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STAFF STUDY

DIRECT PROCUREMENT METHOD (DPM) COST MODEL

September 1971

U.S. ARMY
TRANSPORTATION ENGINEERING AGENCY
MILITARY TRAFFIC MANAGEMENT AND TERMINAL SERVICE
Newport News, Virginia 23606

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U.S. Army Transportation Engineering Agency
Military Traffic Management and Terminal Service
Newport News, Virginia 23606
September 1971

SUBJECT: Direct Procurement Method (DPM) Cost Model

1. PROBLEM. There are two parallel systems for moving personal property within the Department of Defense (DOD), that is, the Through Government Bill of Lading (TGBL) and the DPM method. The TGBL system can be managed through the collection of data in the Worldwide Household Goods Information System for Traffic Management (WHIST) data bank. There is no comparable system for the DPM method. The problem is to develop a cost model for the DPM system that could be utilized as a management tool for comparative purpose with the TGBL system.

2. ASSUMPTION. That Continental United States (CONUS) Installation Transportation Officers (ITOs) utilize the CONUS Export Terminal Selection Guide (Appendix G to MILSTAMP Regulation DOD 4500.32-R) for routing of DPM shipments.

3. FACTS BEARING ON THE PROBLEM.

a. Some of the data elements necessary to complete this model are not currently being recorded.

b. There is no central data bank for collection of the cost elements used in this model.

4. DISCUSSION. See Annex A.

5. CONCLUSIONS. With minor modifications in reporting procedures, the cost data necessary to compute the DPM model can be accumulated. The data are available in various formats within the purview of Headquarters, Military Traffic Management and Terminal Service (HQ MTMTS), and ITOs.

6. RECOMMENDATION. Recommend that HQ MTMTS:

a. Initiate the necessary reporting procedures to accumulate the cost data.

b. Implement the proposed model as a management tool.

Allan W Doss

ALLAN W. DOSS
Major, TC
Project Officer

ANNEX A - Discussion

ANNEX B - Mathematical Cost Model

ANNEX A to Staff Study (Direct Procurement Method (DPM) Cost Model)

September 1971

DISCUSSION

1. Background.

a. The present DPM printout rates are calculated in the Personal Property Directorate, HQ MTMTS, using a variety of factors.

(1) The basic input is the DD Form 1702, Direct Procurement Method Household Goods Shipment Data, which is submitted annually by ITOs. From this form various data are extracted to ascertain the packing and crating rates at origin for Type II containers only, oversea line-haul rates, unpacking rates at destination, and ports utilized by oversea installations.

(2) Line-haul rates for CONUS are obtained from the MTMTS data banks.

(3) Both port of embarkation (POE) and port of debarkation (POD) port handling rates are a fixed factor of 6 dollars a measurement ton (MTON) regardless of the port utilized.

(4) Overocean rates, which are obtained from the Military Sealift Command (MSC), are the shipping agreement rates tendered by various carriers to MSC These rates are averaged

based on weighted utilization from the previous time period. The weighted average rates by coastal areas to various oversea ports are then presented to MTMTS.

(5) There are various fixed charges for container usage and administrative overhead. These figures are either calculated by HQ MTMTS or extracted from directives issued by higher headquarters.

b. After all the factors are accumulated, a final DPM cost in terms of hundredweight (CWT) is printed and distributed for the benefit of using activities.

c. This study is the result of a dual effort of George H. Carroll and Major Allan W. Doss, Operations Analysis Division.

2. Model Development.

a. The proposed DPM cost model is derived in a similar manner to the current DPM printout rate; however, it uses more actual cost data and results in a more accurate cost picture than the latter method. The only assumption in the proposed model is that CONUS ITOs will utilize the cost-favorable ports as outlined in Appendix G, MILSTAMP DOD Regulation 4500-32R, for the movement of DPM shipments overseas. The ports selected by oversea installations for DPM shipments are currently reported to HQ MTMTS on DD Form 1702 which will require modification in order to accumulate some of the new data utilized later on in the model.

b. The basic DPM cost model -

$$T = \sum_{i=1}^{8} x_i$$

denotes that the sum of all the cost variables will equal the cost of the DPM shipment; the final cost (T) being expressed as the hundredweight cost of making a DPM shipment from one installation to another. This cost is the direct cost associated with the shipment. The direct cost rather than the total cost is used because we are interested only in the change in total costs that will be associated with the next DPM shipment. This gives a valid comparison to the TGBL out-of-pocket cost that the next shipment would require, if that method of shipment were to be chosen. In most cases the indirect or overhead costs will be the same within the two methods of shipment and will remain whether the shipment is made or not. Thus, the only real cost of interest is that cost associated with the next shipment for comparative and managerial purposes. The following table depicts the proposed DPM cost model and the sources from which this data may be obtained.

TABLE
PROPOSED DPM COST MODEL

Cost Element		Source of Data
Symbol	Item	
x_1	Packing and crating costs paid by the installation	ITOs
x_2	Line-haul costs to POE	MTMTS Eastern and Western Areas

TABLE - cont

Cost Element		Source of Data
Symbol	Item	
x_3	Port handling cost POE	Comptroller, HQ MTMTS
x_4	Transocean transportation costs	Military Sealift Command
x_5	Port handling cost POD	Comptroller, HQ MTMTS
x_6	Line-haul costs from POD	ITOs
x_7	Delivery and unpacking costs	ITOs
x_8	Container costs	GSA

(1) The first factor for inclusion in the cost model (x_1) is the actual packing and crating costs per hundredweight experienced by an installation during a given time frame. To derive this figure, the ITO will be required to keep a cumulative total of all packing and crating costs paid out to the contractors during this time period. From this total he will deduct the General Services Administration (GSA) purchase price for Type II containers that contractors were required to build (when the Government was unable to furnish them).* The resulting figure

*Normally, Type II containers are furnished by the Government to the contractors. When the Government cannot provide a container, the contractor will build a Type II container at his contract price, which may or may not be the same as the GSA purchase price. This deduction allows for the difference in price between the Government-furnished container and the contractor-built container to be taken into account in the cost model. For example, if the contractor-built container costs $75 and the GSA purchase price is $52, the difference is $23. The $52 will be accounted for in variable x_8, and $23 will be accounted for in variable x_1.

would then be divided by the total hundredweight of personal property shipped from an installation. This data can be accumulated by the ITOs in a variety of ways. One way would be to keep a running log on DPM shipments indicating the various data elements. Under this system a cumulative total for each of the data elements would merely be extracted on the cutoff date of the report and submitted to HQ MTMTS. These data are available to the ITOs, as pointed out in MTMTS Personal Property report of 27 April 1971, subject: DPM/LMI Study by HQ MTMTS, PPA. The advantage of using this actual cost data is to account for the extra charges against the Government by the contractor. These extra charges include, but are not limited to, overflow boxes, piano hoisting, etc. The current packing and crating rate being used in the DPM printout does not reflect these additional charges. Thus, the new packing and crating cost factor is a more realistic cost based on actual contracts paid.

(2) The second cost element (x_2) represents the CONUS line-haul costs expressed as a dollar figure per hundredweight of goods shipped. This figure is the same as is presently being used for the DPM printout. It is available through the MTMTS rate data bank at Eastern and Western areas.

(3) The next cost element in the model (x_3) represents the cost of the nearside port handling costs. Since these are usually expressed as a measurement ton cost, they must be converted

to a hundredweight figure for use in the proposed model. The Comptroller at HQ MTMTS receives and publishes quarterly a cost element breakdown for every CONUS port. These figures also include a cost breakout for the handling of personal property. Both the direct and indirect costs are broken out; but for the model, only the direct costs should be included.

(4) Overocean costs (x_4) are currently received from the Military Sealift Command in an averaged format by coasts. These averaged shipping agreement rates are the most accurate costs that can be used for this type model. The rates being in MTON would naturally be converted to a hundredweight figure. Converting MTON to a hundredweight cost is simply a mathematical exercise. Presently this conversion is made by using a factor of 7 pounds per cubic foot as the density of personal property. The model would use the actual density experienced by each installation rather than the standard 7 pounds per cubic foot. This actual density is easily obtained from the DD Form 1702. Both the total weight and cube are currently reported. Dividing the weight by the cube would result in the actual weight per cube or density experienced. Thus, through the use of actual port handling direct costs, shipping agreement rates, and the actual density experienced, an accurate over-the-ocean rate can be calculated.

(5) The Comptroller also receives a similar quarterly cost element breakdown from oversea ports, but it currently does

not carry personal property charges. These data would have to be obtained from the oversea ports in order to complete the model. Conversion to a hundredweight cost would provide this cost element (x_5).

(6) The hundredweight cost for the farside line-haul (x_6) is currently reported by the oversea installation on DD Form 1702. This same figure could be used in the derivation of the new DPM cost factors.

(7) The unpacking costs (x_7) can be computed in the same fashion as the packing and crating costs (x_1). The ITOs merely divide the total amount paid out at an installation for unpacking by the total hundredweight of incoming personal property shipments. The resulting figure then is an accurate cost per hundredweight actually experienced by that installation.

(8) The last cost element to be included is the container cost (x_8) associated with a personal property move via the DPM method. The computation of this element is arrived at by dividing the current GSA cost of the Government containers utilized by the average number of trips per container. This provides the cost per container per shipment. Multiplying this figure by the number of containers used at an installation and dividing by the hundredweight total of outgoing shipment would provide a cost per hundredweight for container utilization. Computations of a

similar nature are currently being used by HQ MTMTS to arrive at a hundredweight factor for the current DPM printout.

c. The advantages of this model are simplicity, flexibility, and accuracy. The simplicity of construction will allow for either a machine or manual computation. Its flexibility is inherent in its construction. Factors may be added or subtracted to account for the particular situation in question. Local drayage charges unaccounted for elsewhere may be substituted for line-haul rates where applicable. A CONUS move could be calculated by excluding the ocean segment and the farside line-haul charges. An air shipment would be calculated by substitution of air rates for water rates, etc. Its accuracy, despite some averaging, is far superior to the pumped-in factor method currently being utilized. The cost factors reflect actual costs paid and account for many of the additional charges being overlooked.

ANNEX B to Staff Study (Direct Procurement Method (DPM) Cost Model)

September 1971

DIRECT PROCUREMENT METHOD (DPM) COST MODEL

$$T = \sum_{i=1}^{8} x_1$$

T = Hundredweight cost of a DPM household goods shipment from installation to installation.

NOTE: All variables are expressed as a hundredweight (cwt) cost.

x_1 = The actual packing and crating costs paid by the installation.

x_2 = The cwt line-haul rate for the near-side move.

x_3 = The cwt cost of the POE handling.

x_4 = The cwt cost of the overocean segment.

x_5 = The cwt cost of the POD handling.

x_6 = The cwt line-haul rate for the farside line-haul.

x_7 = The actual unpacking costs paid by the installation.

x_8 = The cwt container costs of the Type II Government container.

INDIVIDUAL VARIABLE COMPUTATIONS

1. Packing and Crating Costs.

$$x_1 = \frac{x_{1a}}{x_{1b}}$$

$$x_{1b} = \frac{x_{1c}}{100}$$

x_1 = The actual packing and crating costs paid by the installation.

x_{1a} = Actual total dollars paid by the installation for packing and crating.

x_{1b} = Total cwt shipped from that installation.

x_{1c} = Total DPM weight shipped from an installation.

2. Nearside Line-Haul Costs.

x_2 = Line-haul rate.

3. Port Handling Costs POE.

$$x_3 = \frac{x_{3a}}{x_y}$$

$$x_y = \frac{x_c}{100}$$

$$x_c = \frac{40a}{b}$$

x_3 = The cwt cost of POE handling.

x_{3a} = The routing rate per MTON POE.

x_y = Cwt per MTON.

x_c = Weight per MTON.

40 = Factor 40 cubic feet per MTON.
a = Total weight shipped.
b = Total cube shipped.
$\frac{a}{b}$ = Weight per cubic foot shipped.

4. Transocean Transportation Costs.

$$x_4 = \frac{x_{4a}}{x_y}$$

x_4 = The cwt cost of the overocean segment.

x_{4a} = Shipping agreement rate per MTON for overocean.

x_y = Same as previously defined.

INDIVIDUAL VARIABLE COMPUTATIONS - cont

5. Port Handling Costs POD.

$$x_5 = \frac{x_{5a}}{x_y}$$

x_5 = The cwt cost of POD handling.

x_{5a} = The routing rate per MTON POD.

x_y = Same as previously defined.

6. Farside Line-Haul Costs.

x_6 = Cwt line-haul cost rate for the farside line-haul.

7. Delivery and Unpacking Costs.

$$x_7 = \frac{x_{7a}}{x_{7b}}$$

$$x_{7b} = \frac{x_{7c}}{100}$$

x_{7a} = Actual unpacking costs paid at an installation.

x_{7b} = Total cwt of incoming shipments.

INDIVIDUAL VARIABLE COMPUTATIONS - cont

x_{7c} = Total weight of shipments received.

8. Container Costs.

$$x_8 = \frac{x_{8a} \cdot x_{8b}}{x_{8c}}$$

$$x_{8b} = \frac{x_{b1}}{x_{8b2}}$$

x_{8a} = Number of containers used.

x_{8b} = Factor cost per container.

x_{8c} = Cwt of outgoing shipments. (Same as x_{1b})

x_{8b1} = Current GSA cost of Type II container

x_{8b2} = Number of shipments per container.

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13. ABSTRACT

The study develops a simple but rather detailed marginal cost model for the Direct Procurement Method (DPM) of moving personal property within the Department of Defense and examines sources for the data elements that could make the model a management tool for the comparison of the DPM and Through Government Bill of Lading (TGBL) systems. The study concludes that the required data elements can be accumulated from sources in the MTMTS purview with minor modifications of the existing reporting structure.

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