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DEFENSE LOGISTICS AGENCY VENDOR RATING SYSTEM

September 1992

OPERATIONS RESEARCH AND ECONOMIC ANALYSIS OFFICE

DEPARTMENT OF DEFENSE
DEFENSE LOGISTICS AGENCY

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FOREWORD

The Defense Logistics Agency (DLA) Vendor Rating Systems was developed to provide information to buyers on the past performance of contractors for bid evaluation in support of "best value" contracting initiatives. The rating system systematically collects and analyzes historical data to provide consistent measures of the vendor's ability to supply conforming materiel, on time. This system was developed under the guidance of a Study Advisory Group (SAG). The SAG, knowledgeable experts in the areas of contracting, production and quality assurance, provided valuable contributions to the development of the prototype model. Representing each Supply Center and DLA headquarters, the SAG provided detailed advice and direction as well as solutions to many problems encountered during development. We thank all members of this group for their cooperative spirit and teamwork that led to the timely completion of this effort.

Roger C. Roy

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Assistant Director
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EXECUTIVE SUMMARY

Traditionally, DLA has awarded an overwhelming majority of its contracts to the low bidder. In an effort to move towards the buying practices of private industry, Total Quality Management initiatives in the late 1980's led to increased efforts to consider other factors in award decisions. All DLA centers have implemented a program, under different names, that permit proven, superior performers to obtain awards with bids above low bidder. These programs have been successful but limited in scope because participation by contractors is restricted due to the extensive manual effort required by the contractor and the DLA Supply Center to administer the program. As a result, the DLA Vendor Rating System (DVRS) has been developed to automate, to the maximum extent possible, the data collection and analysis of contractor performance, so that the information can be used in a broader range of applications.

In the development of a prototype model for use at the Defense General Supply Center (DGSC), two high level factors other than price are measured. Delivery performance, a measure of the contractor's past ability to deliver contract lines on time, considers the frequency of delinquent contract lines and the duration of lateness. Quality performance, measuring historical nonconformance rates of a contractor, is based on customer complaints and lab test results. Ratings are developed at the Federal Supply Class (FSC) level and are generally based on 2 years of past performance. The model has been designed to accept additional factors, should management decide to expand the definition of performance.

To use DVRS, buyers will access the ratings through the DLA Pre Award Contracting System (DPACS). DVRS is designed to run in a batch mode (monthly) on the Information Processing Center-Richmond (IPCR) mainframe computer. Vendor ratings are downloaded to the DPACS system to the personal computer of the buyers. The ratings will appear automatically on various DPACS screens to facilitate bid evaluation and other processes. Also, the ratings and supporting data are archived for purposes of contract review and defense of protests.

Preliminary testing of the DVRS model has been successfully completed. Ongoing functional testing will be done at DGSC, with results expected in early FY 93. The major obstacle to full scale implementation of DVRS appears to be accuracy of the historical data used by DVRS to compute ratings. Efforts are underway at DGSC and elsewhere to analyze the causes of incorrect data and to prevent entry of incorrect data into our systems for those few key data fields used by DVRS. Manual correction of known or suspected errors is being performed at DGSC for those FSCs being tested.

Implementation of DVRS throughout DLA is constrained only by the need to process DVRS at IPCR. As the other hardware Supply Centers migrate data processing to IPCR through May 1993, the DVRS prototype can be adapted for wider use. However, DLA-wide use may require additional standardization of post-award and quality assurance processes at each of the DLA Supply Centers. The DLA Operations Research and Economic Analysis Management Support Office is planning future projects to provide analytical support necessary to transform this prototype model to a production system.

LIST OF ACRONYMS

Acronyms	Definitions
ACF	Active Contract File
ADP	Automated Data Processing
ALLACF	DORO's Archived Closed and Open Contract File
CAGE	Commercial and Government Entity
CDCS	Customer/Depot Complaints System
CLIN	Contract Line Item Number
DCSC	Defense Construction Supply Center
DGSC	Defense General Supply Center
DIDB	DLA Integrated Data Bank
DISC	Defense Industrial Supply Center
DLA	Defense Logistics Agency
DLA-LO	DLA Operations Research and Economic Analysis Office
DLA-PPR	DLA Directorate of Contracting, Contracts Division, Policy Branch
DLA-Q	DLA Directorate of Quality Assurance
DLA-QL	DLA Directorate of Quality Assurance, Logistics Management Division
DLA-S	DLA Directorate of Technical and Logistics Services
DLAM	DLA Manual
DMINS	Distributed Minicomputer System
DORO	DLA Operations Research and Economic Analysis Management Support Office
DPACS	DLA Pre Award Contracting System
DSC	DLA Supply Center
DVRS	DLA Vendor Rating System
FSC	Federal Supply Class
IPCR	Information Processing Center-Richmond
NSN	National Stock Number
PIIN	Procurement Instrument Identification Number

LIST OF ACRONYMS (Continued)

Acronyms	Definitions
QEP	Quality Evaluation Program
QVP	Quality Vendor Program
SAG	Study Advisory Group
SALT	System for Analysis of Laboratory Testing
SAMMS	Standard Automated Material Management System
USPF201	Recent Six Months of Closed Contracts

SECTION 1
INTRODUCTION

1.1 BACKGROUND

In the 1980's, under the influence of Dr. W. Edwards Deming's quality philosophy and intense foreign competition, U.S. manufacturing firms have adopted purchasing strategies geared toward close buyer-supplier relationships with fewer suppliers of proven high quality performance. The Department of Defense, though limited by law through the Federal Acquisition Regulation, has encouraged its activities to adopt commercial buying practices where possible. The Defense Logistics Agency (DLA), because of its extremely high volume of relatively low dollar value awards, has had very little experience in using factors other than price to award contracts. Bids from extremely poor performers are occasionally eliminated through a nonresponsibility determination. In the late 1980's and early 1990's, DLA hardware centers initiated programs to recognize and reward suppliers with outstanding track records. Those suppliers that applied for and could prove that they met very demanding performance criteria were placed on an exclusive list by Federal Supply Class (FSC) and could receive awards even if their bids were up to 20 percent higher than the low bidder.

Both nonresponsibility determination and premium awards are limited in scope and application because of the manual effort involved by the contractor and government. These tools only affect the very few extremely high and extremely low performers. Most competitive awards are still primarily determined by selecting the low bidder from a group of vendors that have neither extremes in their performance history. Nonetheless, often the difference in price between the low bidder and the next to low bidder may be small, yet the past performance of the low bidder may be significantly worse. The "best value" to the government, considering post award costs associated with late deliveries and quality resolution, may result in a judgement by the contracting officer to award the contract to other than the low bidder.

To provide the information needed to make a "best value" decision, DLA Directorate of Contracting, Policy Branch (DLA-PPR) and DLA Directorate of Quality Assurance, Logistics Management Division (DLA-QL) tasked the DLA Operations Research and Economic Analysis Office (DLA-LO) to develop a system that collects historical performance data, systematically analyzes the data to produce vendor ratings and provides the ratings and supporting information to the buyer for bid evaluation. This request was made after DLA-LO had completed a feasibility study in March 1991 that verified the technical feasibility of the concept.

1.2 SCOPE

The DLA Vendor Rating System (DVRS) prototype was developed based on data from the Defense General Supply Center (DGSC) from March 1989 to September 1991. The model is designed for use at all DLA hardware centers, but because DVRS uses Standard Automated Material Management System (SAMMS) files and DLA Integrated Data Bank (DIDB) files (which only reside at Information Processing Center-Richmond (IPCR)), the model cannot be used for other hardware centers until SAMMS processing migrates to IPCR. Contractor performance, as measured by DVRS, is limited to two main areas of quality assurance and delivery effectiveness. Resolution of DVRS measures will be at the FSC level and above.

1.3 OBJECTIVES

The objectives of this project are:

(1) To develop an automated system to systematically measure contractors past performance.

(2) To demonstrate DVRS ratings accurately reflect contractor performance.

(3) To provide buyers access to current ratings at the point of bid evaluation.

1.4 DOCUMENT OVERVIEW

The purpose of this document is to provide a description of the DVRS prototype model and to document the methodology used to develop DVRS. Two additional documents will be published for DVRS. A technical report by DLA Operations Research and Economic Analysis Management Support Office (DLA-DORO) will provide source code and Automated Data Processing (ADP) information necessary for program maintenance. A user's manual will be published by DLA-PPR. This report will supplement the user's manual and serve as a baseline for future model enhancements.

SECTION 2
METHODOLOGY

2.1 ANALYSIS AND MODEL DESCRIPTION

2.1.1 GENERAL MODEL DESCRIPTION

The overall objective of the DVRS model is to provide the DLA buying community with an effective tool to evaluate competing vendors' bid prices against each vendor's past performance of providing quality material in a timely manner. This approach provides the buyers with a mechanism for determining the Best Value during the contract award process. As the objective states, a vendor's performance can be broken into two distinct areas. These areas are an assessment of the quality of material provided to the Agency and whether or not the contracted material was delivered in a timely manner. This section focuses on developing the model methodology for assessing the vendor's performance.

2.1.2 QUALITY ASSURANCE VENDOR RATINGS

2.1.2.1 Quality Data Sources

Developing the methodology for assessing a vendor's quality performance initially concentrated on identifying data sources which were both accessible and fairly standardized among DLA's Supply Centers. An earlier feasibility study, which was conducted by DLA-DORO, identified three primary sources of data which could be used for assessing quality performance of DLA's vendors. These sources are: the Customer/Depot Complaints System (CDCS), Quality Evaluation Program (QEP), and System for Analysis of Laboratory Testing (SALT) data files. These files contain the data needed to calculate both Center and FSC quality scores for all vendors and to produce an archive transaction file for vendor viewing.

As the file name indicates, the CDCS file contains information relating to customer generated reports that reflect the quality of products issued to them. Such reports/complaints are also generated internally by depot and supply center's Quality Assurance representatives when they determine an item did not meet the established quality standards. Submitted complaints are reviewed, investigated, and the cause is determined. Based on guidance provided by the Study Advisory Group (SAG), this file is screened to capture only closed complaints in which a vendor was found to be in noncompliance and that the complaint was quality or packaging related. The SAG members also recommended shipping and transportation related complaints not be used in assessing a vendor's quality performance, since a vendor could not be held solely accountable for such shortcomings.

The QEP file is used primarily by the contracting community to summarize a vendor's product quality history. After careful review and evaluation, the SAG determined that the QEP file would have little value in directly determining the quality performance of vendors. However, the SAG did feel that several of the QEP data elements could be incorporated into DVRS as supplemental information. Information on results from first article tests, pre-award surveys, post award evaluations, quality audits, and contract waivers and deviations will be available in DPACS should the buyer desire additional background history.

The SALT file is a DLA Directorate of Quality Assurance (DLA-Q) initiated and monitored consolidated database which contains testing results from DLA's Laboratory Testing Program. The focus of the query into this file is to ascertain the percentage and the degree to which items did not conform to design specifications. SALT data are linked to the CDCS file since the center's quality assurance personnel are required to generate a CDCS complaint whenever an item fails a laboratory test. As discussed later, this linkage plays a critical role in identifying quality indicators.

2.1.2.2 Quality Indicator Methodology

Quality Indicator Selection: Based on guidance provided by the SAG's Quality Assurance representatives, three DVRS quality indicators were identified. Selected indicators are product complaints, packaging complaints, and laboratory test results. Product and packaging complaints are selected from the CDCS by document type codes and discrepancy codes. Lab test failures are linked between the SALT and CDCS by the CDCS control number to provide necessary data to evaluate the test results. All complaints and test failures must be specifically coded as a contract nonconformance. Also, all records must be coded as closed, indicating an investigation has been completed and the contractor has been notified. Complaint indicators are normalized for contract volume since a contractor with more contracts has more opportunity for complaints than a low volume contractor.

Vendor Discrepancy Volume Determination for Product and Packaging Complaints: The first step in developing the required quality database is to screen the CDCS file for only closed complaints that are determined to be the fault of the vendor. These records are identified by having a cause code of CN or CS (which indicates the complaint is due to contractor non-compliance) and having a date entered in the closed date field. Complaints are further screened to capture only the most recent 2 1/2 years of data and to eliminate all remaining complaints in which the Commercial and Government Entity (CAGE) code or Procurement Instrument Identification Number (PIIN) are missing. The next screen is to eliminate all shipping and transportation type complaints. This is accomplished by keying on both the Document Type and Discrepancy codes. The final step in the screening process is to eliminate duplicate complaints for the same Contract Line Item Number (CLIN). Complaints that clear all screening criteria are then written to a quality transaction file.

The second step is to append laboratory testing information to the appropriate transaction record. This step is accomplished by linking SALT records to the transaction file by matching CDCS control numbers in both files. SALT data appended to transaction file include: test date, laboratory test control number, number of parts tested, number of critical failure parts, number of major failure parts, and number of minor failure parts.

The third step in the process uses transactional file records to develop a by-vendor and FSC frequency count on the number of product and packaging complaints and lab test failures. For the product and packaging indicators this is accomplished by keying on the Document Type and Discrepancy codes. See Appendix A for breakout of codes in determining the type of complaint.

Development of Six 2-year Windows: The SAG felt that the trend of DVRS scores could be important in bid evaluation. To conduct trend analysis of a vendor, six 2-year windows are developed. Each window is off-set by 1 month, starting with the most recent 2 years of history. This approach provides a 6 month trend for vendors' performance. The close date for each valid record is used to determine in which of 2-year windows a complaint should be counted. Computer code is provided to take advantage of the computer's system date to automatically revise the window thresholds during each update run of the model. After lengthy discussions, the SAG came to an agreement that the Quality indicators should be based on the most recent 2 years of data. The decision to limit the data to 2 years was based on the following:

(1) Compatible time period with the Delivery Indicator window.

(2) A workable time frame for validating past complaint data.

(3) Reasonable length of time for holding a vendor accountable for his quality performance.

(4) Reasonable length of time given that there is not always an exact correlation between the time when a complaint was generated and when the item was provided by the vendor.

FSC Indicator Scores For Vendors: Once complaint frequencies are calculated for each vendor within an FSC, the next step accounts for a vendor's contract volume within that FSC. This is done to provide some perspective when comparing complaint volume between vendors. The selected approach is to develop a ratio of complaint volume over contract volume for a vendor within an FSC for a 2-year window. The Product and Packaging scores are:

$$\text{Product Score} = 100 * 1 - \left[\frac{\text{\# of Vendor Quality Complaints within FSC}}{\text{\# Vendor CLINS Awarded within FSC}}\right]$$

AND

$$\text{Packaging Score} = 100 * 1 - \left[\frac{\text{\# of Vendor Packaging Complaints within FSC}}{\text{\# Vendor CLINS Awarded within FSC}}\right]$$

The vendor's contract data is obtained by matching the vendor's quality count file to the delivery indicator file which contains the contract volumes for each vendor per FSC. A rate of 100.0 is provided in those cases in which a vendor has no complaint data for given indicator. In cases where a vendor has more complaints than lines, the model gives a rate of zero.

Laboratory Testing Indicator: Laboratory testing indicator rates are determined for CDCS records that have a nonblank Test Date field. Here, contract volume is not considered. Lab test failures are normalized by the total number of parts tested. Laboratory testing scores are calculated using the following equation:

$$\text{Lab Testing Score} = 100 * [1 - (CRTW * (PCF / TPT) + MAJW * (PMAJF / TPT) + MINW * (PMINF / TPT))]$$

where:

CRTW = Critical Failure Weight
MAJW = Major Failure Weight
MINW = Minor Failure Weight
PCF = Total # Parts within an FSC with Critical Failures
PMAJF = Total # Parts within an FSC with Major Failures
PMINF = Total # Parts within an FSC with Minor Failures
TPT = Total # Parts Tested

The weighting values approved by the SAG are:

Critical Failure Weight = 1.00
Major Failure Weight = .80
Minor Failure Weight = .40

These weighting values are hard coded within the DVRS model and cannot be changed by the buyers.

Center Level Indicator Scores For Vendors: DVRS quality ratings are also computed at the DLA Supply Center (DSC) level. The equations for Center level ratings are essentially identical to those used to compute FSC ratings. The only difference is that the data is expanded from FSC to the vendor's complete data across all FSCs managed by the Center. Center level indicator scores are determined by accumulating a vendor's complaint volume across all FSCs. These scores are used to provide the buyer an assessment of a vendor's performance when a vendor has no contract data within an FSC or when the buyer would like to determine the vendor performance across the center.

Center Mean and Standard Deviation Determination: The last step calculates a center level mean and standard deviation for each indicator. These statistics are needed in calculating a vendor's final DVRS score (Section 2.1.4). Product and packaging indicator means are determined by dividing the accumulated quantity of complaints for each indicator type by the total contract volume for the center for each 2-year window. The indicator mean equations are:

$$\text{Product Indicator Mean} = \frac{\text{Tot. \# of Product Complaints @ Center}}{\text{Tot. Contract Lines for Center}}$$

AND

$$\text{Packaging Indicator Mean} = \frac{\text{Tot. \# of Packaging Complaints @ Center}}{\text{Tot. Contract Lines for Center}}$$

The Laboratory Test Mean is calculated in a slightly different manner.

$$\text{Laboratory Test Mean} = \frac{\sum \text{Lab Test Scores}}{\text{Tot. DVRS Records}}$$

Each indicator's standard deviation value (σ) is developed using the following formula:

$$\sigma = \sqrt{\frac{\sum X^2 - N\,u^2}{N}}$$

where;

u = Indicator Mean
N = Total # Vendor/FSC combinations
X = Indicator Score for Indicator/FSC combination

2.1.3 DELIVERY VENDOR RATINGS

2.1.3.1 Delivery Data Sources

All necessary delivery data is extracted from three input files: the active contract file (ACF), DORO's archived closed and open contract file (ALLACF), and a file containing up to the most recent 6 months of closed contracts (USPF0203). These files contain the data needed to calculate both DSC and FSC delivery scores for all vendors and to produce an archived transaction file for vendor viewing.

2.1.3.2 Delivery Indicator Methodology

Delivery Indicator Selection: Two DVRS delivery indicators were identified by the SAG. The first indicator is the percent of vendor contract lines that were delivered on-time. The second delivery indicator is associated with the average number of days a vendor's contract lines were late arriving. This indicator becomes relevant when a vendor's contracts are late and is incorporated within DVRS to provide the buyers insight on the degree of lateness, given that contracts are late. As an example, if a vendor has delivered ten contract lines in the past 2 years and three of those lines were delivered late, then the average days late is calculated using only those three late contract lines.

Procedures for Screening Delivery Data: Before making any calculations, the data must first pass through several screening procedures. First, all duplicate CLIN records are dropped (only the most current of the duplicate CLINs is kept). Next, each record, which represents a contract line, is flagged to identify which of the six 2-year windows that the contract lines are associated with (see Section 2.1.2.2). This is done by keying on the contract delivery date field and comparing that date to the opening and closing date of the 2-year window.

Vendors' contract lines are considered late either when the material arrives late or when the ship quantity is less than the contract quantity by a value which is greater than what is permissible by the quantity variance code.

The percentage of on-time deliveries is calculated from the number of times a contractor ships on time (or the quantity varies within authorized limits) to total lines. Each record (contract line) can have at most, one late frequency count charged against it. There are no penalties or benefits for early deliveries in the DVRS scoring methodology. Thus, early contract deliveries are considered on time.

There are some exceptions to a late contract line which are used to excuse the vendor. For instance, if the Project Action Code equals R5 or if the Reason For Delay Code is equal to H2, H3, H4, H5, P1, P2, P3, P4, V1, V2, V3 ,V4, V5, or V6, or if the Termination Code equals G or P, the contract line is considered delivered on time. In each of the above cases, it was judged by the SAG that the contractor was not responsible for the late delivery. Explanation of these codes is found in Appendix B.

Delivery Statistics: After conducting the required screening procedures, both delivery indicators are calculated for each vendor for the entire DSC. The percentage of contract lines delivered on-time per vendor is simply found by dividing the number of lines delivered on-time (where the ship date was less than or equal to the contract delivery date) by the total number of contract lines for that vendor. The average numbers of days late is calculated by dividing the total sum of the number of days late by the number of late contract lines. The data generated in these steps is then used to determine the DVRS score for each vendor at the DSC level. The same procedures are applied to calculate similar statistics for each vendor at the FSC level. Vendor's FSC contract frequency data are determined by simply distributing the DSC statistics to the appropriate FSC. This is accomplished by keying in on the first four positions of the contract record National Stock Number (NSN) field. Part numbered buys are included in the DSC statistics but are unattributable to an FSC.

The statistics calculated in the previous steps are compared against the overall DSC averages to determine the actual scores. The next step in the process is to calculate an overall DSC average percent on-time, average days late, and a corresponding standard deviation for each of the six 2-year windows. The average days late is converted into a "percent" score by subtracting the average days late from 100. If the average days late is greater than 100, the percent is converted to zero.

2.1.4 THE DVRS SCORING METHODOLOGY

Next, the quality indicator information at the DSC level is merged with the delivery indicator at the DSC level. These two files are matched by CAGE to form a single file containing both delivery and quality information. Similarly, the FSC indicator data for both delivery and quality are merged into a single file. The overall DSC indicator averages with their corresponding standard deviations are merged into a single file.

The next phase calculates the delivery score, quality score, and total combined DVRS score at the DSC and FSC level for all vendors. Scores are calculated in the following manner: First the "range" of each indicator is determined by subtracting each lower bound from each upper bound. The lower bound is equal to the overall DSC indicator average minus three times its standard deviation. The upper bound is equal to the overall DSC indicator average plus three standard deviations. If any lower bound value falls below zero, that lower bound is then truncated to zero. If any upper bound is greater than 100 percent, that upper bound is also truncated to 100 percent. The greatest range, between the lower and upper bounds, is used to calculate the scores for all five indicators. Each indicator is then normalized to this largest range.

The normalization process is accomplished by first noting that each indicator percent lies somewhere within its own indicator range. The position on this range is transformed to a similar position on the largest range. In most cases, the range will be between 0 and 100 and normalization is unnecessary. For example, suppose the range for lab testing is 15 with a lower bound of 85 and an upper bound of 100. Further, suppose that the vendor of interest has a lab testing success rate of 97 percent. Since 97 is 80% of the distance from 85 to 100, then 80 becomes the score of that indicator. For this example, the vendor's laboratory test score would be 80. The formula used in scoring each of the DVRS indicators is:

$$\text{Indicator Score} = (\text{indicator \%} - L)*(\max - \min)/(U - L) + \min$$

where;

max = the upper bound of the greatest range (usually 100),
min = the lower bound of the greatest range (usually 0),
U = the upper bound of the indicator,
L = the lower bound of the indicator.

After calculating all five individual indicator scores, the scores are grouped to yield an overall delivery score, an overall quality score, and the total DVRS score for each vendor at both the FSC and DSC levels. An external file is read by the DVRS program to supply weights to each indicator for combining into both delivery and quality score. Weights are also provided to calculate the total DVRS score. The default value of these weights were determined by the SAG, but the model is structured to allow the centers (the DVRS administrator) to change overall weighting values. The initial weight settings are:

The default values of the overall scoring weights are:

Delivery: 50%
Quality : 50%

The delivery indicator weights are:

Percent on-time: 60%
Average days late: 40%

The quality indicator weights are:

Product: 50%
Packaging: 20%
Laboratory tests: 30%.

Using these weights, the following formulas are used to generate the quality and delivery scores for FSCs and DSCs:

$$\text{Quality score} = (PW * Prod) + (PRW * Pack) + (LW * Lab)$$

where;

PRW = packaging weight,
PW = product weight,
LW = lab testing weight,

Prod = product indicator score,
Pack = packaging indicator score,
Lab = lab testing indicator score.

A vendor's overall delivery score is calculated using the following equation:

$$\text{delivery score} = (OW * Perc) + (AW * Avg)$$

where;

OW = percent on-time weight,
AW = average days late weight,
Perc= percent on-time indicator score,
Avg = average days late indicator score.

Once the quality and delivery scores are calculated, the overall DVRS score is determined by:

$$\text{DVRS score} = (QW * \text{quality score}) + (DW * \text{delivery score})$$

where;

QW = quality score weight,
DW = delivery score weight.

The last step in the DVRS methodology involves an examination of vendors that have changed their CAGE codes within the past 2 years. If DVRS determines that a CAGE has changed within that time frame, all scores under the prior CAGE are be combined with the scores of the new CAGE (unless the vendor has shown sufficient cause not to combine the scores). These scores are combined using a weighted average based on the number of contract lines for each CAGE. Due to the nature of the CAGE file, only one previous CAGE can be identified.

2.2 VALIDATION METHODOLOGY

The DVRS prototype was tested in a variety of ways. First, the model was run at IPCR using live production files. An ADP verification was made to insure the correct data files were captured and processed through DVRS, yielding the analytically correct ratings based on the methodology described in Section 2.1. Secondly, DVRS ratings were compared to other sources of information on contractor performance to check for consistency. Finally, a functional test is planned at DGSC where DVRS ratings will be used by Contracting personnel for a period of time on certain FSCs. The results of the functional test will not be known until early FY 93 and will be reported in a separate document.

ADP validation and verification was conducted by checking input and output files for each step in the 28 step program. Values were checked to make sure data did not fall outside theoretical limits (such as negative numbers). For several FSC/contractor combinations, raw data was manually reviewed along each step to verify data screening and insure that final ratings matched manual calculations.

To check the consistency of DVRS ratings, a Mann-Whitney nonparametric test was performed to assess the degree of agreement between DVRS and other data sources. A list of contractors with known excellent performance was obtained from each hardware center's representatives to the SAG. These were generally from the Quality Vendor Program (QVP) list. A list of poor performers was also obtained from the SAG representative. These lists were compared with DVRS scores to measure the ability of DVRS to distinguish between known poor and excellent performers. A hypothesis test was constructed at the 95 percent confidence level. The design of the test was to identify each vendor as either a high or low performer and then sort the contractors in DVRS sequence, low to high. The rank of each contractor in the sample was then determined (worst DVRS rating rank is 1, second worst rank is 2, etc.). The sum of ranks for the high performers was then compared to the sum of ranks for low performers. A null hypothesis was established that the rank sums were not statistically different (i.e. high performers and low performers were not differentiated by DVRS). The alternate hypothesis was that high performing vendors had higher DVRS ratings than low performers. If the rank sums of the two groups were fairly close, the null hypothesis would be accepted. If the rank sums of the high performers are much greater than those of poorer performers, the null hypothesis would be rejected and the alternate would be accepted.

Initially, DVRS will be available at DGSC for three FSCs. Those selected were FSC 5975 - Electrical hardware and supplies; FSC 9330 - Plastics fabricated materials; and, FSC 9390 - Miscellaneous fabricated nonmetalic materials (asbestos,cork, clay, etc). An effort was made to manually review the historical data on those FSCs and to correct errors prior to implementation.

2.3 IMPLEMENTATION CONCEPT

DVRS is designed to run monthly on the IPCR mainframe computer. Each month at a scheduled time, DVRS will capture the current information in the SAMMS production files and augment the data with the SALT file and DIDB data to produce DVRS scores. Ratings by CAGE and FSC, along with summary ratings at the center level, associated statistics and raw data will be stored on tape and archived. DVRS ratings and associated statistics will be downloaded from the mainframe to the Distributed Minicomputer System (DMINS). DPACS will load the DMINS files into UNIFY databases which will feed various DPACS screens. Buyers and contracting officers will access the ratings through a variety of menu driven options on their personal computers. Archived data will eventually be sent to a proposed DLA bulletin board that will be designed for contractor access.

There are two manual processes built into DVRS. When a vendor reviews its own archived data and does not agree with the accuracy of the data, the vendor must notify the DSC. DVRS contains a data element for each CAGE/FSC combination that can be manually set as a Y/N (Yes/No) indicator to tell DPACS that the vendor disputes the rating. Secondly, if a vendor believes that performance under a prior CAGE code should not be used to measure the current CAGE's performance, a similar Y/N flag is set to suppress combining of scores.

Central to the design of DVRS is the need to control and monitor DVRS applications. A DVRS focal point is needed to manage the manual processes within DVRS, coordinate activities between the contracting officer, contractor, IPCR, DVRS system developers, DVRS system maintainers, and other Supply Center organizations. Additionally, the DVRS focal point will provide required reports to higher level DLA activities. This proposed focal point has been designated as DVRS Administrator for the DSC. DLA-PPR and the Office of Civilian Personnel have developed Agency Job Guidelines to establish series, grade, and staffing requirements for this function.

SECTION 3
FINDINGS

3.1 MODEL RESULTS

DVRS was run on the IPC-Richmond mainframe computer during the month of March 1992. Total run time was approximately 7 CPU minutes on an Amdahl 5880. Data checks confirmed that all production files were accessed correctly and that data integration from all sources occurred as planned. Computations were hand checked to confirm internal processes correctly compute vendor ratings. Table 1 summarizes the ratings, highlighting those FSCs that were chosen for functional testing. Data from these FSCs were undergoing manual review and correction at the time of processing and are probably more accurate than data for other FSCs. The high quality ratings are partially explained by the fact that the Lab Testing program at DGSC is in its infancy and therefore almost no lab test data was available. When lab testing matures, the DVRS quality ratings may be much lower and comparable to Delivery Scores. Output products, i.e. the vendor rating files and archive transaction files were reviewed to insure completeness and accuracy. Vendor ratings were downloaded successfully to the DMINS system and are available for use by DPACS. Unforeseen problems with DPACS have delayed the integration of DVRS into DPACS by the DPACS developer. Partial integration is now planned for September 1992 with full integration by January 1993.

3.2 VALIDATION RESULTS

In addition to insuring that the data was processed correctly, statistical tests were conducted to verify that DVRS ratings matched the perception of experts or other sources. A reality check was conducted to compare a sample of contractor ratings for those vendors that have a known track record. By nature of the business practices used, contracting shops in DLA have hard data visibility only for extremely good and extremely poor performers. Thus, DVRS ratings for those high and low performing vendors were checked to insure that the ratings worked at the extremes of the distributions of vendors. This test did not measure DVRS ability to distinguish between vendors of moderate performance history.

TABLE 1

DVRS RESULTS

DGSC
SCORES

CATEGORY	DVRS	DELIVERY	QUALITY	AVG LINES PER FSC/CAGE LINES	NUMBER OF FSC/CAGE
OVERALL DGSC					
CURRENT MONTH	89.0	81.3	96.7	18	25044
1ST PRIOR MONTH	88.8	80.8	96.8	18	25228
2ND PRIOR MONTH	88.4	80.1	96.7	18	25353
3RD PRIOR MONTH	88.2	79.6	96.8	18	25386
4TH PRIOR MONTH	87.9	79.1	96.7	18	25562
5TH PRIOR MONTH	87.8	78.7	96.9	18	25699
FSC 5940	88.1	79.2	97.1	12	694
FSC 6230	86.9	79.0	94.8	10	226
FSC 6685	88.7	79.7	97.7	15	763
QVP VENDORS	91.1	85.2	97.0	624	81
NON QVP	89.0	81.3	96.7	16	24963

Lists of high and low performers were provided by SAG members from DGSC[1], DCSC, and DISC. For DGSC, the FSC was also identified. Therefore, the list was matched to the DVRS rating of the vendor for the particular FSC. For the other centers, no FSC designation was available; for these vendors, the center average DVRS rating was used. For DCSC and DISC, no quality assurance data was available, so the DVRS rating used was the delivery rating. Raw delivery data from DGSC was current; but data from the other centers was only available through September 1991.

To illustrate the use of the Mann-Whitney nonparametric test (see para 2.2), the DISC data will be highlighted. Test data for DGSC and DCSC is shown in Appendix C. In April 1992, DISC provided the CAGE codes for 10 vendors, five each high and low delivery performers. DVRS delivery ratings were produced and are shown in Table 2 in order of lowest to highest rating. The rank sum of each group (high and low performers as identified by the experts) is the sum of the rankings with rank 1 meaning the lowest DVRS rating and 10 the highest rating.

TABLE 2
Mann-Whitney Test Data - DISC

Contractor	Functional Expert Rating	DVRS Delivery Rating	Rank	Rank Sum
Z	Low	44	1	
Y	Low	52	2	
X	Low	58	3	
W	Low	62	4	
V	Low	63	5	
E	High	70	6	15
D	High	73	7	
C	High	77	8	
B	High	79	9	
A	High	83	10	
				40

1 "Poor" performers at DGSC were those that applied for but failed to meet Quality Vendor Program criteria. These vendors were not necessarily below average performers.

A test statistic is calculated and compared to a limit derived from the normal distribution to determine if the sample results are significant. In this case, the Mann-Whitney statistic for the low performers is -2.51 compared to a critical value of -1.96 for a two-tailed test at 95 percent confidence. From Table 2 it is apparent that there are no inconsistencies since all the high performers are ranked higher than all the low performers. The possibility of chance correlation to this degree is less than 5 percent (1.2 percent to be exact). Therefore, for DISC, it is concluded that DVRS ratings can distinguish between good and poor performers.

The sample sizes for DGSC and DCSC were much larger than for DISC. Although there were cases at these centers where occasionally, an identified low performer rated highly in DVRS and vice versa, the correlation achieved using Mann-Whitney tests combined with the large sample produced overwhelming results leading to the same conclusion. Table 3 summarizes test results. In all cases, the DVRS passed the test with 95 percent confidence.

TABLE 3
Mann-Whitney Results

Center	Delivery (D) or Quality(Q)	Sample Size	Z Mann-Whitney Test Statistic	Type I Error
DISC	D	10	-2.51	.0120
DCSC	D	154	-5.62	<.0001
DGSC	D	100	-4.91	<.0001
DGSC	Q	85	-2.12	.0348

SECTION 4
CONCLUSIONS

The DLA Vendor Rating System prototype model has proven to be a "nearly-automated" system which provides measures of contractor past performance for delivery effectiveness and quality assurance effectiveness. The prototype has been run in the production environment on the IPC-Richmond mainframe using DGSC SAMMS data, DIDB data and lab test data transferred from the DLA Administrative Support Center. Mainframe processes have been validated and statistical tests were successfully conducted to assure measures were reasonable.

The ability to provide these measures to the buyers for transition from prototype to production has not yet been achieved. The insertion of DVRS into the DPACS system has been delayed because of technical problems with the DPACS system. With minimal programming effort, but with a higher burden on users, DVRS could be transformed into a stand-alone system, independent of DPACS.

SECTION 5
RECOMMENDATIONS

It is recommended that the DVRS prototype be conditionally approved for transition into the DLA standard system. Final approval should be contingent on the development of systems to allow better access to the DVRS by buyers and vendors. Buyer access will be best achieved through DPACS. Vendor access will be best achieved via electronic communication.

It is recommended that the DVRS sponsors, DLA-PPR and DLA-QL, sponsor additional projects to guide the transfer of DVRS into a standard system. These projects involve coordination with system developers for buyer and vendor access and model modifications needed for use of DVRS at the other hardware centers.

APPENDIX A

IDENTIFICATION OF DVRS QUALITY AND PACKAGING INDICATORS BY CDCS CODES

APPENDIX A
IDENTIFICATION OF DVRS QUALITY AND PACKAGING INDICATORS BY CDCS CODES

CDCS complaints can be grouped into the four following categories: Packaging, Quality, Shipping, and Transportation. As mentioned in the DVRS main report, Shipping and Transportation type complaints are screened out by keying on both the CDCS Discrepancy Code and the Document Type Code (ref CDCS Users Manual, Working Copy, June 1986). The screening process is based on using the following code combination matrix.
Note that Document Types of 5 and 8 are not included in this matrix since these type records are also screened out of the DVRS model. The matrix coding scheme is:

CODE	TYPE COMPLAINT
P	Packaging
Q	Quality (Product)
S	Shipping
T	Transportation

Discrepancy	Document Type										
Code	0	1	2	3	4	6	7	9	A	B	C	B
A1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
A2	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
A3	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
A4	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
A5	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
C1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
C2	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
C3	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
C4	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
C5	Q	Q	T	T	Q	T	T	T	Q	Q	Q	Q
C6	Q	Q	T	T	Q	T	T	T	Q	Q	Q	Q
D1	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
D2	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
D3	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
L1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L2	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L3	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L4	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L5	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L6	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L7	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
L8	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
M1	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q

Discrepancy Code	Document Type 0	1	2	3	4	6	7	9	A	B	C	B
O1	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
O2	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
O3	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
O4	Q	Q	T	T	Q	T	T	T	Q	Q	Q	Q
P0	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P1	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P2	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P3	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P4	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P5	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P6	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
P7	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
Q1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q2	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q3	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q4	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q5	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q6	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
Q7	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
S1	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
S2	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
S3	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
S4	Q	Q	S	T	Q	S	S	S	Q	Q	Q	Q
S5	Q	Q	T	T	Q	T	T	T	Q	Q	Q	Q
T1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
T2	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
T3	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
T4	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
T5	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
T6	Q	Q	P	T	P	P	P	P	Q	Q	Q	Q
W0	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W1	Q	Q	Q	T	Q	S	S	S	Q	Q	Q	Q
W2	Q	Q	Q	T	Q	S	S	S	Q	Q	Q	Q
W3	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W4	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W5	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W6	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W7	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W8	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
W9	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
X1	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q
XL	Q	Q	Q	T	Q	Q	Q	Q	Q	Q	Q	Q

APPENDIX B

PROJECT ACTION CODE

REASON FOR DELAY CODE

TERMINATION CODE

APPENDIX B

The Project Action Code, Reason for Delay Code, and Termination Code are used to help evaluate a late delivery. The actual codes used in the screening process, along with their references and definitions, are listed in the following paragraphs.

PROJECT ACTION CODE

Reference: DLAM 8100.1 2-23, ACTION-DLA Operational Procedures and Personnel Computer Users Manual, dated 7 Oct 88

R5 - Delivery action on this CLIN has been suspended due to a request for a technical or legal determination. This CLIN may be terminated, cancelled, or extended if the legal/technical decision so dictates.

REASON FOR DELAY CODE

Reference: DLAM 4715.1 I, SAMMS Manual of Operating Procedures for the Contracting Subsystem, Vol 1, dated 2 Jan 91

H2 - GFM/GFP supplied late.
H3 - GFM/GFP inadequate.
H4 - GFM/GFP defective.
H5 - GFM/GFP uneconomically repairable.
P1 - Natural disaster, fire.
P2 - Natural disaster, flood.
P3 - Natural disaster, extreme weather.
P4 - Natural disaster, earthquake.
V1 - Energy shortage, natural gas.
V2 - Energy shortage, electricity.
V3 - Energy shortage, coal.
V4 - Energy shortage, gasoline.
V5 - Energy shortage, fuel oil (all types).
V6 - Energy shortage, liquefied gas (all types).

TERMINATION CODE

Reference: DLAM 4715.1 1-2 A20-1, SAMMS Manual of Operating Procedures for the Contracting Subsystem, Vol 1, Parts 1 & 2, dated 2 Jan 91

G - Termination for government convenience.
P - Pending termination for government convenience.

APPENDIX C

MANN-WHITNEY STATISTICAL TESTS

APPENDIX C
MANN-WHITNEY STATISTICAL TESTS

Nonparametric test data for Mann-Whitney[1] tests are contained in this Appendix. Tests for delivery ratings by FSC at DGSC are provided on page C-5. Similar quality ratings are shown on page C-6. Delivery ratings for DCSC are shown on pages C-7 through C-8.

The objective to be tested is to determine if DVRS can statistically distinguish between known poor and known excellent performers. If there is no ability to distinguish, then poor performers and good performers will achieve comparable DVRS ratings. When DVRS scores of a sample containing both types of performers are ranked ordered, then the types will be randomly arranged if there is no effect. If DVRS does distinguish, then the poor performers will be clustered at the low range of DVRS scores and the high performers will tend toward the upper ranges of scores. If we define M as the median value, where M_y is the median value for high performers and M_x is the median value for low performers, the hypothesis[2] test is set up as follows:

$$H_0: M_y = M_x$$
$$H_1: M_y = M_x$$

The test statistic, which is compared to the normal deviate, is (if the sample size is large and there are few ties)

$$Z = \frac{T_x - m(N+1)/2}{\sqrt{m\ n(N+1)/12}} \qquad \text{Where}$$

T_x is the rank sum of the poor performers
m is the number of poor performers
n is the number of excellent performers
N is the total sample size (m+n)

To pass the test at 95 percent confidence, the above equation must be less than -1.96 or greater than +1.96. If the test statistic is outside these limits, we reject H_0 and accept H_1, and conclude that DVRS does indeed distinguish between poor and excellent performers. (Note: This test could be designed as a one-tail hypothesis test, in which case the limit is less than -1.64.)

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1 Jean Dickerson Gibbons, Nonparametric Methods for Quantitative Analysis, Second Edition, (American Sciences Press, Inc.), pp. 159-171

2 John E. Freund, Modern Elementary Statistics, 3rd Edition, (Printice Hall Inc.), pp. 243-248

In the following tables, each line is an anonymous contractor. A "Y" in the last column reflects that the Center has determined that vendor to be a high performer and a "N" designates a poor performer.

TABLE C-1. Test Data for Delivery Ratings by FSC at DGSC

	FSC	CAGE	OSCORE_O	
1	6105		43.9	N
2	6220		44.8	N
3	5995		46.8	N
4	6850		49.2	N
5	6680		52.1	Y
6	6685		55.5	Y
7	3439		56.5	N
8	6685		58.2	N
9	6130		58.5	N
10	6150		58.6	Y
11	7320		60.3	N
12	6230		61.1	Y
13	5970		63.4	Y
14	6810		63.8	N
15	7320		63.8	Y
16	5970		65.3	N
17	2040		67.0	Y
18	6685		68.1	Y
19	9330		68.2	N
20	6680		68.2	Y
21	6810		69.4	Y
22	6680		69.4	Y
23	1560		69.6	N
24	5995		70.5	N
25	6230		70.5	Y
26	7320		71.1	Y
27	3455		71.8	Y
28	6210		72.6	Y
29	1680		73.2	Y
30	6750		74.0	Y
31	6680		74.3	Y
32	4240		75.6	N
33	6680		75.9	N
34	4140		76.7	Y
35	6105		76.8	Y
36	6850		76.9	N
37	5977		77.0	Y
38	6260		77.3	Y
39	7320		78.0	N
40	6240		78.2	Y
41	6685		78.7	Y
42	6610		79.1	Y
43	5975		79.7	Y
44	9150		81.4	Y
45	6130		81.6	Y
46	6230		82.3	Y
47	6645		83.8	N
48	5975		84.4	Y
49	5995		85.5	Y
50	5995		85.8	Y
51	6210		86.1	Y
52	6810		86.2	Y
53	9150		86.3	Y
54	6685		86.3	Y
55	5975		86.5	Y
56	7690		86.5	Y
57	3610		86.9	Y
58	6105		87.[illegible]	[illegible]
59	1560		87.3	Y
60	5995		87.5	[illegible]
61	5940		[illegible]	[illegible]
62	6105		88.[illegible]	[illegible]
63	5970		[illegible]	[illegible]
64	6220		89.3	Y
65	6240		89.8	Y
66	5995		89.9	Y
67	4140		90.0	Y
68	5975		90.1	Y
69	6635		90.4	Y
70	9150		90.5	Y
71	5995		90.6	Y
72	3439		91.1	Y
73	5995		91.4	N
74	5975		91.9	Y
75	5970		92.4	Y
76	6130		92.8	Y
77	6230		94.3	Y
78	6105		94.3	Y
79	6750		94.4	Y
80	6695		94.5	Y
81	3439		98.1	Y
82	3444		98.1	Y
83	3439		99.2	Y
84	6230		100.0	Y
85	6210		100.0	Y
86	5995		100.0	Y
87	4130		100.0	Y
88	6660		100.0	Y
89	1560		100.0	Y
90	6685		100.0	Y
91	3460		100.0	Y
92	7310		100.0	Y
93	9330		100.0	Y
94	6105		100.0	Y
95	7320		100.0	Y
96	6685		100.0	Y
97	9150		100.0	Y
98	9330		100.0	Y
99	9150		100.0	Y
100	6150		100.0	Y

T_x = 1+2+3+4+7+8+9+11+14+16+19+23+24+32+33+36+39+47+73 = 401

m = 19 N = 100

n = 81 Z = −4.907

TABLE C-2. Test Data for Quality Ratings by FSC at DGSC

	FSC	CAGE	OSCORE_0	
1	6660		34.4	Y
2	9150		60.5	Y
3	6105		68.5	Y
4	6810		76.4	N
5	6810		83.6	Y
6	6810		85.2	Y
7	3439		86.3	Y
8	6685		87.5	N
9	7320		87.8	Y
10	9330		88.3	Y
11	7320		90.6	Y
12	6130		90.7	Y
13	7320		91.9	Y
14	6210		92.2	Y
15	5970		92.9	Y
16	6260		93.4	Y
17	3460		93.5	Y
18	6150		93.8	Y
19	9150		93.9	N
20	1560		94.9	Y
21	6230		95.5	Y
22	9150		96.1	Y
23	1680		96.2	Y
24	3455		96.8	Y
25	4130		97.1	Y
26	6685		97.2	Y
27	5995		97.3	Y
28	9150		97.4	Y
29	6750		97.4	Y
30	6685		98.0	Y
31	6105		98.2	Y
32	5970		98.3	Y
33	6685		98.4	Y
34	5977		98.4	Y
35	6230		98.5	Y
36	5975		98.6	Y
37	4140		98.7	Y
38	5995		98.9	Y
39	9150		98.9	N
40	5995		99.0	Y
41	6230		99.0	[illegible]
42	5975		99.1	[illegible]
43	5995		99.1	Y
44	6105		99.1	Y
45	6210		99.2	Y
46	3439		99.4	Y
47	3439		99.4	Y
48	6685		99.5	Y
49	6680		99.5	Y
50	6240		99.8	Y
51	6750		99.9	Y
52	5970		100.0	Y
53	6130		100.0	Y
54	6680		100.0	Y
55	5940		100.0	Y
56	6240		100.0	Y
57	6150		100.0	Y
58	6230		100.0	Y
59	5975		100.0	Y
60	6210		100.0	Y
61	5975		100.0	Y
62	6230		100.0	Y
63	4140		100.0	Y
64	6695		100.0	Y
65	6680		100.0	Y
66	6105		100.0	Y
67	5995		100.0	Y
68	5995		100.0	Y
69	7310		100.0	Y
70	3610		100.0	Y
71	6680		100.0	Y
72	3444		100.0	Y
73	7690		100.0	Y
74	9150		100.0	Y
75	6105		100.0	Y
76	5975		100.0	Y
77	9150		100.0	Y
78	6685		100.0	Y
79	9330		100.0	Y
80	6685		100.0	Y
81	2040		100.0	Y
82	6610		100.0	Y
83	6635		100.0	Y
84	1560		100.0	Y
85	6220		100.0	Y

$T_x = 4+8+19+39 = 70$

$m = 4$ $\quad N = 85$

$n = 81$ $\quad Z = -2.117$

TABLE C-3. Test Data for Delivery Ratings at DGSC

RANK	CAGE	%ON-TIME	AVG DAYS	OVRS SCORE	HIGH PERFORMER
1		54.8	82.0	40.1	N
2		53.6	77.0	41.4	N
3		53.8	78.4	46.9	N
4		54.8	62.5	47.9	N
5		80.3	122.7	48.2	N
6		61.5	66.0	50.5	N
7		44.9	41.0	50.5	N
8		52.5	50.6	51.3	Y
9		39.1	29.3	51.7	N
10		33.6	20.2	52.1	Y
11		90.2	107.1	54.1	N
12		35.3	17.0	54.4	Y
13		92.7	251.0	55.6	N
14		92.7	110.0	55.6	N
15		77.4	76.3	55.9	N
16		58.4	47.5	56.0	N
17		73.8	66.3	57.8	N
18		73.8	65.7	58.0	N
19		69.2	55.9	59.2	N
20		80.2	65.6	61.9	N
21		69.4	46.6	63.0	N
22		55.7	25.7	63.1	Y
23		96.2	86.0	63.3	N
24		56.0	25.2	63.5	Y
25		75.7	54.0	63.8	Y
26		57.7	24.8	64.7	Y
27		70.6	41.1	65.9	Y
28		69.2	39.0	65.9	Y
29		69.7	39.2	66.1	N
30		60.7	24.1	66.8	Y
31		68.9	34.0	67.7	Y
32		63.5	25.8	67.8	Y
33		70.1	34.9	68.1	Y
34		61.6	20.5	68.8	Y
35		61.5	20.2	68.8	Y
36		63.8	22.9	69.1	Y
37		88.0	59.1	69.2	N
38		72.8	36.3	69.2	Y
39		75.1	39.2	69.4	N
40		83.1	48.9	70.3	Y
41		79.8	44.0	70.3	N
42		60.9	13.4	70.6	Y
43		78.4	40.2	71.0	N
44		78.5	29.7	71.3	N
45		61.9	14.6	71.3	Y
46		78.5	39.0	71.6	Y
47		74.8	32.4	71.9	Y
48		54.5	16.2	72.3	Y
49		79.8	37.1	72.4	N
50		73.5	29.0	72.5	Y
51		93.5	59.1	72.6	N
52		72.0	24.9	72.2	N
53		[illegible]	35.0	73.5	N
54		91.5	53.2	73.6	[illegible]
55		80.7	35.8	74.1	[illegible]
56		73.9	28.6	74.1	[illegible]
57		[illegible]	23.0	74.1	[illegible]
58		59.7	19.2	74.1	Y
59		75.0	29.6	74.2	Y
60		86.3	41.7	75.1	Y
61		66.3	11.7	75.1	Y
62		76.8	27.2	75.2	Y
63		87.9	42.9	75.5	Y
64		84.0	36.6	75.8	N
65		90.4	30.9	75.9	Y
66		83.0	33.8	76.3	N
67		59.6	13.7	76.3	Y
68		78.1	25.6	76.6	Y
69		84.1	34.2	76.8	Y
70		94.6	49.1	77.1	Y
71		90.8	28.4	77.1	Y
72		75.3	20.2	77.1	Y
73		72.1	14.8	77.3	N
74		79.5	25.4	77.5	Y
75		78.7	24.3	77.5	Y
76		79.6	25.1	77.7	Y
77		80.7	26.2	77.9	Y
78		78.1	22.5	77.9	Y
79		92.0	28.1	78.0	Y
80		76.3	19.1	78.1	Y
81		78.8	22.5	78.3	Y
82		74.5	15.0	78.7	Y
83		91.9	25.5	78.9	Y
84		80.5	23.3	79.0	Y
85		86.0	30.9	79.2	Y
86		72.5	10.8	79.2	Y
87		92.4	40.3	79.3	Y
88		90.6	37.6	79.3	Y
89		93.0	26.2	79.3	Y
90		76.5	16.5	79.3	Y
91		79.8	20.9	79.5	Y
92		87.5	32.0	79.7	N
93		75.8	13.7	80.0	Y
94		79.0	16.8	80.1	Y
95		79.9	17.9	80.2	Y
96		84.4	25.8	80.3	Y
97		74.0	10.0	80.4	Y
98		77.4	14.2	80.8	Y
99		81.0	18.8	81.1	Y
100		84.2	22.9	81.4	N
101		91.4	23.0	81.6	Y
102		79.3	15.2	81.8	Y
103		79.7	14.2	82.1	N
104		85.3	22.9	82.2	Y
105		94.4	21.0	82.2	Y
106		87.5	25.7	82.3	Y
107		80.3	14.3	82.3	Y
108		82.7	19.1	82.4	Y

TABLE C-3. (continued)

RANK	CAGE	%ON-TIME	AVG DAYS	OVRS SCORE	HIGH PERFORMER
109		84.6	20.6	82.5	Y
110		90.[illegible]	29.6	82.6	Y
111		80.2	13.5	82.7	Y
112		93.8	18.6	82.8	Y
113		88.4	25.4	82.9	Y
114		90.9	27.0	83.7	Y
115		84.3	17.3	83.7	Y
116		86.1	19.6	63.8	Y
117		85.6	18.9	83.8	Y
118		88.5	23.0	83.9	N
119		8[illegible]	21.7	83.9	Y
120		88.4	21.5	84.4	Y
121		85.7	17.4	84.5	Y
122		83.6	14.2	84.5	Y
123		82.5	12.6	84.5	Y
124		96.3	33.0	84.6	Y
125		89.6	22.9	84.6	N
126		95.1	31.0	84.7	Y
127		83.9	12.8	85.2	Y
128		88.5	18.6	85.7	Y
129		85.4	13.8	85.7	N
130		85.0	12.6	86.0	Y
131		89.2	16.5	86.9	Y
132		91.7	20.0	87.0	Y
133		86.6	12.0	87.2	Y
134		85.9	10.5	87.3	Y
135		92.4	18.8	87.9	Y
136		96.7	23.6	88.6	Y
137		99.7	12.8	88.7	Y
138		87.5	8.1	89.3	Y
139		92.2	14.0	89.7	N
140		89.2	8.7	90.0	Y
141		97.6	21.0	90.2	Y
142		98.7	21.0	90.8	Y
143		90.4	7.6	91.2	Y
144		30.1	6.3	91.5	Y
145		90.0	6.0	91.6	Y
146		98.1	18.0	91.7	Y
147		94.1	10.9	92.1	Y
148		94.6	9.4	93.0	Y
149		94.1	8.6	93.0	Y
150		96.2	8.8	94.2	Y
151		99.0	8.7	95.9	Y
152		98.9	2.0	98.5	Y
153		98.4	0.0	99.0	Y
154		100.0	0.0	100.0	Y

T_x = 1+2+... 7+9+11+13+14+... 21+23+29+37+39+41+43+44+49+51+52+53+64+66+73+92+100+103+118+125+129+139 = 1671

m = 39 N = 154

n = 115 Z = -5.615

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The DVRS is a tool to enhance the DLA buyer's ability to make a "best-value" contracting decision. Because efforts to quantify past performance are labor and data intensive, an automated, standardized method was needed to measure a contractor's historical performance. DVRS is mainly an automated system that collects historical data from numerous sources, consolidates raw data and performs an analysis to produce ratings in a systematic approach. These ratings are passed into the DLA Pre-Award Contracting System to be shown along with bid prices to assist in the bid evaluation process. DVRS is a composite rating that measures a vendor's quality assurance program and on-time delivery effectiveness over a two year period. Under this project a prototype model was developed for use at the Defense General Supply Center.

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