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A STUDY OF THE COST-EFFECTIVENESS OF INVENTORY MANAGEMENT POLIC--ETC(U)
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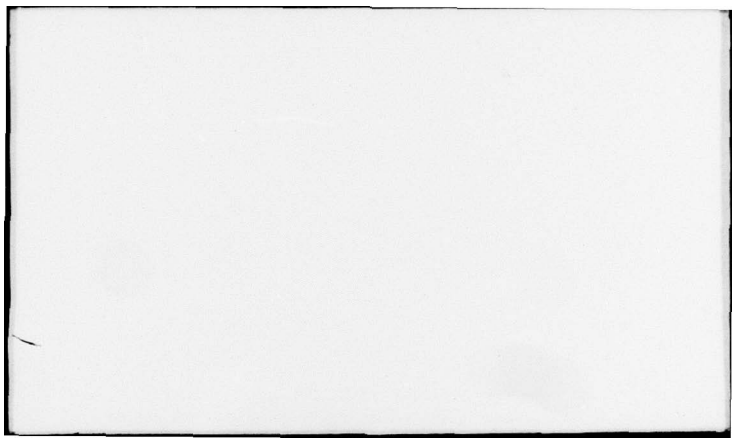

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Final Report

on

A Study of the Cost-Effectiveness

of

Inventory Management Policies

Based on

Average Requisition Size

August 1977

Submitted by

RM-77-04
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Final Scientific Report
on
A Study of the Cost-Effectiveness
of
Inventory Management Policies
Based on
Average Requisition Size

This paper is the Final Scientific Report for a research effort entitled "A Study of the Cost-Effectiveness of Inventory Management Policies Based on Average Requisition Size". The paper contains a comprehensive review of accomplishments and a chronological bibliography of a significant papers resulting from the research effort.

Research efforts associated with this project commenced on 3 December 1976 and terminated on 31 July 1977. Accomplishments include the completion of all tasks defined in Decision Systems contract F49620-77-C-0063. Results of these efforts are documented in the following technical reports:

Demmy, W.S., A Study of the Cost-Effectiveness of Inventory Management Policies Based on Average Requisition Size, Technical Report RM-77-01, Decision Systems, 3575 Charlene Drive, Dayton, Ohio 45432, Aug 1977, 112 pp.

Demmy, W.S., The Inventory System Simulator (INSSIM), Volume I: Model Description, Technical Report RM-77-02, Decision Systems, 3575 Charlene Drive, Dayton, Ohio 45432, Aug 1977, 114 pp.

Demmy, W.S., The Inventory System Simulator (INSSIM): Volume II: Program Listing and Narratives, Technical Report RM-77-03 Decision Systems, 3575 Charlene Drive, Dayton, Ohio 45432, Aug. 1977, 116 pp.

Major findings of the research effort are as follows:

1. There are substantial logical inconsistancies in EOQ Data Bank historical records for the period FY 71 through FY 75 defining
   (a) the number of units demanded in a given quarter and
   (b) the associated number of requisitions submitted.
   Consequently, these records could not be used to develop probability descriptions of the distribution of requisition sizes for specific items. Upon further investigation, we found that several data system changes were implemented in the spring of 1976 to correct timing and accuracy problems associated with the recording of requisition counts. At the time of this study, only one period of information was available in which these data system improvements had been implemented--the period 1 July 76 to 31 December 76. Analysis of this data showed that the gross logical inconsistancies we found in older data sets were no longer present. Consequently, data from this period was used to develop a simulation model for the demand requisition process.

2. The Inventory System Simulator (INSSIM) was then modified to permit evaluation of alternate inventory management policies based on average requisition size. Details of the modified model are documented in Technical Report RM-77-02 and RM-77-03 listed above.

3. A stratified sampling plan was then used to select items for simulation analysis. Three groups of 100 items each were constructed from EOQ Data Bank records. These groups corresponded to High, Low and Medium demand rate classes, where High items had net demands in excess of $5000/year in the FY 71 to FY 72 period and Low items had demands of less than $500/year in FY 71 to FY 72. Demands for Medium items were between these values.

   Three alternate versions of the Presutti-Trepp (PT) safety level formulas were then simulated using actual EOQ Data Bank demand histories for each item group. For the High demand group of items, the PT-formula with Z=1 produced consistently better values of unit-weeks of backorders than the PT-formula in which $Z=\sqrt{R}$, where R denotes average requisition size. Further, the PT-formula with $Z=\sqrt{R}$ was consistently better than the Z=R formula. On the other hand, when supply performance was measured by requisition-weeks of backorders, (e.g. 1 requisition that is backordered for one week) there appeared to be no clear differencess among the three formulas.

   Similar results were observed for the Medium and Low demand rate classes, but in these cases the results were less clear-cut due to the low activity levels in these classes.

4. An Analysis of Covariance model was used in an attempt to measure the statistical significance of the observed differences. Unfortunately, the best model we could find did not appear to provide a good description of the observed data. Consequently, we were unable to conclude that there were any statistically significant differences among the three alternate formulas.

Details of the simulation and statistical analyses are documented in Technical Report RM-77-01.

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This paper summarizes the accomplishments and lists associated documentation associated with Decision Systems Contract F4920-77-C-0063. The object of the study was to evaluate the relative cost-effectiveness of three alternate formulas developed by Presuitti and Trepp for use in depot-level EOQ inventory management. Simulation studies using actual demand histories for Air Force items were used to evaluate the operating characteristics of each formula. (6)

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