "dollar value of material inspected and released for shipment", is the responsibility of the Directorate for Quality Assurance and not Procurement and Production.

3. The procurement workload of the central procurement offices of the major subordinate commands is well documented in the AMCRP-127 report. PWD's awarded and cancelled are coded as to method of procurement and dollar threshold. Also, there is a listing of the number of PWD's transferred by dollar threshold. The dollar thresholds will be expanded.

4. There must be continued emphasis on the accuracy of reporting data by both the P&P Directorate and Comptroller and to the continual improvement of appropriate output and input measures.

5. Productivity indices are not suitable for comparing one procurement directorate to another but only for comparing one directorate with itself over time.

6. Productivity indices are not in themselves the only basis on which decisions with respect to management planning, budget purposes, and manpower forecasting should be made. Other forecasting techniques should be used in conjunction with productivity indices for such management requirements.

7. Productivity indices are simply measurement tools. They by themselves do not increase productivity nor necessarily measure the quality of performance. It is the responsibility of management to increase productivity through training, motivation, automation and use of improved management techniques.

C. Recommendations.

1. As soon as the reorganization of DARCOM into Development and Readiness Commands is completed and a new base year has been established, the productivity model developed in this report should be used by the DARCOM Comptroller to measure the productivity of the functional area for procurement at the commodity commands. The model has been developed so as to be easily assimilated into the Comptroller's Composite Efficiency Index.

2. The DARCOM P&P Directorate should collect the procurement workload data recorded on the AMCRP-127 report and weight it according to the list in Appendix IV, Tables II & III. Productivity measurement should be done separately on both procurement operations PE 721113.1 and contract administration PE 721113.2 by P&P personnel to monitor any unusual shift in workload and productivity in the procurement directorates. In addition, the categories of

cancelled PWD's and PWD's transferred should be monitored to check any change in the productivity in procurement operations.

3. On the AMCRP-127 the dollar threshold should be expanded to include the categories $10,000 and under; over $10,000 to $99,999; $100,000 to $999,999; $1 million and over. All of AMCRP-127 report should be implemented into the CCSS system as soon as possible.

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INTERVIEWS

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APPENDIX I

This Appendix is Section VIII of AR 37-100-76, Army Management Structure. It defines what each code signifies for central procurement activities and its respective performance factor.

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CODE	ACTIVITY & PERFORMANCE FACTOR DEFINITIONS	PRIOR CODE
721113.00000	CENTRAL PROCUREMENT ACTIVITIES Operate the Army's central procurement offices and provide for contract administration and quality assurance services not assigned to the Defense Contract Administration Service (DCAS).	
721113.10000	Procurement Operations Includes actions following the receipt of a procurement request up to but NOT including the preparation and issuance of solicitation for bids and proposals; preparation and issuance of solicitation documents; receipt and evaluation of bids and proposals; performance of pre-award surveys, negotiation and award of basic contractual documents and negotiation and execution of contract modifications which meet the criteria for procurement actions. Also includes formulation of policies; advance procurement planning; coordination with other internal organizations; coordination with higher echelons at the Military and Defense Department levels; General Accounting Office, Defense Supply Agency, other agencies and Congressional personnel or committees; preparation of procurement reports for higher authority; and the supervision, clerical and service support that is applicable to more than a single functional area within Procurement Operations. PF: (1) Total procurement actions processed. Includes the following components:	721113.10000 721113.11000 721113.12000 721113.19000

CODE	ACTIVITY & PERFORMANCE FACTOR DEFINITIONS	PRIOR CODE
	(a) The total number of procurement actions during the report period as indicated in Section A, Line 6, Monthly Procurement Summary by purchasing office (DD Form 1057), plus total number of DD Forms 350 submitted during the report period, excluding reversal corrections (DD Form 350). See ASPR Section XXI, Parts 1 and 2. Excludes: Actions resulting from workload financed under Base Operations (B1000). (b) Procurement actions excluded by Section A, Line 6, Monthly Procurement Summary by Purchasing Office (DD Form 1057). (c) No-cost procurement actions. (2) Dollar Value of all procurement actions executed by source of funds: (a) Procurement Appropriations, Army. (b) Research, Development, Test and Evaluation, Army. (c) Stock Fund, Army. (d) Operations and Maintenance, Army. (e) Other customers. (f) Total Dollar Value.	
721113.20000	CONTRACT ADMINISTRATION OPERATIONS Planning actions designed to assure that purchase requirements are delivered efficiently in the quantity needed and at the time required. Includes review and	721113.20000 721113.21000 721113.22000 721113.29000

CODE	ACTIVITY & PERFORMANCE FACTOR DEFINITIONS	PRIOR CODE
	identification of conditions potentially threatened or actually delaying contract delivery or performance, as well as prompt accomplishment of actions to achieve the most economical and timely solution; system support; and furnishing systems status information and engineering support on special and designated programs. Includes management of assigned contracts to assure that a contractor's total performance is in accordance with his contractual commitments and that the obligations of the Government are fulfilled. This management is conducted within the framework of delegate contracting officer responsibility and authority includes support of buying organizations; actions required in relation to the cessations or cancellation in whole or in part of work under a prime contract, or a subcontract thereunder, for the convenience of or at the option of the Government, property administration and disposal of contractor inventory. Overall management of the contract administration functions, excluding quality assurance, including general supervision, clerical and support services applicable to more than a single functional area within contract administration. PF: Contracts requiring production action.	
721113.30000	QUALITY ASSURANCE FOR CENTRAL PROCUREMENT ACTIVITIES Actions of Quality Assurance personnel engaged in centralized acquisition of supplies and services from advance procurement planning throughout closeout of the contract file. Includes:	721113.30000 721113.31000 721113.32000 721113.33000 721113.33100 721113.33200 721113.39000

CODE	ACTIVITY AND PERFORMANCE FACTOR DEFINITIONS	PRIOR CODE
	Quality assurance actions in support of Central Procurement Offices whether performed in contractor plants or GOCO's to assure the adequacy of procurement requests, solicitations for bids or proposals and contracts, quality assurance actions on pre-award and post-award functions surveys; procurement quality assurance planning actions; procurement plants and Government Owned-Contractor Operated (GOCO) facilities under Army cognizance; product oriented surveys and reviews conducted at contractor plants and GOCO's conduct of system and hardware audits to include evaluation, verification, and appraisal of the contractors quality control system to identify extent and cause of sub-standard quality; analysis, and investigation, and resolution of product quality problems/materiel deficiency reports; management, reporting, policy and procedural development, ADP, administrative and clerical actions related to quality assurance in support of central procurement activities; acceptance testing and proofing including planning of tests, conduct of the test, processing and analysis of test data and preparation and distribution of test reports and related actions pertaining to centrally procured stock fund items, procurement appropriations items (at Jefferson Proving Ground only). Excludes: Reliability, Maintainability, Quality Engineering and Systems Performance Assessment Actions including	

CODE	ACTIVITY AND PERFORMANCE FACTOR DEFINITIONS	PRIOR CODE
	related analyses, testing, etc., which are appropriately chargeable to other OMA accounts or other benefiting appropriations; i.e., RDTE and Procurement Appropriations. Also excludes surveillance or stockpile testing of materiel previously placed in storage.	
	PF: Dollar Value of Materiel Inspected and Released for Shipment	

APPENDIX II

CENTRAL PROCUREMENT WORKLOADING REPORT

AMCRP-127

Appendix II contains Part I, Sections A, E, and F of the AMCRP-127 report which lists the number of PWD's awarded, cancelled, and transferred according to method of procurement and dollar threshold. Part II, Sections A and B contains the workload for contract administration broken out as to production and overall management. Part IV, Sections A and B records the monthly utilization of procurement personnel within the directorate.

CENTRAL PROCUREMENT WORKLOADING REPORT (AMCR 5-4)	"As Of" Date	REPORTS CONTROL SYMBOL AMCRP-127
TO:	FROM: (Reporting Activity)	

PART I - PROCUREMENT OPERATIONS
SECTION A - PROCUREMENT ACTIONS AND PWD AWARD

	UNDER $10,000	a. CODE 1	b. CODE 2	c. CODE 3	d. CODE 4	e. CODE 5	f. CODE 6	g. CODE 7	h. CODE 8	i. TOTAL 9
1	NUMBER PROCUREMENT ACTIONS CUR MO	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
2	CUMULATIVE OF LINE 1 FY	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
3	DOLLAR VALUE OF PROC ACTIONS	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
4	NUMBER PWDs CURRENT MONTH									
///	PRODUCTIVE MAN-DAYS									
5	PLANNING	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
6	EXECUTION	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
	$10,000 AND OVER									
7	NUMBER PROCUREMENT ACTIONS CUR MO	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
8	CUMULATIVE OF LINE 7 FY	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
9	DOLLAR VALUE OF PROC ACTIONS	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
10	NUMBER PWDs CURRENT MONTH									
///	PRODUCTIVE MAN-DAYS									
11	PLANNING	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
12	EXECUTION	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
	SECTION B - AWARD UNDER $10,000 (EXCLUSIONS UNDER SECTION A)									
13	NUMBER PROCUREMENT ACTIONS CUR MO	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
14	CUMULATIVE OF LINE 13 FY	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
15	DOLLAR VALUE OF PROC ACTIONS	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
	SECTION C - NO COST									
16	NUMBER PROCUREMENT ACTIONS CUR MO	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
17	CUMULATIVE OF LINE 16 FY	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	

SECTION D - PWD RECEIPT

	NUMBER	a. UNDER $10,000	b. $10,000 AND OVER	c. TOTAL CURRENT MONTH
18	FUNDED			
19	UNFUNDED			

CENTRAL PROCUREMENT WORKLOADING REPORT--Continued (AMCR 5-4)	"As Of" Date	REPORTS CONTROL SYMBOL AMCRP-127

SECTION E - FWD CANCELLATION

			a. CODE 1	b. CODE 2	c. CODE 3	d. CODE 4	e. CODE 5	f. CODE 6	g. CODE 7	h. CODE 8	i. TOTAL CUR MONTH
	UNDER $10,000										
20	NUMBER	FUNDED									
21		UNFUNDED									
	PRODUCTIVE MAN-DAYS										
22	PLANNING		XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
23	EXECUTION		XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
	$10,000 AND OVER										
24		FUNDED									
25		UNFUNDED									
	PRODUCTIVE MAN-DAYS										
26	PLANNING		XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	
27	EXECUTION		XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	

SECTION F - FWD TRANSFER

SAMPLE

		a. UNDER $10,000	b. $10,000 AND OVER	c. TOTAL CURRENT MONTH
28	NUMBER TO OTHER AMC PROC ELEMENTS			
29	PRODUCTIVE MAN-DAYS			
29	PLANNING			
30	EXECUTION			
31	NUMBER TO OTHER AMC OR NON-AMC ELEMENTS			
	PRODUCTIVE MAN-DAYS			
32	PLANNING			
33	EXECUTION			

METHOD OF PROCUREMENT CODES

1 - Formally Advertised
2 - Two-Step formally advertised
3 - Competitive negotiation
4 - Commercial sole source (includes Universities and other non-profit institutions)
5 - Non-competitive negotiation from follow-on action after price competition design or technical competition
6 - Government-owned/contractor-operated plant; non-competitive negotiation
7 - Government-owned/contractor-operated plant; competitive negotiation
D - Orders issued against indefinite delivery type contracts

CENTRAL PROCUREMENT WORKLOADING REPORT--Continued (AMCR 5-4)			"As Of" Date			REPORTS CONTROL SYMBOL AMCRP-127
PART II - CONTRACT ADMINISTRATION SECTION A - PRODUCTION						
	PENDING DELIVERY OR PERFORMANCE (COLUMNS a, b, c, and d)		a. PURCHASE ORDERS	b. DELIVERY ORDERS	c. ORDERS UNDER BOA	d. CONTRACTS
1	ON HAND	ACO				
2		PCO				
3	NUMBER	PCO				
4	PRODUCTIVE MAN-DAYS	PCO	XXXXXXXX	XXXXXXXX	XXXXXXXXX	
SECTION B - CONTRACT MANAGEMENT						
			a. PURCHASE ORDERS	b. DELIVERY ORDERS	c. ORDERS UNDER BOA	d. CONTRACTS
5	ON HAND	ACO				
6		PCO				
7	NUMBER	PCO				
8	PRODUCTIVE MAN-DAYS	PCO	XXXXXXXX	XXXXXXXX	XXXXXXXXX	

REMARKS FOR PART II

SAMPLE

PART III - OVERALL MANAGEMENT		
1	PRODUCTIVE MAN-DAYS (THE MANAGEMENT OF THE PROCUREMENT FUNCTION UNDER PART I) -	
2	PRODUCTIVE MAN-DAYS (THE MANAGEMENT OF THE ADMIN FUNCTIONS UNDER PART II)-	

REMARKS FOR PART III

CENTRAL PROCUREMENT WORKLOADING REPORT--Continued (AMCR 5-4)	"As Of" Date	REPORTS CONTROL SYMBOL AMCRP-127

PART IV - PROCUREMENT PERSONNEL MONTHLY UTILIZATION - (PRODUCTIVE AND NONPRODUCTIVE TIME)

SECTION A - PROCUREMENT OPERATIONS

	a. MAN-MONTHS PROCUREMENT PLANNING	b. MAN-MONTHS CONTRACT EXECUTION	c. MAN-MONTHS OVERALL MANAGEMENT	d. MAN-MONTHS TOTAL
1 CIVILIAN (NON-AIF)				
2 CIVILIAN (AIF)				
3 MILITARY (NON-AIF)				
4 MILITARY (AIF)				
5 CIVILIAN NON-AIF (INTERN PROGRAM)				
6 CIVILIAN AIF (INTERN PROGRAM)				

SECTION B - CONTRACT ADMINISTRATION

	a. MAN-MONTHS PRODUCTION MANAGEMENT	b. MAN-MONTHS CONTRACT MANAGEMENT	c. MAN-MONTHS OVERALL MANAGEMENT	d. MAN-MONTHS TOTAL
7 CIVILIAN (NON-AIF)				
8 CIVILIAN (AIF)				
9 MILITARY (NON-AIF)				
10 MILITARY (AIF)				
11 CIVILIAN NON-AIF (INTERN PROGRAM)				
12 CIVILIAN AIF (INTERN PROGRAM)				

REMARKS FOR PART IV

APPENDIX III

Appendix III defines and describes the make-up of the workload in the production and contract management categories for contract administration. These definitions should clarify Appendix B, AMCRP-127.

Production. Planning actions designed to assure that purchase requirements are delivered efficiently in the quantity needed and at the time required. Includes review and identification of conditions threatening to delay or actually delaying contract delivery or performance, as well as prompt accomplishment of actions to achieve the most economical and timely solution; system support; and furnishing systems status information and engineering support on special and designated programs. Includes:

a. Developing and implementing management controls to insure identification and elimination of delinquencies.

b. Monitoring delivery progress and performing expediting actions to cure or resolve potential or actual delinquencies. Visiting Defense Contract Administration Services (DCAS) sites and contractors' plants for on-the-spot identification and resolution of production difficulties.

c. Monitoring and coordinating manufacture of First Article.

d. Assessment of contractor's capability to accelerate delivery of critical items.

e. Aiding contractors in obtaining any assistance that may be required in performance of the contract, such as how to obtain higher rating under Defense Materials System (DMS).

f. Production Schedules and Delivery Reports -- The development and priority assembly of data, including briefings, and the preparation of RCS reports.

g. All clerical and typing activity in support of the above functions.

Contract Management. Management of assigned contracts to assure that a contractor's total performance is in accordance with his contractual commitments and that the obligations of the Government are fulfilled. This management is conducted within the framework of delegate contracting officer responsibility and authority, and includes support of buying organizations; actions required in relation to the cessation or cancellation in whole or in part, of work under a prime contract, or a subcontract, for the convenience of or at the option of the Government property administration and disposal of contractor inventory. Includes:

a. All activity from the point of execution of a contract or modification or the placement of a work order upon or through another mission agency to the point of close-out of the file, including both Procuring Contracting Officer (PCO) and Administrative Contracting Office (ACO) functions as assigned, but NOT including modifications regardless of nature. This entails:

(1) Post-award meetings and conferences, including "start of work" conferences, inter-agency coordination conferences, milestone or review point conferences, and other meetings affecting the performance of contracts.

(2) Action on such matters as use or dispostiion of Government-owned/furnished property; approvals for repair or other adjustments for defective Government-furnished property; approval of subcontracts; make or buy plans; security clearances; services certificates, royalty reports and patent disclosures; overtime approvals.

(3) Coordinating, adjudicating, and making required determinations resulting from disputes, claims, defective pricing actions, and other litigation. Excludes negotiation settlement.

(4) Bankruptcy cases.

(5) Termination for convenience or default. EXCLUDES negotiation settlement.

(6) Maintaining liaison with ACO at DCAS and other agencies.

(7) All required administrative actions closing out contracts, purchase orders, or delivery orders.

(8) Determining disposition of excess contractor inventory.

(9) All activity associated with processing vouchers for provisional payments.

(10) Contracting Officer's Representative activity under the authority and limitation of APP 1-406-51.

b. All clerical and typing activity in support of the above functions.

APPENDIX IV

DERIVATION OF WEIGHTS

Since no accepted time standards could be found for the workload categories found in AMCRP-127 Central Procurement Workload Report, another method was sought to differentiate between the amount of man-effort involved in the award of a PWD. An Air Force Procurement Research Office report on "Procurement Productivity Indices" had surveyed procurement managers both military and civilians in grades of GS-13/major or higher on the establishment of weights for various characteristics of procurement actions. A similar method was used in this study to help differentiate between awarded PWD's. However, the survey did not attempt to reach as many procurement personnel as did the Air Force study. Instead, 45 key procurement contracting officers in grades GS-12 and above with over 10 years experience in procurement at the major subordinate commands were personally contacted. They were asked to weight on a scale from 1 to 20 the following eight methods of procurement, broken out as over and under $10,000 and as to fixed or cost type contracts: Formal Advertising, Two-Step Formal Advertising, Orders Issued Against Indefinite Delivery Type Contracts, Commercial Sole Source (including universities and other non-profit institutions), Non-Competitive Negotiation (follow-on action after price competition; design on tech competition), Competitive Negotiation, GOCO Plant (Competitive Negotiations), and GOCO Plant (Non-Competitive Negotiations). These methods of procurement were used since they are already coded on the AMCRP-127 Central Procurement Workload Report. However, during the initial survey and in reviewing the weights assigned to the methods of procurement, there was discussion to expand the dollar thresholds and increase

the range of the weights. This would entail a change in AMCRP-127 but the model would be improved. Another survey was made from a representative sample of experienced personnel made up of contracting officers and procurement analysts from the commodity commands. They were asked to determine what they felt were proper dollar intervals and then to weight the eight methods of procurement in each interval. The consensus of the group was that there were definite dollar values at which the workload increased due to additional requirements imposed upon procurement personnel by regulations. Dollar intervals of $10,000 and under; over $10,000 to $99,999; over $100,000 to $999,999; and $1 million and over were determined to be proper break points at which workload increased. The persons in the sample then weighted on a range from 1 to 100 the eight methods of procurement in each interval. The methods of procurements thought to require the greatest number of manhours to perform by procurement personnel were given a weight of 100 and those requiring the least were given a weight of 1. The type of contract involved in the procurement (cost or fixed price) was not considered. It was felt that up to the point of award the type of contract did not increase or decrease the workload significantly. The range of 1 to 100 was used to provide sufficient tolerance between the different methods of procurements and dollar values.

The method used in determining the weights was similar to that used by judges at sporting events; that is, drop the lowest and highest figures to eliminate any bias and to minimize the variability encountered in such

subjective weighting. Therefore, five percent of the lower and upper numbers were dropped from the distribution of weights and the average of the remaining ninety percent were calculated. After all the average weights were determined the data was again scrutinized by the group of experienced procurement personnel and the final weights determined. This was essentially the application of a modified delphi technique.

A similar procedure was used to determine the weights for the .2 category of PE 721113 dealing with contract administration. The contractual type documents, listed in Part II of the AMCRP-127 report, of purchase orders, delivery orders, orders under BOA, and contracts for production and contract management were judged and weighted. However, the range of tolerance for the weights in the .2 category were judged adequate at 1 to 20.

The weights for PWD's awarded and transferred are shown in Table II and the weights for contractual documents in Table III.

TABLE II

WEIGHT FOR PWD'S

$1 Million & Over		$100 K - $999 K		Over $10 K - $99 K		$10 K & Under		PWD's Transferred	
Code*	WT	Code*	WT	Code*	WT	Code*	WT	$10 K & Under	Over $10 K
1	60	1	60	1	50	1	5	3	15
2	96	2	96	2	90	2	5		
3	95	3	90	3	75	3	5		
4	90	4	80	4	65	4	5		
5	90	5	80	5	65	5	5		
6	90	6	80	6	65	6	5		
7	100	7	100	7	80	7	5		
8	3	8	3	8	2	8	1		

*Code	Method of Procurement
1	Formal Advertising
2	Two-Step Formal Advertising
3	Competitive Negotiation
4	Commercial/ Sole Source (Includes Universities & Other Non-Profit Institutions)
5	Non-Competitive Negotiation (from Follow-on Action After Price Comp; Design on Tech Comp)
6	GOCO Plant; Non-Comp Neg.
7	GOCO - Comp. Neg.
8	Orders Issued Against Indefinite Delivery Type Contracts

TABLE III

WEIGHTS FOR CONTRACT ADMINISTRATION

PRODUCTION

Commands — Type of Document

	Purchase Orders	Delivery Orders	Orders Under BOA	Contracts
Readiness	1	1	10	15
Development	1	1	10	15

CONTRACT MANAGEMENT

Commands — Type of Document

	Purchase Orders	Delivery Orders	Orders Under BOA	Contracts
Readiness	1	1	15	20
Development	1	1	15	20

APPENDIX V

STUDY TEAM COMPOSITION

Charles A. Correia, B.S., University of Massachusetts, 1960; M.A., University of Mississippi, 1961; M.S., Virginia Polytechnic Institute and State University, 1971. Operations Research Analyst, US Army Procurement Research Office, ALMC. Mr. Correia has worked on APRO projects in the areas of cost estimating techniques, forecasting methods, and life cycle costing. In addition to his research position, Mr. Correia instructs in several local colleges and universities. Prior to joining the APRO, Mr. Correia was an Instructor of Mathematics at Southeastern Massachusetts University.

Frank J. Kelsey, Procurement Analyst, GS-14, Directorate of Procurement and Production, Headquarters, US Army Materiel Development and Readiness Command. Mr. Kelsey has twenty-nine years procurement experience covering the entire spectrum of contracting for varying types of procurements, i.e., post, camp, and station, and national mission (R&D and production) involving both formal advertising and negotiation with the contract administration thereof. This experience was gained with 20 years at the Electronics Command, Fort Monmouth, NJ, and nine years at Headquarters, DARCOM. Procurement career encompassed all levels of positions starting with clerical and ascending to purchasing agent, supervisor purchasing agent, contract specialist, supervisor contract specialist, and in 1967 to present position as a Procurement Analyst. Presently possess a Contracting Officer warrant and has held same for twelve years.