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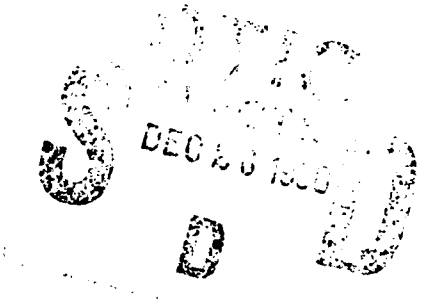

COST-BENEFIT COMPARISON: A METHOD FOR EVALUATING PROPOSED CHANGES TO DEFENSE ACQUISITION PROCEDURES

THESIS

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AFIT/GSM/LSR/90S-19

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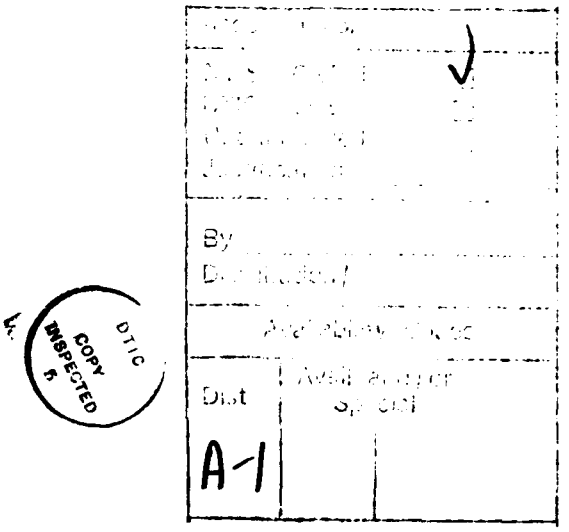

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COST-BENEFIT COMPARISON: A METHOD FOR EVALUATING PROPOSED CHANGES TO DEFENSE ACQUISITION PROCEDURES

THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

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In Partial Fulfillment of the

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Master of Science in Systems Management

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Captain, USAF

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Preface

My initial goal for my master's thesis was to determine if many of the changes made to improve defense acquisition procedures have a detrimental effect on our ability to acquire defense products, and if the use of some form of analysis to evaluate changes would prevent the adoption of future changes having adverse net impacts. My chief problem in pursuing this goal was that I was unable to identify an existing analysis method that could be used to evaluate changes made to defense acquisition procedures. For this reason I deferred my initial goal so that I could identify an acceptable method for reviewing proposed changes to defense acquisition procedures.

The purpose of this study was to prepare a model to allow for the identification, comparison, and analysis of the advantages and disadvantages of proposed changes to defense acquisition procedures. The research resulted in the creation of a method for cost-benefit comparison of proposed changes to defense acquisition procedures. Based on the cost-benefit comparison method developed, instructions for the establishment of a cost-benefit comparison program were proposed and examples of cost-benefit comparisons were provided.

With a suitable method established, follow-on research can be conducted to determine whether actual evaluation of

proposed changes to defense acquisition procedures is performed. In addition, follow-on research can be conducted to determine if using cost-benefit comparison to evaluate proposed changes will have a positive effect on defense acquisition procedures.

I would like to thank all those individuals who made this research effort successful. I am grateful to have had Dr. Robert B. Weaver as my thesis advisor. His help, guidance, and expert advice were instrumental in the conduct of this exploratory study. Also I would like to thank Dr. Richard T. Taliaferro, whose experience, insight, and advice while serving as reader for this thesis were of great benefit to me and to the final product. I would like to thank those individuals who served as technical advisors, providing comments on earlier versions of my thesis. The technical advisors from the faculty of AFIT included Dr. Leroy Gill and Dr Rita Wells. Lt Col Stephen Busch and Major Charles O'Connor also assisted as technical advisors providing useful suggestions based on their experience accumulated as Congressional liaison staff officers. I am also grateful to the instructors at AFIT who provided both inspiration and information with which my research effort grew. I thank Brigadier General Kenneth R. Israel for supporting my efforts to attend AFIT while he was my commanding officer at ESD/IC. I am forever in debt to my daughter Amanda and my son Grant whose love and laughter have always served as an inspiration to me. Finally I would

like to thank my wife Gena, whose love and support allowed me to endure the challenges I faced while performing this research, and is the only person I know who can wreck two cars in one week.

May only good things come from this effort through God, whose infinite capacity is full of charity, patience, and hope, and whose gift of free will to mankind has made all things possible.

Ted McIntire

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Abstract

Defense acquisition procedures are changed with the intention of improving the method of acquiring defense products and obtaining better defense products. It is possible that some changes to improve defense acquisition procedures have the effect of degrading defense acquisition procedures.

Evaluating the impacts of proposed changes to defense acquisition procedures may preclude the adoption of those changes that are degrading to the defense acquisition process. This exploratory study identified a method of identifying, comparing, and analyzing the advantages and disadvantages of proposed changes to defense acquisition procedures. This method, named cost-benefit comparison, was developed following a review of the defense acquisition environment, and a review of existing evaluation tools and management theory. This research also resulted in the preparation of draft instructions for the implementation of a cost-benefit comparison program. In addition, examples of cost-benefit comparisons of potential changes to defense acquisition procedures were provided.

COST-BENEFIT COMPARISON: A METHOD FOR EVALUATING PROPOSED CHANGES TO DEFENSE ACQUISITION PROCEDURES

I. Introduction

General Issue

Defense acquisition procedures are changed with the intention of improving the method of acquiring defense products and obtaining better defense products. It is possible some changes intended to improve defense acquisition procedures degrade defense acquisition procedures. It is possible that the comparison of the advantages and disadvantages of a proposed change to defense acquisition procedures will preclude the adoption of those changes that are degrading to the defense acquisition process.

Problem Statement

There is no documentation of an appropriate method for identifying, analyzing, and comparing the advantages and disadvantages of proposed changes to defense acquisition procedures.

Research Objectives

A procedure for evaluating proposed changes to defense acquisition procedures does not exist. The objective of this research was to identify a method to evaluate proposed

changes to defense acquisition procedures. The research established a suitable method, called cost-benefit comparison, for comparing the advantages and disadvantages of proposed changes to defense acquisition procedures. With a suitable method established, follow-on research can be conducted to determine if the use of cost-benefit comparison can prevent the adoption of proposed changes that have a negative impact on defense acquisition procedures.

Research Questions

To develop a method for evaluating proposed changes to defense acquisition procedures, it was necessary to investigate the following areas. First, information related to defense acquisition was reviewed to determine why defense acquisition procedures are changed. Next, an examination was made of how defense acquisition procedures are changed. Research was then conducted to determine how proposed changes to defense acquisition procedures should be evaluated.

To determine an adequate method for comparing advantages and disadvantages that could be used for reviewing changes to defense acquisition procedures the following areas were researched. First a study to determine aspects of cost-benefit analysis that are appropriate when comparing the costs and benefits of changes to defense acquisition procedures was made. The next task was to research and document what type of analysis is currently

performed on proposed changes to defense acquisition procedures and how this analysis is performed. This research then determined an appropriate cost-benefit comparison method that could be incorporated into the existing process by which defense acquisition procedures are changed.

Scope

This exploratory study was undertaken to identify a method for evaluating proposed changes to defense acquisition procedures. The cost-benefit comparison method developed for this thesis can be used by any individual or organization to review any contemplated changes. In addition, the method developed does not require the modification of any processes currently in existence in the defense acquisition environment.

Limitations

Because of the nature of an exploratory study, where an unknown area is investigated to obtain a basis of knowledge, and because of limitations of resources (primarily time and manpower) the items identified below could not be included in this study.

This exploratory study did not survey individuals who currently may be involved in performing some form of analysis of changes to defense acquisition procedures. This exploratory study could not conduct tests with the cost-benefit comparison model created for this thesis. This

research could not study the consequence of, or the problems with, implementing the cost-benefit comparison program. Because this study was limited to the identification of a single method for evaluating proposed changes, other methods were not investigated. These areas of interest and other areas that may be identified after reviewing this thesis can be addressed in follow-on research.

Definitions

The important terms used in this thesis are defined below.

Cost-Benefit Analysis. "It is very easy to define benefit-cost analysis; simply add up all the gains from a policy alternative, subtract all the losses, and choose the alternative that maximizes net benefits" (Gramlich, 1990:8). Cost-benefit analysis is an evaluation tool customarily used when considering investment alternatives (Truett and Truett, 1980:344).

Although the definition given above is very simple, many books and articles give additional details and procedures for performing cost-benefit analysis. These sources of information may give slightly different interpretations of cost-benefit analysis depending upon the background and perspective of the author. For instance, different definitions, methodologies, and interpretations may be given by an economist, a financial analyst, or a behavioral scientist. For this reason it was decided that

the term cost-benefit analysis should not be used for the method developed in this thesis. The use of the term cost-benefit comparison to describe the method developed in this thesis avoids possible confusion that might develop because of different interpretations of the meaning of cost-benefit analysis and different procedures used in existing forms of cost-benefit analysis.

Cost-Benefit Comparison. Cost-benefit comparison is a procedure that involves the identification and assessment of the advantages and the disadvantages of an alternative. It can be used to assist decision makers' review and evaluate the advantages and disadvantages of a change to defense acquisition procedures. Cost-benefit comparison is an analytical method developed for this thesis and is based on many of the principles used in cost-benefit analysis.

Defense Acquisition Procedures. Defense acquisition procedures are the regulations, rules, and policies that govern how Department of Defense (DoD) procurement offices obtain defense products from external organizations and transfer these defense products to the using organizations.

Defense Acquisition Process. The defense acquisition process is the total of all activities carried out by DoD procurement offices to obtain defense products from external organizations and transfer these defense products to using organizations.

Defense Products. Defense products consist of equipment and supplies acquired by DoD contracts, according

to defense acquisition procedures, which increase the United States' ability to defend itself.

System. A system is defined as follows:

> A group of elements, either human or nonhuman, that is organized and arranged in such a way that the elements can act as a whole toward achieving some common goal, objective, or end. (Kerzner, 1989:72)

II. Methodology

Overview

This research was an exploratory study to determine an appropriate method for evaluating proposed changes to defense acquisition procedures. A literature review was conducted to gather background data in the area of defense acquisition and in the use of various forms of cost-benefit analysis. It was then possible to identify what additional research was needed for the development of the cost-benefit comparison model. Research was then conducted to determine the characteristics necessary for inclusion in the cost-benefit comparison model to insure the method developed would accomplish its intended purpose.

The information gathered from this research was arranged into an explanation of how the identification and comparison of advantages and disadvantages could be performed to analyze proposed changes to defense acquisition procedures. A set of instructions describing the operation of a cost-benefit comparison program based on the cost-benefit comparison method developed for this thesis was prepared and attached as an appendix. Also, examples of cost-benefit comparisons of potential changes to defense acquisition procedures were provided to demonstrate how cost-benefit comparison could be used.

Data Gathering

In the literature review books and periodicals on defense acquisition and weapon system procurement were reviewed to gather information on defense acquisition procedures. Financial and accounting textbooks and periodicals were examined to identify and record the prevailing concepts and procedures in the area of cost-benefit analysis. In addition to identifying the important elements of cost-benefit analysis, this search provided lists of key attributes and principles that were included in the cost-benefit comparison model developed.

In conducting the research for this thesis, continued analysis of information concerning defense procurement and decision making techniques was conducted. Information in these areas was obtained from textbooks and periodicals. Congressional records, government reports, and case studies of previous changes made to defense acquisition procedures were some of the sources used to research how proposed changes to defense acquisition procedures are reviewed. Management and organizational behavior journals and books were reviewed to uncover information about the use of analysis techniques in decision making. In addition, research studies, case histories, and government regulations were reviewed and analyzed to determine how analysis techniques could be used to evaluate proposed changes to defense acquisition procedures.

Information which provided accepted rules of operation and general theory on what types of analysis decisions makers should use when making changes to a system were reviewed. This information helped determine the appropriate guidelines that can be employed when comparing the costs and benefits of proposed changes to defense acquisition procedures.

Sources of Data

The textbooks, journals, research reports, government documents, and reference material necessary for this thesis were obtained from the libraries at AFIT and the Wright Research and Development Center, from the Dayton main public library, and from faculty members in the departments of Contracting, Systems Acquisitions, and Quantitative Management at the Air Force Institute of Technology.

Research and Analysis

The research and analysis for this thesis is divided into two main sections. The first part of the research consists of a study of how defense acquisition procedures are changed and evaluated. This section consists of research conducted as a result of the information obtained in the literature review.

The first part of this research was directed at what types of analysis is performed and what types of analysis should be performed when defense acquisition procedures are changed. Continued research into documents that describe

the process of how defense acquisition procedures are changed was performed. Documents which record the impact of past changes were also reviewed to determine the extent to which the comparison of costs and benefits may be currently performed. It was essential for any evaluation method identified through this research to function smoothly within the existing process by which defense acquisition procedures are changed.

The second half of the research and analysis is devoted to assembling the required elements of a cost-benefit comparison model. This section also provides for the incorporation of a cost-benefit comparison program that makes use of the cost-benefit comparison model developed for this thesis. This section explains how a cost-benefit comparison can be accomplished and gives examples of completed cost-benefit comparisons.

Key Concepts

In this research it was important to show as clearly as possible that the businesslike method of cost-benefit comparison is appropriate in the government where changes to defense acquisition procedures are made. It was necessary to establish a clear link between how changes are made and how efficiently the defense acquisition process operates -- that individuals contemplating changes to defense acquisition procedures should (or must) compare the advantages and disadvantages of a change to insure the

change can produce a net benefit. To insure fewer future changes have detrimental effects, the process of considering and making changes to defense acquisition procedures must become more business oriented.

This research sought to develop a method for identifying and comparing the positive and negative aspects of proposed changes to defense acquisition procedures. Various terms such as pros and cons, benefits and costs, advantages and disadvantages, or even pluses and minuses could have been used to identify the procedure developed from this research. The term Cost-Benefit Comparison was selected as the name of the method as it was believed to best indicate the analytic and associative nature of the procedure developed. Throughout this thesis the positive and negative aspects of a change are usually referred to as either advantages and disadvantages, or benefits and costs, and have the same meaning.

III. Literature Review

Overview

This section provides a review of the current literature which furnishes an explanation of defense acquisition procedures, an overview of how changes are made to defense acquisition procedures, and how proposed changes are evaluated. This chapter also gives an introduction to the accepted principles and uses of cost-benefit analysis.

Importance

If changes to any system are made and those changes result in greater costs than the benefits derived, then the net cost of the change is satisfied through a decrease in system performance. Defense acquisition can be viewed as a system that converts inputs consisting of resources into outputs in the form of defense products. The defense acquisition system functions within the system of national policy, which also converts inputs in the form of resources into outputs in the form of achievement of national policy objectives. Any change made to either system will affect the way in which these systems convert inputs into outputs. If a change is made to either system and the costs of the change are greater than the benefits, then the system will function at a lower efficiency. The result of this lowered efficiency will be that decreased outputs will be achieved

with the given input, or increased input will be required to achieve the previous level of output.

For defense acquisition, decreased outputs would translate into fewer or poorer quality defense products produced with the inputs provided. The requirement for increased inputs would translate into more money, time, or manpower necessary to acquire the same output and quality of defense products. It is for these reasons that the study of how changes to defense acquisition procedures are evaluated is important.

The applicability of the acquisition procedures followed by defense acquisition offices is a prime indicator of the quality and quantity of the nation's war fighting materials. The use of cost-benefit comparison to analyze changes to defense acquisition procedures will help insure beneficial changes are made to the procurement process, thus increasing the value of the defense products produced.

The entire military community is passing through a period when improved performance is being requested from organizations that are being provided with the same or a smaller amount of resources. Improved performance cannot be achieved without the use of new technology that would allow for an improved output with a given amount of resources (Mansfield, 1988:9). Savings can only come about from new or improved methods of operation. The investigation of new analysis techniques, to include cost-benefit comparison,

must be conducted to identify new methods to increase the efficiency of defense acquisition procedures.

Added to this is the changing environment the military acquisition community is faced with. Changes in the form of increasing regulatory direction have been brought about by a perceived need to correct a poorly functioning military procurement system. These changes have an enormous potential for affecting the efficiency and effectiveness of defense acquisition procedures. The necessity for an evaluation method can be appreciated when considering the increase in regulatory reform.

> The regulations governing business operations of the Defense Department and private industry have increased markedly since World War II. In 1947, the Armed Services Procurement Regulation (ASPR) numbered approximately 125 pages; in 1987, Federal Acquisition Regulation (FAR) and Defense Acquisition Regulation (DAR), the successors to ASPR, constituted several large volumes, totaling approximately 1,200 pages, with new pages added each month. (Fox and Field, 1988:17)

Scope

The purpose of this literature review is to examine and report what has been written about defense acquisition procedures, how existing defense acquisition procedures are changed, and the use of cost-benefit analysis when evaluating changes to a system of procedures. The purpose of this literature review is not to study or determine the relative effectiveness of previous or current defense acquisition procedures. A basic assumption of this research is that all systems, good and bad, will grow and evolve over

time, and will require modifications to insure a sustained level or improvement in performance.

The literature on this subject reveals that changes can be evaluated to determine and compare most or all the costs and benefits resulting from a change. In addition, this section provides indications of where further research can and should be conducted to facilitate the documentation of a useful method for analyzing proposed changes to defense acquisition procedures.

Management of Defense Acquisition Procedures

The primary organizations responsible for directing, controlling, and making changes to defense acquisition procedures are Congress, offices of the Executive Branch, and the DoD (Fox and Field, 1988:18). Each of these organizations has "numerous oversight and monitoring agencies" to aid in controlling the defense acquisition process (Fox and Field, 1988:18,19).

> The executive branch has the Justice Department and the Office of Management and Budget; the Department of Defense and each military service has an independent inspector general and auditing office; and Congress uses the General Accounting Office (GAO) for program audits and assessment, the Congressional Budget Office for budget and program cost estimates, and the Congressional Research Service and Office of Technology Assessment for analyses. (Fox and Field, 1988:19)

There are other organizations in addition to these offices in the executive branch, the legislative branch, and the military that influence the defense acquisition process by imposing regulatory requirements that direct and control

the selection and procurement of defense products. These organizations include the Civilian Agency Acquisition (CAA) Council and the Defense Acquisition Regulatory (DAR) Council, who jointly manage the Federal Acquisition Regulation (FAR) system, The Department of Labor (DOL), the Cost Accounting Standards Board (CASB), and the General Services Administration (GSA) (Kestenbaum and Wilson, 1988a:5).

Actions of the judicial branch also have consequences for defense acquisition procedures. Federal courts' decisions on cases concerning federal contracts (including Department of Defense contracts) "form the most authoritative source of decisional law on the subject of federal contracts" and influences the conduct of acquisition procedures (Wehrle-Einhorn, 1988:1-7).

In addition, state or local laws may affect defense acquisition procedures.

> In general, Federal procurement is subject only to Federal law and is unaffected by State or local law. However, the Uniform Commercial Code (UCC) has been adopted by nearly all the states and may be followed in Federal procurement cases if there is no applicable Federal law. In addition, it should be noted that subcontracts are generally subject to state law. (Wehrle-Einhorn, 1988:1-8)

Taken together, the activities of the above organizations are responsible for creating, influencing, and maintaining the defense acquisition procedures that govern the system acquisition process. "System acquisition programs go through a sequence of key program decisions,

milestones, and activities known as the system acquisition process" (McCarthy, 1988:5). The system acquisition process "is essentially a logical flow of activity representing an orderly progression from an identification of system need to final operational deployment" (McCarthy, 1988,5).

Responsibility for procurement of defense products according to the defense acquisition procedures goes to the acquisition commands of each military service (Fox and Field, 1988:14,18). The art of managing the procurement of defense products in the Department of Defense is known as systems acquisition management. "System acquisition management is the process whereby the diverse tasks, functions, and resources required are integrated and focused upon the development and production of a necessary capability on time and within budget" (McCarthy, 1988:2).

Current Environment

The need for the comparison of costs and benefits of proposed changes to defense acquisition procedures is as important now as in any time in the history of the United States. The Executive Branch, the Congress, and the military are expending significant effort in reviewing current defense acquisition procedures and considering changes to be made. These changes will be added to the modifications of previous years. Previous changes have mainly centered around whether or not acquisition authority should be consolidated in the centers of government or

distributed to the acquisition offices (Brandt, 1988:2). During these years, there has also been a steady increase in legislation and regulations affecting the conduct of defense acquisition business. The legislation and regulations have run the gamut, from requiring the use of commercial practices, to prohibiting the purchase of materials based on brand names and limiting competition, to enhancing an unsuccessful bidder's ability to protest and delay a contract award (Gansler, 1989:94-96). In the future, more proposed changes rooting deeper into the operating procedures of the acquisition offices can be anticipated.

As can be expected, each group has a desire to take the lead in procurement reforms. The following was observed at the beginning of 1989, when President George Bush had just taken office.

> The defense management team from the Bush Administration may not have long -- a couple of months perhaps -- to stake out its position on defense procurement reform. If the administration's opening pitch is unconvincing, Congress is likely to take matters into its own hands. (Correll, 1989:25)

This situation was an opportunity for the newly elected President, carrying the approval of the American public, to take the initiative for change away from Congress. From the early 1980's, the Congress had taken the lead in effecting changes to defense acquisition procedures because of its involvement in approving the increasing defense budgets of the Reagan Presidency and because of public outcry over

reported extravagant spending practices (Kluter and Tate, 1987:10).

It appears the executive branch did take action by issuance of National Security Review 11. This document required the involvement of the Department of Defense in reviewing Defense Management, much of which focused on improvements to the defense acquisition process. In the June 1989 response to National Security Review 11, the Secretary of Defense, Dick Cheney, identified that the level of regulation and legislation had long passed the point of marginal utility. Specifically, the report Defense Management Report to the President states:

> Numerous reviews of the acquisition system, including the Packard Commission's, have found that the system is encumbered by overly detailed, confusing, and sometimes contradictory laws, regulations, directives, instructions, policy memoranda, and other guidance. Little room now remains for individual judgment and creativity of the sort on which the most successful industrial management increasingly relies to achieve higher levels of productivity and lower costs. (Cheney, 1989:11)

The report goes on to describe the excessive level of guidance as a "stifling burden" and reports that those segments of government responsible for creating their portion of the burden must also be responsible to take corrective action to remedy the situation (Cheney, 1989:11). The report does not describe any specific techniques to be used to remedy the situation. The use of an analytical tool to evaluate proposed changes to defense acquisition procedures would appear to provide a procedure compatible

with the objectives of the report and may be useful to help correct the situation described.

How Defense Acquisition Procedures Are Changed

Defense acquisition procedures are changed to correct problems. 'A problem exists when managers detect a gap between existing and desired levels of performance' (Daft and Steers, 1986:438).

Although an idea for a change may come from within the military, within the government, or from outside the government, there are a limited number of ways a change can be made to defense acquisition procedures. It is important to identify and understand the organizations involved in changing defense acquisition procedures so that the evaluation method proposed will accommodate the structure in which it will function.

As stated in the previous section, the primary organizations responsible for making changes to defense acquisition procedures are Congress, offices of the Executive Branch, and the DoD. Changes these organizations make to defense acquisition procedures can result from legislative action taken by Congress, executive orders issued by the President, or by improvements directed by the DoD (Kestenbaum and Wilson, 1988a:5). These changes are put into place by incorporating them into the directives, regulations, and military standards governing the defense acquisition process. In addition, changes made by other

organizations within the federal government (such as the CAA Council, the DAR Council, the DOL, the CASB, and GSA) modify defense acquisition procedures. These organizations regulate activities within their area of authority in the federal government and thereby affect federal and defense acquisition procedures (Kestenbaum and Wilson, 1988a:5).

How Changes to Defense Acquisition Procedures Are Evaluated

A review of literature did not identify any standard procedures to evaluate proposed changes to defense acquisition used by any organizations in the Federal Government. The only procedure for evaluating some of the proposed changes to defense acquisition procedures is described in OMB Circular A-19. Circular A-19 gives directions to Executive Branch departments on the coordination and clearance of department recommendations on legislation (OMB, 1979:1).

Circular A-19 deals with procedures for obtaining Executive Branch approval of department and agency recommendations pertaining to Congressional activities. A-19 does not give much detail on how impacts, or what impacts, should be evaluated. One requirement that is given in the Circular is that budgetary and personnel impacts must be included "for the budget year and for each of the four succeeding fiscal years" (OMB, 1979:4,7). In addition, the circular states that impacts on other areas such as the environment, economics, and paperwork should be considered

(OMB, 1979:8-9). Circular A-19 also encourages agencies to "consult with each other in order that all relevant interests and points of view may be considered and accommodated" (OMB, 1979:12).

Within the DoD, Department of Defense Directive 5400.4 describes the policy that regulates the furnishing of information to Congress (DoD Directive 5400.4, 1978:1). DoD Directive 5400.4 requires all organizations in the DoD to comply with OMB Circular A-19. This Directive does not provide any additional direction on how legislation should be evaluated (DoD Directive 5400.4, 1979:3,Encl 2).

OMB Circular A-19 and DoD Directive 5000.4 mainly provide administrative guidance on how to coordinate recommendations pertaining to Congressional activities. Neither of these documents requires that proposed changes to defense acquisition procedures be evaluated.

Evaluation that Needs to be Performed When Changes Are Made to Defense Acquisition Procedures

This apparent lack of standardized procedures for evaluating and communicating the consequences of proposed changes to defense acquisition procedures is alarming. Organizational and management theory indicates how proposed changes to defense acquisition procedures can be evaluated. Decisions pertaining to proposed changes to defense acquisition procedures are in response to unique and hard to measure problems, information about the problem is ambiguous

and unclear, the problem may require extensive study, and there may be little assurance that the implemented change will work (Daft and Steers, 1986:438,439).

Researchers Vroom and Yetton have developed a model to help identify the appropriate decision style based on the type of decision being made (Daft and Steers, 1986:449-453). Based on the desired decision effectiveness of proposed changes to defense acquisition procedures, the Vroom and Yetton model suggests that as a minimum the decision maker should obtain information concerning each decision from subordinates impacted by each change (Daft and Steers, 1986:450).

In business organizations it is an accepted principle that "decisions should be made at the lowest managerial level which has access to all relevant data regarding the possible outcome of a decision" (Readings, 1990:8). However, decisions concerning proposed changes to defense acquisition procedures pertain to a nonprofit organization and can be ambiguous, unclear and difficult to measure. "As a result, a high degree of centralization of decision-making" usually results for these types of decisions (Readings, 1990:8). Because decisions concerning changes to defense acquisition procedures tend to be centralized does not mean information and data should not be gathered from lower levels to help decision makers choose the best course of action.

An Existing Business Method Used to Evaluate Decisions

The regulations, policies, and processes governing how defense acquisition offices operate determines the efficiency and effectiveness of the DoD's ability to supply itself with weapons and support materials to defend the United States and project military power. When these operating procedures are changed they should be evaluated to insure the DoD's ability to supply itself is not adversely affected.

The procedure of reviewing a proposed activity or selecting among multiple proposals to determine what resources will be expended to accomplish the activity, and what value will be derived from the activity, is an important factor in any decision. In management and in managerial accounting, this type of study is known as cost-benefit analysis.

A cost-benefit analysis is the most important factor in selecting appropriate management accounting procedures (Horngren and Foster, 1987:6). Its importance and relevance to any organization are readily apparent. The purpose behind any cost-benefit analysis is to determine the best choice to take among alternative courses of action. A choice is made through reviewing both the financial impacts (which can generally be quantified) and the nonfinancial impacts (which may or may not be quantified) the competing choices will create. (Fasci, 1987:45)

Use of Cost-Benefit Analysis to Evaluate Changes in Defense Acquisition Procedures. A review of literature in the fields of defense acquisition procedures, systems acquisition management, management and decision making, and cost-benefit analysis did not provide any information on the office or offices responsible for performing cost-benefit analysis for changes to defense acquisition procedures. In addition, no methods, including cost-benefit analysis methods, were located which were identified as appropriate for the analysis of a change to an existing system of procedures.

The investigation conducted as part of the research for this thesis attempted to uncover what, if any, elements of cost-benefit analysis are performed on changes made to defense acquisition procedures.

Use of Cost-Benefit Analysis in Federal Government. Organizations outside the military and defense procurement are also subject to federal requirements for which the comparison of costs and benefits is appropriate. The significance of the amount of regulatory laws and guidance that has been growing in this country was documented in a research study entitled The Impact of Federal Regulations on the Construction Industry. The report read:

> Between 1970 and 1975, there was a 25% annual growth rate in the number of federal regulations published. There was an average in excess of 10,000 new regulations each year; and in a 1975 report conducted by the GAO, regulatory controls cost $60 billion to the economy. This has caused many to question as to whether the quality of regulatory decision making has

> kept pace with the growth and quantity of the regulatory output. (Hill, 1986:18)

This paper goes on to note that a major deficiency observed among the regulatory agencies is the failure to analyze the costs and benefits that result from the implementation of all features of the new procedures initiated (Hill, 1988:18).

In researching this topic, some offices in the federal government (outside of the DoD) responsible for performing limited cost-benefit studies were identified. An article from Chemical and Engineering News discusses the responsibility of the Office of Management and Budget (OMB) to recommend changes to existing federal health and safety rules based on cost-effectiveness studies. The article is unique because it shows specific dollar figures have been and can be scientifically attributed to specific regulations. The article also gives the promise of obtaining even more precise estimates with an improved understanding of the regulation's impact on its environment and with the development of more precise models of the processes impacted. (Long, 1987:13-14)

Use of Cost-Benefit Analysis to Evaluate Proposed Changes in the Federal Government. The problem with the above examples of the use of cost-benefit analysis in the federal government is that the analysis described takes place after the change has been made. In the course of this literature review, it was found that in only two

circumstances was analysis of the impacts of a change systematically performed or documented prior to changes being made to existing processes. These two procedures are documented in the article "Assessing the Cost of Federal Mandates on State and Local Government" from the periodical Public Budgeting & Finance.

The first procedure is performed by the Congressional Budget Office (CBO) and is somewhat limited.

> In 1981 the State and Local Government Cost Estimate Act directed CBO to estimate the costs for state and local government of all proposed federal legislation imposing on them an aggregate cost of $200 million, or which would place "a significant burden on one region or one government." In practice, CBO makes an estimate on all legislation to determine if the threshold is exceeded and provides that information to Congress.
>
> CBO's reviews only direct budgetary costs or savings. Excluded are incidental administrative costs, secondary revenue effects or economic impacts. CBO uses no standardized methodology to evaluate cost impacts, but instead relies on national data sources and a network of state and federal officials to provide cost information. After a bill leaves the congressional committee, CBO generally has only a few days to complete its analysis, to include its estimates in the committee report. (Kee, 1989:107)

The second process discussed in the article requires the OMB to review the costs of federal regulations to state and local governments. However, this process is restricted because OMB only has the power to exert influence to alter the regulations it has reviewed, and it appears that OMB performs its analysis of impacts only on regulations generated by executive branch agencies. (Kee, 1989:107-108)

The important point brought out and well-documented by this article is that both processes are limited in their

effectiveness of bringing about change. But the limitations are not of a nature that would prevent improvement of these processes to obtain effective and efficient results.

Existing Cost-Benefit Analysis Programs

A review of cost-benefit analysis programs and the theory behind cost-benefit analysis was performed to gain an understanding and an appreciation of this evaluation method. The principles of cost-benefit analysis can serve as a guide in the development of a technique to evaluate proposed changes to defense acquisition procedures.

The earliest identification of a cost-benefit approach to decision making used by an individual influential in our national government was the system used by Benjamin Franklin. A description of this procedure follows.

> In the affair of so much importance to you, wherein you ask my advice, I cannot, for want of sufficient premises, advise you what to determine, but if you please I will tell you how. When those difficult cases occur, they are difficult, chiefly because while we have them under consideration, all the reasons pro and con are not present to the mind at the same time; but sometimes one set present themselves, and at other times another, the first being out of sight. Hence the various purposes or inclinations that alternately prevail, and the uncertainty that perplexes us. To get over this, my way is to divide half a sheet of paper by a line into two columns; writing over the one Pro, and over the other Con. Then, during three or four days consideration, I put down under the different heads short hints of the different motives, that at different times occur to me, for or against the measure. When I have thus got them all together in one view, I endeavor to estimate their respective weights; and where I find two, one on each side that seem equal, I strike them both out. If I find a reason pro equal to some two reasons cons, I strike out three. If I judge some two reasons con, equal to some three reasons pro, I strike out five; and thus proceeding I find at length where

> the balance lies; and if, after a day or two of further consideration, nothing new that is of importance occurs on either side, I come to a determination accordingly. And, though the weight of reasons cannot be taken with the precision of algebraic quantities, yet when each is thus considered, separately and comparatively, and the whole lies before me, I think I can judge better, and am less liable to take a rash step, and in fact I have found great advantage from this kind of equation, in what may be called moral or prudential algebra.
>
> Benjamin Franklin, London, September 19, 1772 (Gramlich, 1990:1)

Although no specific mention was found of whether Franklin or others actually used this cost-benefit approach while being of service to our government, it is useful to consider his simple and straightforward approach with the understanding that it may enlighten our search for an applicable method for evaluating changes.

The complicated and multi-faceted tasks involved in evaluating proposed changes to defense acquisition procedures requires consideration of many issues and many areas of impact. These tasks that need to be undertaken are dependent upon the type of issues involved in the analysis. An approach to ensure consideration of the issues to be resolved when performing a cost-benefit analysis are recorded by Alfred R. Oxenfeldt in his book Cost-Benefit Analysis for Executive Decision Making: The Danger of Plain Common Sense, and are as follows.

> - What effects of an action should be included in its cost, and what effects represent benefits?
>
> Benefits occur when one gains an objective; costs are incurred when one loses an objective.
>
> An executive should include only costs and benefits that result from the decision action--not some average or standard amount computed according to formula.

- How can an executive deal with the uncertainty of the effects of each alternative action? Of course an executive can make a "best forecast," but it is obvious that many outcomes are likely enough to occur to justify consideration.

    In major decisions, these different outcomes should be identified explicitly and their implications explored--in particular, the amount of injury they might cause the organization.

- How can an executive value the effects of an action, especially its intangible effects?

    This problem has two parts: (1) How to identify the significant effects of the action. The "solution" consists of gaining a thorough understanding of the phenomenon, and that requires the use of valid models. (2) How to value those effects in a specific context.

- How can an executive take account of the fact that the effects of an action occur at different points in time--years apart?

    This problem has a relatively simple but still tricky solution: it is to state all effects as present values.

- How can an executive take account of organization policy, limited resources, the prejudices of persons with strong influence in the organization?

    Constraints on a decision maker's choices may sometimes be overcome; but they should be identified, and the cost of overcoming them should be reckoned in the total cost of the relevant projects. (Oxenfeldt, 1979:32)

It should be noted that these issues are repeatedly examined and reexamined during the process of preparing and evaluating a cost-benefit analysis (Fisher, 1971:7). Both the individuals preparing the cost-benefit analysis, and the decision makers using the analysis must have access to the analysis for continued review and incorporation of modifications. This availability for access, review, and correction of existing cost-benefit analyses is crucial to their being properly prepared and used.

It is also important to remember that consideration of the above issues does not mean all matters related to the alternative evaluated will or can be adequately addressed.

> In practically no case should it be assumed that the results of the analysis will 'make' the decision. The really critical problems are too complex, and there are too many incommensurables (for example, political, psychological, and sociological considerations) that cannot be taken fully into account in the analytical process, especially in a quantitative sense. In sum, the analytical effort should be directed toward assisting the decision-maker in such a way that this basis for judgement is better than it would be without the results of the analysis. And in many instances even a modest amount of incisive analytical work can have a high payoff. (Fisher, 1971:7)

The key to developing a useful method to evaluate changes to defense acquisition procedures will be to identify an analysis and reporting method that requires minimum resources while generating a product with a high payoff.

Because of the complexities of modern government, and the necessity of incorporating any newly proposed program into the existing process by which defense acquisition procedures are changed, it is necessary to consider how a new program should be assimilated into the existing structure in which changes are made. The article 'Everyone Can Use This Cost/Benefit Analysis System' gives recommendations for installing or improving a cost-benefit analysis program in an organization. The article identifies four key elements to a good cost-benefit analysis system. These elements are:

> Senior management must provide the impetus and support for the program. Leadership by example is

> critical if the program is to be used widely by lower management levels.
>
> The standard costing program should be installed using a written corporate policy that is communicated and explained to managers at all levels.
>
> The program should be accompanied by a standard costing manual that explains in "cookbook" fashion to the non-financial manager the preparation of a valid cost/benefit analysis. The manual should be user friendly in its language. Standard costing forms and tables of standard costing factors can simplify both the completion of the analysis as well as the communication of its results.
>
> The corporate controller or corporate finance officer should be prepared to assist any nonfinancial user in completing a cost/benefit study. Additionally, corporate policy should require a technical review of completed studies above specified dollar thresholds to ensure the accuracy of the financial inputs to the decision-making process. (Fasci, 1987:47)

These suggestions for installing a cost-benefit analysis program in an organization provide a framework within which productive evaluation of changes can be established.

The tasks to be accomplished and the principles of installing a cost-benefit analysis program provided above would be important to consider when developing an analysis method. Of equal importance is the need to identify the product of the analysis. The book Benefit-Cost Analysis: A Practical Guide gives typical requirements for a cost-benefit analysis report.

> In general, a benefit-cost report should include, at a minimum, the following information:
> 1. A description of the program objectives and accounting stance,
> 2. A taxonomy of direct benefits and costs and any noncanceling secondary effects,
> 3. A discussion of the effects for which benefit and cost estimates were actually made and of the methodology and data used in the measurements,
> 4. A display of the benefit-cost measures,

5. A discussion of the unmeasured and unmeasurable (intangible) effects and how they might be expected to alter the benefit-cost measures, and,
6. A discussion of the distributional aspects of the project. (Anderson and Settle, 1977:115)

By using the information provided by these sources and applying it to the process by which defense acquisition procedures are changed, we have guidance for the formulation of a suitable system to be used to perform evaluation of proposed changes to defense acquisition procedures.

Existing Cost-Benefit Analysis Information Systems. In conducting research for this literature review, sources were sought that described management information systems in existence, or under development, which performed some or all the tasks of cost-benefit analysis. There were no sources obtained describing an existing computer system or computer systems under development that performed cost-benefit analysis. Of all the sources researched, only vague generalizations were made about the use of a computer system for the type of executive level decision making that a cost-benefit analysis would entail. Statements such as the following were typical of what was found in the literature.

> Applications for top management decision making are practically nonexistent, although systems designed for computer-assisted decision making are growing in number and degree of sophistication. (Murdick and Ross, 1975:191)

Although the above reference is 15 years old, and much work has been done in the last decade in the area of developing decision support systems to provide managers information to make decisions about how to organize and

control resources effectively' sources discussing management information systems, executive decision making, cost-benefit analysis, and defense acquisition made only casual reference to the future potential of applying automated computing equipment to cost-benefit types of decisions (Schultheis and Sumner, 1989:517).

A cost-benefit analysis provides information about an ad hoc decision or unique problem to assists management make infrequent, unstructured decisions that are strategic in nature and based on information that will ultimately affect the economic success of an operation (Oxenfeldt, 1979:32). As such, it might be expected some form of strategic financial information system might be adapted for use in performing cost-benefit analysis for changes to defense acquisition procedures.

However, most strategic financial information systems for business organizations have been created to use the available financial 'computerized information about the current and future status of the organization' (Schultheis and Sumner, 1989:321). For performing an analysis of a change to defense acquisition procedures, there are no financial accounting databases containing the material that would help provide information to the applicable decision makers. Information that might be helpful in assessing an impact of a proposed change to the defense acquisition process would be located throughout the system program offices responsible for procuring our nation's defense

products. In addition, the information needed often times would not be in computerized form, or would not always be stored in a standardized format. For these reasons, existing strategic financial information systems would not provide suitable models to aid in designing an appropriate information system for performing analysis of changes to defense acquisition procedures. Also, it should be remembered that the lack of suitable databases containing the economic information required by decision makers in defense acquisition will serve to limit the extent to which the impacts of changes to defense acquisition procedures can be expressed.

Conclusion

This literature review provided an introduction to defense acquisition procedures, the organizations who have oversight responsibility for these defense acquisition procedures, and the process by which defense acquisition procedures are changed. The one area of information not uncovered through a review of the literature was what office or offices are responsible for systematically performing analysis of changes to defense acquisition procedures. It is possible that there is no organization with this responsibility and that a comprehensive evaluation procedure does not exist.

If this is the case, the challenge facing the field of defense procurement is how to best implement a viable system

to systematically review and assess the costs and benefits of proposed changes to the defense acquisition process to insure changes are made prudently. The review of the literature presented in this chapter provides principles of existing cost-benefit analysis systems. These principles can be incorporated into a cost-benefit comparison program that could be used by an organization to evaluate changes to defense acquisition procedures.

IV. Research and Analysis

Further Research

In the previous chapter the subjects of defense acquisition and procedures for evaluating changes were introduced. Because no information was uncovered in the literature review on the use of an analysis method to review changes to defense acquisition procedures, this chapter contains the results of more in-depth research to identify and piece together information in this area.

Investigation of cost-benefit programs in operation in the DoD was conducted. Exploration of government records and prior research which identified the impacts of changes to defense acquisition procedures has led to the identification of studies that give examples of how a suitable cost-benefit comparison model might be structured. For the most part these studies consist of a review and analysis of a single or a group of changes to defense acquisition procedures to determine and report the effects these changes had on the functioning of the defense acquisition process. In these studies no single procedure was used to analyze changes. Still, it was possible to discern general patterns used by the authors to identify advantages or disadvantages of proposed changes.

A review and analysis of these programs is included in the following sections. With the study of these analysis

techniques and using the principles of cost-benefit analysis identified and recorded in the literature review, it was possible to construct a proposal for an evaluation method to analyze proposed changes to defense acquisition procedures. The evaluation method created is called cost-benefit comparison and is introduced in this chapter. With a method for cost-benefit comparison established, examples of proposed changes were evaluated to demonstrate how cost-benefit comparison can be performed.

Difficulties Associated with Quantifying Impacts

A possible reason the analysis of the impacts of changes to defense acquisition procedures is rarely identified in the literature and is not performed routinely is because it is perceived as being too hard to be accomplished. A viewpoint article from Aviation Week and Space Technology identifies the media stories of defense procurement mismanagement as the cause of hundreds of military and private sector oversight personnel being added to various projects at the ultimate expense of the taxpayer. The article goes on to question whether the additional oversight saved anywhere near the amount of money it cost to hire and pay the oversight workers. (Nordwall, 1987:11)

It is obvious the evaluation of changes to defense acquisition procedures is complex. The findings of an Air University Research Report that reviewed published cost-benefit studies to determine net savings for second-

sourcing decisions reveals how difficult this task is. This report found that of all the studies reviewed, none considered all of the impacts (costs and benefits), and of those impacts considered, many were predicted with methods that were not reliable or credible (Hampton, 1984:78,109-110). The conclusion reached in the report was that there are too many variables, and there was not enough data, or an appropriate methodology did not exist to complete the cost-benefit studies reviewed (Hampton, 1984:xi,78,110).

Although the generation and presentation of specific measurable impacts may appear impressive, consideration of all the assumptions that had to be made, faulty prediction methods that could have been used, and individual biases that may have been factored into the analysis reduces the credibility of those studies and conclusions that rely heavily on measurable impacts.

However, this is not to say the impacts of a decision cannot or should not be addressed. "The cost-benefit way of thinking is widely applicable even if the cost and benefits defy precise measurement" (Horngren and Foster, 1987: 6). Although it would be desirable to express all costs and benefits in the same units of measure this is not always feasible. Cost-benefit analysis should "not attempt to push quantification to meaningless extremes" (Fisher, 1971:8). "Benefits and costs should be quantified when they can be and not when they cannot be, but whether quantified or not, they should never be ignored" (Gramlich, 1990:8). In line

with this perspective, the textbook Life Cycle Cost gives "four different levels of precision with which costs can be defined:

1. Dollar Expenditures
2. Other Costs Evaluated in Dollars
3. Other Costs that can be Quantified
4. Other Non-Quantifiable Costs" (Gill, 1990:42).

Although the same textbook refers to benefits as either "quantifiable or subjective" it can be seen that the same levels of precision used above to define costs could be used to define the benefits of an alternative (Gill, 1990:69).

Cost-Benefit Analysis Programs in Operation in the DoD

An analytical method used regularly by offices involved in defense acquisition that could be classified as cost-benefit analysis is "Economic analysis on proposed programs, projects and activities" (DoDI 7041.3, 1972:1). Though these cost-benefit studies are not applied to changes in the procedures by which defense products are procured, they do give examples of cost-benefit analysis programs in operation in the defense acquisition community.

Department of Defense Instruction (DoDI) 7041.3 Economic Analysis and Program Evaluation for Resource Management, dated October 18, 1972:

> Outlines policy guidance and establishes a framework for consistent application of: 1. Economic analysis on proposed programs, projects and activities, and 2. Program evaluations of on-going activities. (DoDI 7041.3, 1972:1)

DoDI 7041.3 goes on to define both economic analysis and program evaluation. These definitions are as follows.

A. Economic Analysis: A systematic approach to the problem of choosing how to employ scarce resources and an investigation of the full implication of achieving a given objective in the most efficient and effective manner. The determination of efficiency and effectiveness is implicit in the assessment of the cost effectiveness of alternative approaches and is accomplished by:

1. Systematically identifying the benefits and other outputs and costs associated with alternative programs, missions, and functions and/or of alternative ways for accomplishing a given program (usually referred to as projects and activities).

2. Highlighting the sensitivity of a decision to the values of the key variables and assumptions on which decisions are based including technical, operational, schedule and other performance considerations.

3. Evaluating alternative methods of financing investments, such as lease or buy; and

4. Using benefits and costs to compare the relative merits of alternatives as an aid in:
   a. Making trade-offs between alternatives,
   b. Recommending the cost-effective alternative, and
   c. In establishing or changing priorities.

B. Program Evaluation is economic analysis of on-going actions to determine how best to improve an approved program/project based on actual performance. Program evaluation studies entail a comparison of actual performance with the approved program/project. (DoDI 7041.3, 1972:2-3)

As can be seen from the definitions of economic analysis and program evaluation, even though they are used to assess alternative programs, projects or activities, these types of efforts could be quite useful in evaluating changes to defense acquisition procedures.

Enclosure 2 to DoDI 7041.3 gives the following features to be included in an economic analysis or a program

evaluation. The analysis should contain the objectives of the program under study, as well as the assumptions made while preparing the analysis. Because the analysis deals with alternatives, identification and documentation of the costs and benefits of each alternative should be clearly displayed. To obtain the costs and benefits, separate cost and benefit analyses which include the impacts of the programs throughout their life cycles need to be performed. It is preferred that the analyses be expressed in quantitative terms (dollar figures adjusted for inflation and present value whenever possible). The alternatives are then ranked in terms of cost-effectiveness, and the risk and uncertainty of achieving the expectations of each alternative under the defined circumstances are assessed. The analysis includes an identification of the limitations that exist pursuant to each alternative, and sensitivity analysis which identifies the sensitivity of any factor used to perform the analysis and thereby might have significant impacts on the alternatives considered. (DoDI 7041.3, 1972:Enclosure 2, 1-14)

DoDI 7041.3 also includes formats to document and present the results of the analysis. Separate sample formats are provided for recording the costs of an alternative and the outputs (benefits) of an alternative. These formats allow for the separate review of the costs and the benefits of each alternative considered.

Formats for recording life-cycle costs and benefits attached to enclosure 2 of DoDI 7041.3 are shown in appendices A and B of this thesis. As the DoDI states, "The method of documentation used to record and summarize cost and output information will usually vary", and the formats provided are to be used only as a guide (DoDI 7041.3, 1972:Enclosure 2, 14).

Features of Impact Analysis Being Accomplished

Even with the above example of an analysis program that can be modified for use in analyzing changes to defense acquisition procedures, it is necessary to determine what office or offices have responsibilities or are performing any or all the functions of evaluating changes to defense acquisition procedures either before, during, or after changes are put into place. With this knowledge it is possible to develop a program that uses as many existing processes as is efficient to do so, and considers all the unique aspects of existing analysis methods that would be useful in the environment where changes to defense acquisition procedures are considered.

Of all the methods of making a change to defense acquisition procedures this research has identified, only one procedure is known that includes steps to evaluate and record either the costs or the benefits of a change. This effort to document some of the costs and benefits of a

change occurs when legislation is introduced and is being considered by Congress.

An idea for change can be introduced in Congress as a bill, as an amendment to a bill, or as a rider attached to a bill (Berman, 1979:136). A bill is a legislative proposal which has been put before Congress (CQ Guide, 1982:133). An amendment is a "Proposal of a member of Congress to alter the language or stipulations in a bill" (CQ Guide, 1982:133). A rider is:

> An amendment, usually not germane, which its sponsor hopes to get through more easily by including it in other legislation. Riders become law if the bills embodying them do. (CQ Guide, 1982:139)

The sponsor of the bill, amendment, or rider typically accompanies the introduction of the change (including proposed changes to defense acquisition procedures) with an explanation of the benefits expected to be gained by incorporation of the change as a law (Busch, 1990). This account of the perceived benefits of the change is recorded in the Congressional Record. The Congressional Record is "The daily, printed account of proceedings in both House and Senate chambers, with debate, statements and the like incorporated in it" (CQ Guide, 1982:134). Along with this information, it should be remembered that although a record is made of the perceived benefits of the proposed change, often legislation will be altered (and therefore the consequences will be altered) between when the legislation

is first introduced and when it is eventually signed into law.

There is another step in the legislative process which includes a formal procedure for recording costs of legislation. This procedure for recording costs of legislation would include legislation that would change defense acquisition procedures.

The Congressional Budget Office (CBO) was created by the Congressional Budget and Impoundment Control Act of 1974 (Public Law 93-344). The CBO was created as a result of the "decision that Congress needs a highly competent professional staff to guide it in fiscal policy and budgetary considerations" (U.S. Code, 1975:3533). The duties and functions of the CBO include assistance to budget committees, assistance to committees on appropriations, ways and means, and finance, and assistance to other committees and members of Congress (U.S. Code, 1975:334). The law states the CBO will assist Congressional committees and members "in the discharge of matters within its jurisdiction" and other related information that a committee or member may request (U.S. Code, 1975:334). The specific information the CBO is responsible for is:

> (1) information with respect to the budget, appropriation bills, and other bills authorizing or providing budget authority or tax expenditures, (2) information with respect to revenues, receipts, estimated future revenues and receipts, and changing revenue conditions, and (3) such related information as such Committees may request. (U.S. Code, 1975:334)

This assistance to Congressional committees and members manifests itself in the form of cost estimates of legislation being considered by Congress. As the above citation explains, these estimates are customarily limited to the budgetary impacts (changes in federal revenues and expenditures) involved in merging the change with existing procedures and carrying out any activities required by the new law.

As previously mentioned, this is the only source of changes to defense acquisition procedures located which includes routine provisions for the documentation of any of the costs or benefits of a change. The only other documentation or written record of costs or benefits of changes to defense acquisition procedures that could possibly be considered to exist are those indications of impacts incorporated into the written regulations or policy guidance that accompany a change.

Examples of Analysis of Changes Made to Defense Acquisition Procedures

All the remaining examples of what could be considered evaluations of changes to defense acquisition procedures found through further research were initiated at the discretion of the researcher, all were done differently, and all were performed after the fact. These are not ideal circumstances for the initial comparison of costs and benefits. But these examples do provide models of how

analysis can be performed to evaluate changes to defense acquisition procedures.

Historical Evaluation of Impacts. A well-documented illustration of how specific procurement reforms were developed and implemented, and the impacts these reforms had on the defense acquisition process is contained in the report Procurement Reform: A Process Out of Control. In this paper, the authors thoroughly recorded the purpose (expected benefits) prompting the reform actions and the effects (costs and benefits) the reforms had on the acquisition process (Kluter and Tate, 1987:4). The costs and benefits were not quantified; they were not given dollar values or compiled and compared in degrees of magnitude. Instead, the authors of the paper focused attention on the effects, the areas of perturbations, caused by the new legislation.

The method the authors used to perform their analysis was to first provide background information on the defense acquisition environment at the time reforms were proposed. The authors also provided a description of the organizations and the process involved in formulating the final version of the reform. An understanding of the state of affairs in the acquisition community allowed for an understanding of the benefits being sought through the proposed reforms. The explanation of the process by which the reforms matured (which was generally dependent upon the nature of the organization responsible for the reform -- the Executive and

Legislative Branches) helped to explain some of the benefits being sought, but also illustrated the costs being built into the reforms. These costs often manifested as a result of increased complexity or conflicting direction to existing defense acquisition processes.

After providing the historical perspective of a reform package, the authors discussed the implementation of the reform and the consequences, both good and bad (which could be translated into costs and benefits), of the reform. For each reform reviewed as part of this study the actual results (costs and benefits) could be compared to the intended purpose of the reform. Some cases found the reform measure was successful in improving the defense acquisition process, correcting a problem, or satisfying the administration objectives. However, the overall findings were that the defense acquisition reform process is not functioning properly to insure defense acquisition reforms result in an improvement in defense acquisition procedures and achievement of overall national objectives.

This study found the impact of new legislation was generally very costly and had a negative impact on the defense acquisition process. It resulted in additional cost of defense products, administrative costs, and training costs. Also, the time to educate acquisition personnel to properly implement the new legislation increased. Other costs originated out of necessary administrative changes to the FAR, additional lead times for new procurement actions,

and additional time to conduct the entire acquisition process (which increased proportionally with the added confusion created by the preponderance of legislation). In addition, an initial lack of tools and management structure to carry out new legislation caused increasing levels of waste. These same problems were also found in industry, often in magnitudes which far exceeded the effects felt in the government acquisition offices. (Kluter and Tate, 1987:48-61)

Evaluation and Measurement of a Single Cost. The other research reports found in reviewing the literature generally had impacts (costs and benefits) in the same areas as found in the above study. The difference is that most of the other studies done in this area concentrate on one specific cost, and in some cases shows one specific benefit, as a result of a single change made to defense acquisition procedures. Because these studies focus most of their attention on one specific change to defense acquisition procedures, the impacts recorded are usually quantified -- numbers and values are given.

For example, in the report "The Impact of Public Law 98-369 on Air Force Logistics Command Contract Administrative Leadtime," the impact that legislation to increase competition in government contracting had on Contract Administration Leadtimes (CALT) at Air Logistic Centers (ALCs) in Air Force Logistics Command (AFLC) was studied.

This report begins by reviewing the background and circumstances surrounding the change made to defense acquisition procedures, in this case Public Law 98-369. This review provides the reader an appreciation of the environment at the time the change was proposed, the perceived problems the change would rectify (thus identifying the proposed benefits of the change), as well as the way in which the change was intended to be implemented (thus driving the proposed costs of the change). This report was written after the law had been passed, but before it had been implemented.

The report contains the significant changes required to be made to existing defense acquisition procedures as a result of the public law as it was passed (Hedges and Mason, 1985:19). The report goes on to review historical data to determine if there would be an increase in CALT due to the changes made to defense acquisition procedures because of Public Law 98-369. The report found Public Law 98-369 would add approximately six days to the CALT (Hedges, 1985:24). The additional six days of CALT created a need for an additional six days' supply of inventory for every item contracted for. Having determined the daily cost for total pipeline inventory was $6.9 million, the six extra days of leadtime resulted in costs to ALCs in AFLC for FY85 equal to approximately $41 million (Hedges and Mason, 1985:4,26).

Although increased leadtime cost to ALCs in AFLC were computed, the report made no effort to identify or quantify

actual benefits. However, the report does contain an extract from the law that identifies the intent of the new law (intended benefits) which was "designed to increase the use of competition in Government contracting and to impose more stringent restrictions on the awarding of noncompetitive -- sole source -- contracts" (Hedges and Mason, 1985:19).

Review of Existing Procedures and Recommendations for Threshold Level Modification. A different approach to the evaluation of defense acquisition procedures that evaluates the advantages and disadvantages of regulations identified with dollar thresholds is contained in the reports Reforming Acquisition Regulations: Revising Dollar Thresholds and Reforming Acquisition Regulations: Revising Dollar Thresholds (Part 2). The purpose of these studies was to decide which regulatory requirements in the FAR and DFARS identified with dollar limits should be eliminated, changed (dollar threshold increased), or left unchanged (Kestenbaum and Wilson, 1988b:B-1).

The method the authors used to conduct their study was to review all the threshold requirements from the FAR and DFARS. The reference (paragraph) for each FAR and DFARS threshold requirement was identified and an explanation of the reference was provided. This was followed by "A brief analysis of the efficacy of the threshold level established by the FAR or the DFARS" (Kestenbaum and Wilson, 1988b:B-1). Based on the analysis a recommendation concerning the

threshold was offered. If a change or elimination of a threshold was recommended a statement of the resulting impact was given.

The analysis portion of each dollar threshold review contained an examination of the effects the dollar threshold had on defense acquisition procedures. This analysis portion provided a synopsis in very general terms and categories of the pros and cons, the costs and benefits, of the existing threshold. The analysis portion generally consisted of just one or two paragraphs. We can assume the recommendation furnished was a result of the comparison of the advantages and disadvantages that the regulatory threshold provided.

In those cases where dollar thresholds provided little or no benefits, if the cost of the threshold was excessive, or if other thresholds were in existence or provided greater net benefits, changes to the regulatory requirements were recommended. Each time a change or elimination of a dollar threshold was recommended, an overall impact was provided. The overall impact was usually expressed in one or two sentences.

The consequences given for changing or eliminating the dollar thresholds were limited to the benefits which could be obtained by making a change to defense acquisition procedures; for the most part the reports did not identify cost impacts. The report listed the specific types of benefits foreseen as a result of carrying out the changes

recommended. The benefits anticipated are: "Acquisition processing workload can be reduced. Procurement administrative leadtime (PALT) can be shortened. Contracting officers will have greater authority. Dollar thresholds will be more rational" (Kestenbaum and Wilson, 1988a:3). "To simplify the acquisition process" was an additional benefit gained through changing the regulatory requirements identified (Kestenbaum and Wilson, 1988b:2).

Identification of Impacts Using Non-Quantifiable Terms. The research reports discussed so far have focused on the additional costs generated by revisions to acquisition procedures, and the negative effects they have had for the DoD and private industry. However, there are many articles and reports that record the benefits that have been, or will be reaped because of new practices in defense procurement. For instance, the Air Force use of small businesses for some Research and Development programs as required by the Small Business Innovation Research Act of 1982 was identified as resulting in significant benefits for the DoD and American industry (Jones, 1988:13+).

Other research that identified the benefits intended to be derived from changes made to defense acquisition procedures was found. The article "On the Utilization and Degradation of the DoD Acquisition System for Socio-Economic Policy Implementation" gives a description of socio-economic programs and discusses the reasons the acquisition system is used to implement them (McNabb,

1982:22). The description given clearly identifies to the reader the intended constructive benefits of carrying out socio-economic programs by using defense acquisition as the vehicle. The majority of the article proceeds to analyze the impact socio-economic programs have on the defense acquisition process. The concern expressed by the report is that although real and important benefits can be realized through the use of military procurement, the costs associated with this approach are significant and fall into many areas. Most importantly, the defense acquisition system's performance will be negatively affected in direct proportion to the amount of socio-economic policy that it is forced to implement. A point will be reached (or possibly has been reached) where the resulting degradation of the acquisition process is greater and more harmful than the positive effects of the socio-economic programs implemented. Although the article does not identify at what point this occurs, it is clearly understood in the reading that the use of military procurement for carrying out these (or any other) programs should be abated before the associated costs of the programs outweigh the benefits derived. (McNabb, 1982:23-36)

The method the authors developed for analyzing the impact socio-economic programs have on the defense acquisition process was to describe the degradation of the process (the costs) and the socio-economic opportunity costs (the benefits) that arise with increased socio-economic

policy utilization. In the model developed in this article, these costs and benefits were not quantified; numbers and dollar figures were not given. Instead, the authors explained the types, origins, and trends of the costs and benefits brought on by socio-economic policy utilization of the defense acquisition system. The authors further demonstrated their ideas by graphing the incremental costs and the incremental benefits derived through increased socio-economic policy utilization of the defense acquisition process.

Because of the complexity of this issue the authors were unable to gain access to the necessary quantifiable figures. Still, discussion, logical analysis, and evaluation of types of costs and cost categories was efficiently used to show that the use of military procurement for implementing social or economic programs should be abated before the total costs of the program outweigh the benefits derived. By using this framework to describe the costs and benefits derived through socio-economic policy utilization of defense acquisition, the authors were able to demonstrate that an optimal point is reached for the utilization of the defense acquisition process to further social gains. In addition and just as important, the authors were able to explain how the use of the defense acquisition system to further social gains beyond this optimal point was suboptimal because the increased costs were greater than the increased benefits.

Summary. The techniques reviewed above give examples of the many different ways changes to defense acquisition procedures can be evaluated and reported. These methods were considered when constructing the cost-benefit comparison model developed for this thesis.

Public Choice and Cost-Benefit Comparison

In addition to understanding the many ways changes can be evaluated, it is also important to understand why changes need to be evaluated. The last chapter described some reasons for performing cost-benefit analysis. These reasons result from the commercial nature of business decisions where it is important that decisions result in net benefits or savings. However, there are additional reasons for performing an evaluation of the consequences of a decision in a not-for-profit or government organization. These reasons can be comprehended with an understanding of public choice theory.

"Public choice can be defined as the economic study of nonmarket decisionmaking, or simply the application of economics to political science" (Mueller, 1979:1). Because public choice deals with the application of analytical methodologies to the subject matters including "the theory of the state, voting rules, voter behavior, party politics, the bureaucracy, and so on" its study is important to the subject of cost-benefit comparison (Mueller, 1979:1).

Public choice theory addresses the 'important characteristics of the political process' to help understand what they are and why they can produce 'conflicts between good economics and good politics' (Gwartney and Stroup, 1982:75). Also public choice theory can be used to help establish those procedures that serve to eliminate waste and inefficiency resulting from political and bureaucratic decision making, thereby improving the expected outcomes of government operations (Gwartney and Stroup, 1990:96-97). Consideration needs to be given to public choice theory to insure the cost-benefit comparison method developed will be effective when used by goverrment organizations.

One characteristic typical of the political process is the *shortsightedness effect*. The *shortsightedness effect* is described as a:

> Misallocation of resources that results because public sector action is biased (a) in favor of proposals yielding clearly defined current benefits in exchange for difficult-to-identify future costs and (b) against proposals with clearly identifiable current costs yielding less concrete and less obvious future benefits. (Gwartney and Stroup, 1982:78)

One consideration for the development of an evaluation method is the need to express all the advantages and disadvantages of a change in terms that can be related and compared to each other. The impacts are not required to be clearly defined to be recorded. In fact, one useful aspect of the procedure developed is that it could be designed as an analytical method for recording all impacts, both current and future, and would give equal consideration to both

clearly defined impacts and hard to define and measure impacts. Using this type of design for the evaluation method developed would help prevent those decisions that provide political gain from short sighted policies at the expense of the efficient and effective operation of the defense acquisition process.

The literature on public choice also considers the rational ignorance effect which explains why voters, who feel their vote will have little or no effect on the outcome of an issue, have little motivation to inform themselves in order to vote intelligently, or to vote at all (Gwartney and Stroup, 1982:75,364). A similar characteristic of the political process that relates to proposed changes to defense acquisition procedures is something we might call reasonable ignorance. Reasonable ignorance would describe the action of decision makers who face a proposed change to defense acquisition procedures and who do not have the experience or expertise to comprehend the full ramifications of the change. Because these decision makers might believe a single change would have a small effect on the total operation of the defense acquisition process, they have little incentive to inform themselves to make an intelligent decision. A comprehensive evaluation method would provide the decision maker with the full range of consequences that can be easily understood, and the comparison of costs and benefits would tend to impress upon the decision maker the idea that every decision has an important impact.

Another area of study in public choice is the issue of special interest where 'A few gain a great deal individually, whereas a large number loose a little as individuals' and the impact of the special interest issue is difficult for the large number to understand or feel (Gwartney and Stroup, 1982:76,374).

> Public choice theory postulates that individual behavior in the political arena will be motivated by considerations similar to those that influence market behavior. If self-interest is a powerful motivator in the marketplace, there is every reason to believe it will also be a motivating factor when choices are made collectively. (Gwartney and Stroup, 1990:89)

The issue of special interest would apply to changes to defense acquisition procedures when a decision maker or a group of decision makers would make a change that would bring them some form of benefit (such as media attention for trying to correct a poorly functioning acquisition system, increased support from a special interest group, or relief from pressures from superiors to do something--or anything to correct a problem) at a cost to the efficient operation of the defense acquisition process. 'Instead of deciding what is best for the organization, managers of nonprofit organizations often think in terms of 'what will sell'' (Readings, 1990:9).

A method for evaluating and reporting the impacts of changes would help in this situation by making it easier to understand the impacts. This could be done by adopting a method that would show when benefits are outweighed by costs, and providing traceability to show that hidden

benefits are gained by individuals seeking to serve selfish interests. Changes not related to an improvement in the defense acquisition process and inefficient changes should not be rewarded.

Public choice also addresses the issues surrounding the incentive structures decision makers deal with in the public sector.

> Public sector decision-makers confront an incentive structure that is less conductive to operational efficiency. Since there is no easily identified index of performance analogous to the profit rate, public sector managers can often gloss over economic inefficiency. Profits do not necessarily matter. If a public sector decision-maker spends money unwisely or uses resources primarily for personal benefit (for example, plush offices, extensive "business travel," three-martini lunches), the burden of this inefficiency will fall on the taxpayer. The public sector is also not subject to the test of bankruptcy, which tends to eliminate inefficient operations in the private sector. Political finesse, which leads to large budgets, is far mort important to success in the public sector than is operational efficiency, which would lead to a lower cost of production. (Gwartney and Stroup, 1982:377-378)

Although cost-benefit comparison will not remove existing incentive structures, it can serve as a new incentive to promote operational efficiency. The existence of reports that record the costs and benefits of a change will motivate decision makers to be accountable for their actions and enact only those changes that have a promise of providing net benefits. In addition, being able to compare the actual impacts of a change after it has been incorporated into defense acquisition procedures with the impacts projected for the change when the change was proposed (as is recorded

in the original evaluation of the change) will help decision makers by providing feedback on former decisions. This ability to compare projected net impacts to actual net impacts can also allow the evaluation method developed to be used as a tool to measure decision makers performance.

Not only will cost-benefit comparison provide helpful incentive structures and performance measurement tools, but it can assist the completion of a much needed management function. After implementing a change the activities of the organization need to be monitored to insure the change has had its desired effect (Daft and Steers, 1986:438). Unfortunately, this type of follow up action is not being systematically performed for changes to defense acquisition procedures. The cost-benefit comparison method developed for this thesis could also be used to satisfy this management function.

An appreciation of public choice theory helps to understand why the reliance on simple common sense for decision making is so difficult in the political and bureaucratic environment where changes are made to defense acquisition procedures. Because of the complexity of decision making in a political and bureaucratic environment, the evaluation method developed for this thesis can serve as an important tool. The evaluation method will provide the information required to make an informed decision, a decision that is more likely to result in an improvement to the acquisition process.

Constructing a Cost-Benefit Comparison Model and Program Documentation

This section will identify the basic characteristics of the cost-benefit comparison model, the method for evaluating changes to defense acquisition procedures developed for this thesis. A review and analysis of the information gathered in this exploratory study can be used to identify suitable elements to be included, and procedures to be performed, when comparing the advantages and disadvantages of proposed changes to defense acquisition procedures. Using these same components identified as vital to the operation of a cost-benefit comparison model, it is possible to logically construct a set of instructions for the implementation of a cost-benefit comparison program.

This set of instructions for the implementation of a cost-benefit comparison program was constructed and is included as appendix C. The format, organization, and much of the wording used in the instructions was taken directly from DoDI 7041.3. These instructions were prepared so they would be applicable for the DoD, but could be easily modified for use in other organizations and offices.

The instructions contained in appendix C will accommodate the implementation of a standard cost-benefit comparison program to be used by organizations responsible for contemplating changes to defense acquisition procedures. In preparing these instructions, the recommendations for installing a cost-benefit analysis program in an

organization were applied. These recommendations were provided in the article "Everyone Can Use This Cost/Benefit Analysis System," discussed previously.

A method of documentation has been used to aid in traceability between the identification of the components of the cost-benefit comparison model (discussed in this section) and the instructions for implementing the cost-benefit comparison program contained in appendix C. The identification of each element included in this section will be followed with a set of brackets ([ ]) that indicates the location (paragraph number) of each principle as it is used in the instructions. For example, the description that the cost-benefit comparison instructions contained in the appendix are applicable to the DoD is stated in appendix C, paragraph II, and would be shown in brackets as [II.].

Cost-Benefit Comparison Model. This research has shown that there are many ways changes can be evaluated. Although these approaches differ in the methods used, as long as the method of analysis is performed according to accepted procedures, then the resulting analysis can be used by management as an effective decision making tool. Although the approaches reviewed included methods of analyzing alternative programs and methods of analyzing changes to a system, the model developed will be limited to evaluation of changes to defense acquisition procedures. A cost-benefit comparison should be prepared for any changes to defense acquisition procedures being considered [IV. B.].

It should be remembered that current examples of studies which provide analysis of the costs and benefits of a change to the defense acquisition process are performed according to different methods. If these dissimilar impact studies continue to be performed independently then the usefulness and effectiveness of the aggregate of these studies will be limited. If there truly is something wrong with defense acquisition that has warranted the recent waves of reform, then a standardized cost-benefit comparison method that would serve to identify these problems may be necessary [I. A.].

An important part of performing a cost-benefit comparison evaluation is insuring all the consequences of a change are systematically identified and recorded [III. A. 1.]. To simplify this effort the cost-benefit comparison model developed should contain a standard approach for identifying costs and benefits [Encl 1. B.]. In accordance with this principle, documentation of consequences derived from a change should not be limited to consideration of only budgetary impacts. In addition, documentation of impacts should not be limited to the consideration of just the impacts on monetary resources and administrative costs. Impacts should include both short-term and long-term consequences [Encl 1. C.]. If there is some overriding factor of supreme importance that requires a particular change to be made, then this factor should be included in the cost-benefit comparison [IV. D.].

The numerous examples identified through the research show the identification and comparison of both costs and benefits of system alternatives or changes to a system can be performed. It has been established that it is advantageous to compare these costs and benefits simultaneously. This procedure, consisting of face-to-face comparison of costs and benefits, represents the actual impact of the change, and results in providing the maximum value to decision makers [Encl 1. E. 1.].

The consequences of a change can be expressed in quantified terms, in subjective terms, or as a mixture of the two. Sometimes precise measurement of the impacts of a change is not possible. It has been shown that costs and benefits do not have to be expressed in precise terms to be compared [Encl 1. B. 3.]. Remember, these changes are being proposed to remedy hard to measure, ambiguous and unclear problems. The precise measurement of the impacts of these types of changes may be meaningless.

With this realization, and the understanding that additional time and manpower are often required to compute and convert the impacts of a change into desired units, it makes sense not to require the computation of impacts in quantitative terms or require the conversion of impacts into specified units of measure. The only requirements for the assessment of impacts of a change to defense acquisition procedures is that the costs and benefits should be expressed in terms or units of measure compatible with the

areas (categories) of the defense acquisition process impacted, in terms as precise as practical for the analyst to determine, and this procedure should not require conversion of any impact to any other term or unit of measure [Encl 1. B. 6.]. This approach, which allows for the subjective judgment of the analyst performing the cost-benefit comparison without enforcing quantification of impacts to meaningless extremes, will require the least amount of time while providing comparable groupings for comparison. If more precise measurement or weighing of impacts is desired, this level of precision can be accomplished at the direction of the decision makers who may feel they need further delineation of an impact [Encl 1. B. 6. a.]. The estimation of these impacts should be done using accepted analysis techniques.

It has also been shown that an analysis of the costs and benefits of a change can be performed both before a change is made (or at least very soon after the decision to make the change has been made), or later after the change has been implemented [IV. C. 1.]. The analysis performed after implementing the change is usually in response to a perception that the costs brought about as a result of the change may outweigh the benefits of the change [IV. C. 2.].

A comparison made prior to implementing a change can help to identify and prevent those changes whose costs are already expected to outweigh the benefits. A cost-benefit comparison performed after implementing a change can

identify those changes whose actual costs outweigh actual benefits and therefore have degraded the efficiency and effectiveness of the defense acquisition process. Besides the usefulness of evaluating the actual impacts of a change discussed above, advantages may be derived by comparing actual impacts of a change to impacts estimated when the change was originally proposed. This process may be useful as it might provide information and feedback to decision makers responsible for making changes to defense acquisition procedures [IV. C. 2. a.]. The current lack of feedback concerning the effects previous changes have had on defense acquisition procedures may help to partially explain the continuing waves of reform that have been applied to defense acquisition.

In addition to the process by which the cost-benefit comparison is to be performed, the environment the comparison is performed in and the influence the completed comparison has on decision makers responsible for making changes to defense acquisition procedures are very important. Considering that the individuals responsible for making changes to defense acquisition procedures are operating at a very high level, it is very important that the presentation of the cost-benefit comparison is useful to those decision makers [IV. A.]. Anticipating most of the decision makers involved would only have a limited amount of time available, the easier and less time-consuming the comparison is to read and evaluate, the more likely it is to

be used [IV. A. 1.]. We can expect many cost-benefit comparisons will be prepared by analysts who must provide sufficient information to allow decision makers to evaluate the consequences of a proposed change and make responsible decisions [IV. A. 2].

What should be sought is as few pages as possible [IV. 1.]. To increase their influence and effectiveness the cost-benefit comparisons should be in a standard format. To accommodate the simultaneous comparison of both costs and benefits in as few pages as possible a solution would be to allow for the inclusion of both cost and benefit information on each page. Each page can be divided like a ledger into two halves, with costs on one side and benefits on the other. This would be consistent with the suggestions originally provided by Benjamin Franklin [Encl 1. Att 1.].

Because the ledgers used for comparison of costs and benefits are to be kept concise, the identification of costs and benefits will be limited to a few words or phrases or measurements to adequately describe the areas of impact [Encl 1. B. 6.]. The impacts recorded can be organized in groups on the ledger to simplify their review. Cost and benefits can be listed by magnitude, from biggest to smallest, or can be arranged into groups depending upon the type of impact (money, time, performance, etc.). Impacts might be ordered based on when the impact will be felt, from immediate to short-term to long-term [Encl 1. E. 1. b.].

To allow for the consideration of useful assumptions, critical points, justifications for consideration, and other analysis that may be of relevance to the decision maker responsible for making the change, the inclusion of an attachment may be appropriate [III. A. 2. and Encl 1. D.]. This attachment will be referred to as a descriptive summary [Encl 1. E. 2.]. The descriptive summary should not repeat the information provided on the ledger. If the inclusion of a descriptive summary does not provide additional information it should not be included [Encl 1. E. 2. a.]. The presentation of the descriptive summary follows the ledger so that this summary would not be distracting to the review of the ledger. The descriptive summary will allow for inclusion of the level of information equal to that provided in the impact studies reviewed as part of this research [Encl 1. E. 2. b.]. The descriptive summary would also be limited in that it should not exceed the length of the ledger [Encl 1, E. 2. c.].

The combination of ledger and descriptive summary will incorporate all the required output of a cost-benefit comparison study [IV. E.]. This output will comply as much as is practical with the information requirements for a typical cost-benefit analysis report identified in the book Benefit Cost Analysis: A Practical Guide, discussed earlier.

The usefulness of this cost-benefit comparison procedure will extend beyond the mere identification and comparison of costs and benefits of a change to defense

acquisition procedures. A decision maker can estimate the respective weights of the impacts to decide where the balance (the net impact) lies. For some changes the costs will outweigh the benefits. In those cases the proposed changes to defense acquisition procedures can be modified until the point is reached where benefits outweigh costs, making the change better, or consideration of the change can be abandoned because costs continue to outweigh benefits. Similarly, if multiple changes have been proposed to improve defense acquisition procedures, or to remedy a problem with the defense acquisition process, then the use of cost-benefit comparison ledgers for each initial proposal will aid in the selection of the proposed change with the greatest net benefits. Also, cost-benefit comparisons can be used to aid efforts to combine the best aspects of multiple proposals and for making trade-offs between proposals [III. A. 3.].

In these uses of cost-benefit comparison, as in all other uses of this tool, it will be the final responsibility of the decision maker to evaluate the cost-benefit comparison for himself to make the final decision [Encl 1, A.].

Just as important as the format and uses of the cost-benefit comparison output is how to properly conceptualize all the costs and benefits of a change so they can be recorded and compared. As is evidenced by the many impact studies reviewed in this exploratory study, the

identification of the costs and benefits of a change made to defense acquisition procedures is something that can be done [Encl 1.]. The ability to identify costs and benefits of a change is part of the reason it has long been considered a good idea to consider comparing costs and benefits when making a decision.

Since this research report includes instructions for the operation of a cost-benefit comparison program, guidance for ensuring review of issues requiring consideration when analyzing a change are included in the instructions. The suggested approach for ensuring complete consideration of the costs and benefits of an alternative from the book Cost-Benefit Analysis for Executive Decision Making: The Danger of Plain Common Sense discussed earlier, were referred to when these instructions were prepared [Encl 1. B.].

A further aid in the identification of all relevant costs and benefits of a change are the many potential sources to help identify the costs and benefits of a change to defense acquisition procedures. These sources include government records documenting the change, as well any the information available from the originator of the change [Encl 1. B. 9.].

One challenge confronting the decision makers who propose changes to defense acquisition procedures and the analysts who have the responsibility for generating the cost-benefit comparisons is the problem of continuously having to generate, classify, and record the costs and

benefits resulting from changes. Reviewing the results of the impact studies researched for this thesis, many categories were found that appear to be typical of the costs and benefits obtained when changes are made to defense acquisition procedures. Typical costs included increased cost of defense products, administrative costs, training costs, and increased time requirements for product acquisition. Typical benefits included reduction of acquisition personnel workload, acquisition leadtimes shortened, and decreased prices of defense products. Knowledge of these typical impact categories, and the many other existing categories might be useful to those responsible for creating or reviewing cost-benefit comparisons. Following the installation of a cost-benefit comparison program and the generation of numerous examples of cost and benefit impacts, it might be desirable to compile a glossary of these typical impact categories [VI. B. 2.].

To avoid confusion with the doctrine of identification and conversion of all impacts into standard dollar values associated with the concept of cost-benefit analysis, the model developed for this thesis has been identified as a Cost-Benefit Comparison [III. A.]. The ledger used to assemble the face-to-face comparison of costs and benefits of a change made to defense acquisition procedures has been identified as the Franklin Ledger [Encl 1. Att 1.]. The title of Franklin Ledger will provide a unique name to

identify the form used to record the results of a cost-benefit comparison and will serve as a reminder of an early pioneer in the use of "moral or prudent algebra" (Gramlich, 1990:1). The Franklin Ledger includes a section to identify the date the ledger was prepared, the change being evaluated, and to identify the point of contact (POC) responsible for completing and updating the cost-benefit comparison [Encl 1. E. 1. A.].

This thesis has taken the first step into exploring this area of study. As a result, it is difficult to determine how well cost-benefit comparison will be accepted as presented in this thesis. It is expected the method of cost-benefit comparison presented might be changed before being considered for adoption. Depending on the changes ultimately made, it may be appropriate for the principal organizations performing cost-benefit comparison to be incorporated into some existing organization that performs a similar function (such as economic analysis), or it may be appropriate to create a separate office dedicated to performing cost-benefit comparison [I. B. and V.].

The model described in this section will provide an initial framework to pursue the implementation of a cost-benefit comparison program. When a cost-benefit comparison program is ready to be instituted, a version of the instructions contained in appendix C can be signed and any additional documentation required can be prepared [VI.].

Use of an Information System to Aid in Performing Cost-Benefit Comparison

In the last chapter only a limited amount of information was discovered through a review of the literature concerning the use of information systems to perform cost-benefit analysis. To design an information system to facilitate the use of a cost-benefit comparison program our only option is to take our cost-benefit comparison model, with all its components, and try to identify the elements of an information system that could be used to satisfy some or all the functions necessary to perform cost-benefit comparison.

Identifying an Appropriate Information System. "An overall plan or master plan is necessary for the formal information system in an organization (often termed a management information system)" (Davis, 1982:6). Two methodologies to evaluate and meet executive management's information needs about the organization are Business Systems Planning (BSP) and Business Information Control Study (BICS) (Parker, 1982:108-109). In addition, the information system developed should be designed to minimize changes required to be made to existing information systems. However, because of the limitations of this exploratory study, and the lack of available information about existing cost-benefit analysis information systems in operation, and the comprehensive information needs of the organization conducting the cost-benefit comparison program, it is

possible the system designed for this thesis would not be the most optimal or fitting. As stated earlier, the purpose of this section is only to identify a potential mix of computer equipment to simplify the process of conducting a cost-benefit comparison of proposed changes to defense acquisition procedures.

One element included in the information system described in the following section is a central database containing (among other things) cost-benefit comparisons. This central database is useful because it allows for the review of completed cost-benefit comparisons and the identification, review, and comment on cost-benefit comparisons in various stages of completion.

Because of the nature of cost-benefit comparison, there should not be any concern that the existence of a database will allow access to sensitive or raw data. The purpose of the cost-benefit comparison method is to facilitate the open identification and evaluation of commonly agreed upon consequences of changes, good or bad. Only with open, interagency identification and evaluation of all impacts can the best decision be made concerning a proposed change. The impacts to be included in a final cost-benefit comparison will be identified and defined through continued evaluation, discussion, and debate of the issues described in the draft cost-benefit comparisons (regardless of the means used to display this information). Incomplete comparisons or comparisons containing confusing information should be

prepared to accept constructive comments. Incorporation of the useful suggestions contained in these comments will result in the preparation of superior final products.

The use of an information system can simplify the process of commenting on and improving cost-benefit comparisons. After an individual in an organization has taken the responsibility for entering the initial cost-benefit comparison of a proposed change, it would be possible for any organization having access to the information system to review this initial comparison. Comments from reviewing organizations can be provided to the originator of the cost-benefit comparison for consideration and inclusion. It would be possible to arrange for any organization reviewing cost-benefit comparisons to have access to the comments of other organizations on those comparisons. Having access to cost-benefit comparisons and the comments of other organizations can also serve to alert decision makers to any instances where impacts of a change are not being fairly or accurately portrayed.

This open communication of perceived consequences between the organizations responsible for governing the acquisition process is separate from the transmittal of official agency positions described in OMB Circular A-19 (reviewed in the previous chapter). OMB Circular A-19 requires OMB coordination and clearance of recommendations about proposed legislation that would change defense acquisition procedures, but since a cost-benefit comparison

only addresses impacts and does not provide recommendations, the requirements contained in OMB Circular A-19 should not be applied to the cost-benefit comparison program.

Designing the Information System. It would be expected that each organization responsible for making changes to defense acquisition procedures (including the offices of the Executive branch, Congress, and the DoD) would need and want the capabilities of performing cost-benefit comparison of proposed changes. It would be appropriate that any common information organizations need to perform cost-benefit comparisons, any results of past comparisons (for future reference or analysis), and any cost-benefit comparisons being prepared, be stored and accessible from a central location. By ensuring the necessary equipment is available to each organization, and linking them to a central location, we help satisfy the first two points recorded from the article by Fasci: the cost-benefit analysis will be used at all levels, and standardization and intercommunication can be enhanced by having centralized data/information storage.

With the use of a central storage for access of unique information and past cost-benefit comparisons, it also would be possible to maintain and update a central description of standard procedures, standard costing forms (by specifying output format), and standard costing factors with which the cost-benefit analysis is to be prepared. Access to each of these categories of information, recommended in the third

point in the Fasci article, can be made more user friendly with the use of menu driven instructions and menu driven report preparation programs. This central storage point also could maintain the latest version(s) of the changes under consideration, which would allow access to the actual change being considered for all parties interested in evaluating the change.

The office chosen as the central location for the cost-benefit comparison information system should be capable of providing the functions of expert assistance and technical review of completed analysis described in the final point of the referenced material from the article by Fasci. If we were to choose a location from among the organizations involved in proposing and evaluating changes to defense acquisition procedures, the best choice would be the DoD. The DoD probably would be the most responsive to all other organizations involved, and the DoD would have more experience in identifying costs and benefits arising out of changes made to defense acquisition procedures.

Being unsure of the availability of any excess information system capabilities available at the central location chosen, it would be appropriate to suggest a minicomputer could be used to satisfy the data processing requirements identified for the central location.

The different types of cost-benefit comparison output were listed in the material referenced from the book Benefit-Cost Analysis: A Practical Guide by Anderson.

Computer equipment will be required at separate locations to allow each organization to analyze data, interface with the central location, and produce interim and final cost-benefit comparison reports. As can be seen, the output required consists of ledgers followed by explanation, discussion, and possibly a few charts that can easily be prepared with state of the art word processing and graphics software packages operating on minicomputers.

We know that any type of computer equipment we choose for the other locations, from minicomputer to mainframe, could connect and interface to the equipment in operation at the central location. What needs to be determined is whether the microcomputer we identified for use in producing the documents and graphs could also perform the data evaluation that would not (or could not) be done by the equipment at the central location.

The process of cost-benefit comparison consists of identifying and evaluating the consequences of a proposed change to a system. Implicit in these actions are the tasks of first identifying the areas of impact, followed by estimating the amount of impact for each area. When searching for the appropriate equipment to perform this estimating function, we should remember that:

> microcomputers, using a variety of available and custom-tailored software products, can be used to advantage in virtually any estimating situation. Estimates prepared using microcomputers can possess the qualities of high visibility, credibility, and increased professionalism (Stewart and Stewart, 1986:1).

There is a large selection of spreadsheet programs, scheduling packages, database systems, and vertical market systems that can be used on the microcomputer to aid in the function of estimating (Stewart and Stewart, 1986:37). Many of these software packages will work in combination with each other and with the other software packages (word processing and graphics) that would be used in this cost-benefit comparison information system (Stewart and Stewart, 1986:65).

The results of this research have not identified the extent to which the cost-benefit comparison information system that has been designed will actually be used. Still, the choice of microcomputer would appear appropriate when we remember that the "speed, accuracy, and adaptability to a wide range of uses make it an ideal tool for the estimator" (Stewart and Stewart, 1986:3).

Examples Showing How a Cost-Benefit Comparison Could Be Accomplished

To demonstrate how a cost-benefit comparison could be performed, cost-benefit comparisons were prepared for changes that might be made to defense acquisition procedures. A review of these completed cost-benefit comparisons also allows the reader to evaluate the usefulness and applicability of the cost-benefit comparison method.

Preparation of a cost-benefit comparison requires a knowledge of the change and an understanding of the impacts of the change. The use of personal evaluation and judgment may be appropriate when initially attempting to identify the impacts of a change, but should be followed by research of available information on the topic. For this reason, the changes analyzed for this thesis were selected among potential changes that could be made to defense acquisition procedures that had a description of the change and some discussion of the advantages and disadvantages of the change recorded in the literature.

The first cost-benefit comparison prepared considers the advantages and disadvantages of removing existing defense acquisition procedures that require warranties for procured weapon systems.

The second example of cost-benefit comparison considers a change to the requirements for competition in the defense acquisition process. The definition and analysis of this proposed change to competition may turn out to be a complex and iterative process since numerous laws were enacted in 1984 and 1985 to enhance competition and any proposed change would have to study a wide range of impacts.

The third example given considers the advantages and disadvantages of adding a new procedure to the current set of defense acquisition procedures. This third example will consider making the method of cost-benefit comparison

developed for this thesis part of the defense acquisition procedures.

Like any proposed changes, these changes were selected based on the perception that it might be determined that making these changes would improve the defense acquisition process. The preparation of an initial cost-benefit comparison ledger and descriptive summary will help indicate whether the perception is accurate, and whether continued analysis and consideration of the change is warranted. After review of these cost-benefit comparisons, individuals and organizations closer to the decision making levels in our federal government can decide if they want to pursue these issues and propose that some or all of these changes should be made. If it is decided any of these proposed changes warrant further consideration, the ensuing review and debate over these changes will result in more refined and accurate cost-benefit comparisons.

It should be understood and remembered that even though the initial product of a cost-benefit comparison should be prepared as objectively as possible, it will be based on the impacts of a change as compiled from a single perspective. The initial or draft cost-benefit comparisons may not accurately reflect all commonly agreed upon areas of impact, and the impacts recorded may be in need of refinement, alteration, or correction. Later draft cost-benefit comparisons would be more precise and closer approximations of the final cost-benefit comparison. This evolution of the

cost-benefit comparison to its final form is accomplished through continued consideration, analysis, and evaluation of the proposed change.

A factor that helps to guide the level of detail included in a cost-benefit comparison is to estimate how much time is available to prepare an initial comparison or make changes to an existing comparison. The more time available, or the more time the analyst chooses to dedicate to the evaluation of impacts, the more detailed and precise the resulting comparison will be. The initial drafts of the cost-benefit comparisons contained in the appendices to this thesis were completed with between eight and sixteen hours of work by one person.

A Cost-Benefit Comparison of Warranties

Changes were made to defense acquisition procedures to require the DoD to obtain warranties from contractors for weapon systems obtained at a cost of more than $100,000 per unit, or a total procurement cost of $10,000,000 (U.S. Code, 1984:98 Stat. 2601). This change was put into place by laws created by Congress and is contained in Section 794 of the 1984 DoD Appropriation Act, Public Law 98-212 and Section 1234 of the 1985 DoD Authorization Act, Public Law 98-525.

The law requires contractors provide written guarantees that the weapon systems meet design, manufacturing, and essential performance requirements, and are free from defect in materials and workmanship. If the systems do not meet

the required guarantees the contractor must take corrective action or pay necessary costs for the government to take corrective action. A waiver to the requirement for a warranty may be granted as long as the Secretary of Defense notifies Congress that the waiver is in the interest of national defense or if the warranty would not be cost effective. (U.S. Code, 1984:98 Stat. 2602-2603)

Enough articles were located which discussed the impacts of the warranty laws to allow for the completion of an initial cost-benefit comparison. The Franklin Ledger presents the potential advantages and disadvantages of changing defense acquisition procedures by eliminating the requirement for express warranties on weapon system contracts. Because of the many sources of information used to construct this ledger and because the research performed to identify the advantages and disadvantages is part of this thesis, the descriptive summary was used to record the sources from which information or ideas were obtained. The numbered reference system was used to cite each source used in the cost-benefit comparison. The Ledger and descriptive summary are contained in appendix D.

A Cost-Benefit Comparison of Competition in Defense Acquisition

Much has been done in recent years in many different areas to promote competition in defense contracting. During 1984 and 1985 Congress passed new laws requiring the

Pentagon and services to buy more weapons, components and parts from more sources' and 'to competitively award contracts for weapon systems and subsystems' (Denny, 1975:22). The numerous articles arguing the pros and cons of increased competition in defense acquisition appear to be sufficient to suggest the proposition and consideration of a change in this area.

A review of the literature shows no general agreement on the question of whether the increased competition that has been mandated has made defense acquisition better or worse. Because of the lack of general agreement it is possible for suggestions to both increase and decrease competition in defense acquisition to be proposed. For this research it was decided that a cost-benefit comparison would be prepared to evaluate the impact of increasing competition in defense acquisition. For this cost-benefit comparison 'increased competition' is defined as a requirement for the Pentagon and services to buy more weapons, components and parts from more sources and to competitively award contracts for weapon systems and subsystems.

The cost-benefit comparison ledger and descriptive summary prepared for this topic are contained in appendix E. Like the previous cost-benefit comparison on warranties, numerous sources of information were used to construct this ledger so the descriptive summary was used to record the sources from which the information or ideas were obtained

and the numbered reference system was used to cite each source used.

Consideration of the Full Impact of a Cost-Benefit Comparison Program

In most proposals, inclusion of a section on benefits to be gained by adoption of the proposal is typical of how proposed changes to any system are advertised by their advocates. Similarly, a typical thesis will include a standard advocacy section detailing the benefits of beginning the action or program that has been suggested in the completed thesis.

Unfortunately, it is rarely standard procedure to advertise the costs of a program. It has been observed that "proposals with immediate benefits, at the expense of complex future costs . . . are very attractive" and supporters of the proposal have a strong incentive to emphasize immediate benefits (Gwartney and Stroup, 1982:377). Along the same lines, it may be felt that discussing the disadvantages associated with starting a program may foster negative impressions and a reluctance to carry out the program. As a result the disclosure of the disadvantages of a program may be perceived as dangerous as it tends to lessen the likelihood of adoption of the program. However, as shown by the research performed for this thesis, failure to consider both the advantages and

disad antages of a change can lead to the adoption of changes that do more harm than good.

For these reasons a cost-benefit comparison of the cost-benefit comparison method developed for this thesis was prepared and is contained in appendix F. The following two sections provide descriptions of the advantages and disadvantages of cost-benefit comparison that are included in the Franklin Ledger.

Advantages of Instituting the Program Developed for this Research. Given that the objectives of the recent waves of defense acquisition reforms are to promote a more efficient and more effective operation of the defense acquisition process, then cost-benefit comparison should be considered as a required tool for use by all organizations that create changes to defense acquisition procedures. If a cost-benefit comparison program is instituted it can be expected that fewer changes detrimental to the operation of the defense acquisition process will be adopted. The use of this valuable tool will not only aid in insuring future reform is conducted in a businesslike manner, but will also aid in insuring changes lead to a more efficient and effective operation of the defense acquisition process. A cost-benefit comparison program will provide decision makers with the information necessary to make responsible decisions: it will provide the consequences of a change and these consequences will be arranged in an easy to understand and an easy to compare format. Cost-benefit comparisons

also can be used for performance measurement. The net impacts of a decision can be evaluated and the results can be attributed to the decision maker and his ability to make efficient and effective changes to defense acquisition procedures.

There is no reason to postpone the activities necessary to establish a cost-benefit analysis system to analyze changes to the defense acquisition process. The level of detail required and dollar threshold necessary for review can be selected at any reasonable level initially and modified as needed over time to maximize cost effectiveness. The levels of detail chosen will be an integral part of the cost-benefit analysis program and therefore should be documented and consistently used in practice.

In the book The Defense Management Challenge: Weapons Acquisition the authors list a dozen major studies completed since the early 1960's, all of which had similar findings and recommendations for defense acquisition reform (Fox and Field, 1988:41-42). Successive attempts at carrying out these reforms have failed in their objectives because they were unable to change 'counterproductive government and industry incentives' (Fox and Field, 1988:42,48,51). In the development of cost-benefit comparisons these incentive structures were considered and approaches attempting to enhance the motivation for making efficient and effective changes leading to lasting reforms were incorporated.

If the legislative or executive centers of government cannot or will not take appropriate actions to insure this system (which systematically evaluates and compares the costs and benefits of a change) is implemented, then the responsibility falls to those affected by the activities of these centers of the federal government to take action to insure this analysis is done. For changes made to defense acquisition procedures, the responsibility for insuring the costs and benefits are documented and communicated to decision makers should fall on the DoD.

If those organizations responsible for making a change to defense acquisition procedures do not take the responsibility to prepare a cost-benefit comparison then the DoD must be prepared to assemble a cost-benefit comparison with whatever information is available concerning the change. The results of the analysis can then be provided to decision makers who can resolve those situations where it appears the benefits of a change may be outweighed by its costs.

If it is decided that an information system will be used with the cost-benefit comparison program, it will be found that easy and instant access to the latest cost-benefit comparison studies will be available to all users of the system. In addition, it is expected that by using information systems, the communication, information exchange, and cooperation between offices contemplating and assessing the impacts of proposed changes will be enhanced.

Because of the relatively high position levels of the individuals who are typically responsible for making changes to defense acquisition procedures, some organizations may assign analysts the job of preparing the cost-benefit comparisons or assisting decision makers prepare their cost-benefit comparisons. A cadre of analysts who are skillful and experienced at preparing cost-benefit comparisons might result in the improved preparation and presentation of the comparisons. The cost-benefit comparisons prepared by selected analysts could be completed in a more standard format which would become more familiar and easier to understand by the decision makers using the comparisons. These factors would increase their usability and usefulness.

Disadvantages of Instituting the Program Developed for this Research. There are two separate groupings of cost for instituting a cost-benefit comparison program. The first group of costs is derived from the resources required to incorporate the cost-benefit comparison program into the existing environment where changes to defense acquisition procedures are made. These costs include costs to educate and instruct individuals responsible for performing cost-benefit comparison. There will be costs associated with creating the information system and the network to interconnect the centers of decision making responsibility with each other and to the central location. The costs of the information system will be greatly reduced if existing

information systems provide the computer services required of the cost-benefit comparison program.

The second group of costs consists of the resources required to perform cost-benefit comparisons and the costs arising out of the need to maintain the cost-benefit comparison program. Maintenance of the cost-benefit comparison program would include the costs of maintaining and providing access to the database of previously performed cost-benefit comparisons and the resources needed to keep the program operating (training replacement people, upgrading equipment, and revising operating instructions). These costs would persist as long as the program remains in operation.

There also will be manpower, time, and materials required to conceptualize and record the costs and benefits to be derived from the changes made to defense acquisition procedures. This additional time will be limited because many activities that already take place while making changes to defense acquisition procedures (such as the formation of the idea for change, the proposal of the change, and the ensuing debate over the change) identify many cost and benefit impacts that need to be recorded. In addition, the availability of a glossary of frequently used categories of costs and benefits derived from changes to defense acquisition procedures will tend to decrease the time that would otherwise be needed.

Because of the relatively high position levels of the individuals who are typically responsible for making changes to defense acquisition procedures, it may be the case that in some organizations analysts will be assigned the job of preparing cost-benefit comparisons for the decision makers. Increased resource will be required to transfer the completed cost-benefit comparisons to the decision makers responsible for making changes to defense acquisition procedures. Time and energy will be expended in researching the costs and benefits as perceived by the analyst, identifying any other costs and benefits that may be perceived by the originator of the change, and transferring the cost-benefit comparison from the analyst to the decision maker (with any review process and iterative changes required by middle level executives). The time and energy required in the scenario where costs-benefit comparisons are compiled by analysts rather than the originators of a change or the actual decision makers might be larger than they would be if decision makers or the originators of changes completed the cost-benefit comparisons themselves. This would be due to the requirement for these analysts to research the consequences of the change and coordinate the cost-benefit comparisons through layers of management before forwarding the comparisons to the decision makers.

There may be different opinions concerning the appropriate costs and benefits to be recorded in the cost-benefit comparisons. It should be expected that time,

manpower, materials will be used to incorporate changes to draft cost-benefit comparisons.

Results Of Review and Trial Application of the Cost-Benefit Comparison Method

As part of the research and investigation into this subject area, a draft copy of this thesis and different versions of the ledger were provided to Congressional Liaison Staff Officer Major Charles J. O'Connor III for his review and comments on 31 May 1990. Based on his review of the cost-benefit comparison program contained in the draft thesis and with the copies of the ledgers provided to him, Major O'Connor, in consultation with other members of that office, was able to use the cost-benefit comparison method to assist in formulating Air Force positions on pending legislation.

Many positive aspects of the cost-benefit comparison method were reported. It was reported that the use of the cost-benefit comparison method provided both a good structure and introduced a helpful discipline to the process of evaluating legislation, but also allowed for sufficient flexibility in performing the comparisons. Major O'Connor reported that he believed the simple format of the ledger was favorable since it allowed for its use and modification by the many different organizations that would use it. The titles Advantages and Disadvantages over each half of the ledger (as opposed to the titles Benefits and Costs) were

preferred by Major O'Connor since he felt the use of the title Cost was confusing and might mislead some individuals into believing all impacts reported under Costs needed to be converted into quantifiable terms (including dollar figures). Major O'Connor further reported the use of a cost-benefit comparison program appeared to have many desirable qualities and might have important advantages (in the areas of improved coordination and more timely reporting to Congress) over the existing procedure by which the services and the DoD convey impacts of proposed legislation to Congress. (O'Connor, 1990)

Conclusion

The regulations, policies, and processes governing the operation of defense acquisition offices determines the efficiency and effectiveness of the DoD's ability to supply itself with the weapons and support materials to defend the United States and project military power. The applicability of the contracting approaches followed by military acquisition offices is a prime determinator of the quality and quantity of our country's war fighting materials. This research has documented that a procedure to identify and compare the cost and the benefits of changes to defense acquisition procedures can and should be instituted. Accepted concepts based on established analysis techniques have been relied upon to make use of proven products. The use of the cost-benefit comparison program developed as part

of this research would improve the performance and output of the defense acquisition process.

Having identified a method for performing cost-benefit comparison that could be used to evaluate changes to the defense acquisition process, it was also possible to identify the requirements of an information system that would support this task. Based on the knowledge of the organizations involved in performing cost-benefit comparisons, and the type of information used in preparing cost-benefit reports, a relatively inexpensive mix of microcomputers to access a centralized minicomputer (with the addition of the necessary software and communication equipment) was suggested as a potential solution.

V. Conclusion and Recommendations

Arguments to Support the Adoption of a Cost-Benefit Comparison Program

In the previous chapter a cost-benefit comparison method was developed. Some cost-benefit comparisons of changes to defense acquisition procedures were provided as examples of how this procedure could be performed. An issue remaining to be addressed is whether the use of cost-benefit comparison by organizations involved in proposing and making changes to defense acquisition procedures is appropriate.

The Uses of Cost-Benefit Comparison. It is possible the readers of this thesis will hold different views about the causes of the problems in defense acquisition. One perspective is that "The weapons acquisition process is in trouble because it has become increasingly enmeshed in American political procedures that are glaringly at odds with what is required to develop advanced technology" (McNaughter, 1987:102).

Another attitude is that the political nature of the organizations involved in proposing and making changes to defense acquisition procedures is necessary. There may be a belief that this system might curtail the ability of government and private industry officials to use their political skills and powers derived through their job positions when contemplating and making changes to defense

acquisition procedures. This belief could prevent the adoption of a much needed cost-benefit comparison program.

In addition, it is possible those individuals who might benefit from the decisions made in a political environment would be resistant to the installation of a cost-benefit program that curtails the types of decisions from which they benefit. These issues need to be addressed.

The organizations involved in making changes to defense acquisition procedures are part of the federal government. As a result these organizations often operate in a bureaucratic manner with the awareness of political relationships which impact on the decision making process. By its nature, defense acquisition is "both a technical and a political process" (McNaughter, 1987:65). In addition, individuals and groups representing the defense industry use their economic clout and political skills to influence the changes considered and made to defense acquisition procedures. An important issue requiring consideration is whether the existing political relationships and the bureaucratic structures would influence the way a cost-benefit analysis program could be instituted and used by decision makers responsible for making changes to defense acquisition procedures.

Nature of Organizations that Make Changes to Acquisition Procedures

There has been much activity in recent years to reform the acquisition process. The objectives of these reforms have been to remedy problems by making changes to defense acquisition procedures. There are many examples in the literature of changes to defense acquisition procedures that have been proposed and made to correct existing or perceived problems.

One difficulty many researchers have found is sometimes the proposed solutions did not remedy the problem at hand, or in some cases "made a bad situation worse" (Kluter and Tate, 1987:22). As reported in the foreword to Thomas L. McNaughter's book New Weapons, Old Politics, "Repeated attempts to solve these problems with acquisition reform have not just failed, McNaughter suggests, but often have made things worse" (McNaughter, 1989:ix).

The root causes of changes that are not effective or worsen the acquisition process are either the proposed changes are not properly applied to the acquisition process to produce a change, the change made to the defense acquisition process is not a solution to the identified problem, or the side effects of a change create more problems than they solve. It can be expected the bureaucratic and political nature of the organizations involved in making changes to defense acquisition procedures

contribute to the lack of efficiency and businesslike operation that causes these problems.

Indications that changes made to improve the defense acquisition process have not been properly applied are not always easy to identify or measure. Indications of this type of problem are more often found in the perceptions of individuals involved in the defense acquisition process. An illustration of this perception was given by Dr. William Perry, who had been a member of the Packard Commission, at a Congressional hearing in September 1987.

> The whole series of recommendations that have been made in the acquisition reform area, in my judgement, have been followed in form but not in substance. As a result, there is no discernable improvement in defense acquisition in the last year. Indeed, the situation may be worse today that it was two years ago when the Packard Commission was formed. (U.S. GAO, 1988:31)

Adding to this type of problem are the incidents of changes to the acquisition process that do not necessarily solve the intended problems. Much of the criticism for these types of problems has been directed at the Congress, which has been responsible for "redundant and conflicting legislation" and the "willy-nilly process of throwing amendments in the hopper without any consideration of whether they all fit or not" (Pendulum, 1986:22).

What is discouraging to realize is that often the military has had no choice but to carry out inefficient changes forced upon it by other organizations. Efforts by well-intentioned leaders within the DoD to request inefficient changes be revoked are thwarted by accusations

that the military is dragging its feet in implementing directed changes. Just as harmful are efforts by those leaders in the federal government and in the DoD who do not comprehend that some changes have substantial negative net impacts and only see a new wave of reforms as an opportunity to applaud the actions of the current leadership. A sense of maturity needs to be adopted so decision makers can acknowledge that mistakes are made in the complex business of defense acquisition and a procedure needs to be adopted to identify and correct these mistakes.

Even without the problems brought on by inappropriate changes forced upon the defense acquisition process, the colossal and complex nature of the defense acquisition organization can prevent thoughtful and carefully constructed changes from solving the identified problem. The typical steps needed to make a change to the defense acquisition process, and the desire to insure past changes have been effective was described by General Earl O'Laughlin, while he was commander of Air Force Logistics Command.

> 'The more important part of the process is assurance that the law or policy is effectively institutionalized which is a time-consuming process. It involves changes in the FAR (Federal Acquisition Regulations), the DoD (Department of Defense Supplemental) regulations, and, in my case, the subsequent Air Force regulations and supplements to those regulations; then training to be sure the lowest levels in the institution, the people executing the program, understand what you want implemented. That institutionalization process takes three to five years. I strongly urge a halt to new legislation impacting the acquisition process until we can get a better handle' on how well the recent

> legislation is working in terms of achieving its intended goals. ('Pendulum,' 1986:22)

Although the above explanation of the effects of changes to defense acquisition procedures referred to changes made by Congress, the process of incorporating a change is similar regardless of where the change originates. Many would argue it is doubtful the actual impacts of recent changes are anywhere close to the intended impacts (Fox and Field, 1988:37).

Examples such as the above indicate the existence of changes that are not properly applied to the acquisition process and changes made to the defense acquisition process that do not solve the intended problem. What is difficult to determine is what portion of these problems is a result of the political and bureaucratic nature of the federal government and the DoD, and if ill-advised or selfish actions of individuals or groups also contributes to these problems.

Use of Cost-Benefit Comparison to Curtail Defense Reform Problems

'It is necessary to show (or have substantial reason to expect) that government intervention will do more good than harm' (Mansfield, 1988:520). The previous statement, although directed at government intervention in the private sector of the economy, is just as applicable for government intervention into defense acquisition procedures.

Sufficient checks and balances have been put in place in the organizations of the executive branch of the federal government to hamper the proposition and adoption of changes to the defense acquisition process that would serve the selfish purposes of an individual or a group. Still, it is possible some proposed changes that do more harm than good could be adopted because of the impact politics and bureaucracy have on the decision making process. Indeed, the continuing waves of reform and the duration and iterative nature of the current reform movement suggest that modifying defense acquisition procedures is no easy task. In fact, reform to the acquisition process has been continuing in waves since the conclusion of World War II (McNaughter, 1987:64).

Evidence of concern over the continued propagation of changes that do more harm than good can be found in recent suggestions that groups or boards consisting of industry representatives and experts be organized to aid decision makers in the DoD and decision makers in organizations in the federal government assess the complex consequences of proposed changes to defense acquisition procedures. For instance, Robert Trimble in his article "Government Procurement Reform" suggested an Industry Advisory Board (IAB) be established by the DoD "to provide a regular, systematic basis for communicating on key problems and issues affecting the entire DoD-industry relationship and the health of the industrial base" (Trimble, 1987:16). In

addition, Trimble recommended "a Procurement Advisory Board of elder statesmen and current experts should be formed to give continuing proposals and advice to OFPP" the Office of Federal Procurement Policy (Trimble, 1987:16). Along the same lines ad hoc groups and panels have been organized by forces both inside and outside the government to address those areas related to the changing nature of defense acquisition that require attention or are being overlooked in the ongoing defense acquisition reform movement. The Defense Acquisition Environment Panel and the Defense Industry Advisory Group are two examples of such groups ("Defense Industry," 1988:87,88).

The lack of strict control over proposed changes to the defense acquisition process that might be ill-advised is also evident in the Congressional branch. For instance, when recommendations were given at a Senate briefing to establish a Congressional focal point for defense acquisition procedures, then Senator Quayle of the Senate Armed Services subcommittee responded that "his subcommittee is supposed to be that focal point in the Senate, but confessed, 'Unfortunately, amendments are offered on the Floor which we cannot control'" (Pendulum, 1986:22).

In fact, advisory groups similar to those mentioned above have been proposed to aid the legislative branch in assessing the impacts produced by legislative changes to the defense acquisition process. The existing need is:

> to fill the void in Congress' understandings about federal procurement and how different seller/buyer environments affect initiative, product, selection and pricing in both public and private sector procurements. (Hiestand, 1987:56)

To fill the existing void, it was suggested that "Congress should establish panels of government/industry contracting experts to provide it with continuing, cohesive, 'depoliticized' advice on what should be fixed in the system and how" (Hiestand, 1987:54). Obviously, the need for these types of groups has grown out of the perception that those in high levels of the federal government are not well enough acquainted with the defense industrial base and the impacts that changes to defense acquisition procedures have on the defense industrial base to always know or do what is best.

An additional characteristic of changes proposed and made to defense acquisition procedures that might contribute to the problem of continuing waves of reform is the propensity of industry representatives and government officials to identify only the benefits of proposed changes. Examples of this type of behavior can be found throughout the literature. A representative illustration of this is found in the article "Industry Executives Speak Their Minds in AFJI Survey" from Armed Forces Journal International. The article starts out by listing industry executives' complaints had about the current defense acquisition process (many of which were created or made more profound by recent acquisition reforms). Unfortunately, the numerous proposed changes suggested in the article are not accompanied with

any consideration of the adverse impacts these changes might have on other aspects of the defense acquisition process (Goodman, 1988:74). With the excessive emphasis on benefits without ample consideration or open discussion of costs it is easy to understand how some changes made to defense acquisition procedures have made a bad situation worse.

The proper use of cost-benefit comparison can be applied to these problems to eliminate hindrances inherent in the political and bureaucratic nature of organizations in the federal government involved in making changes to defense acquisition procedures. Obviously, to say the use of cost-benefit comparison enables the study of existing choices and selection of alternatives with the greatest net benefits is not enough (Oxenfeldt, 1979:32). The abundance of literature about proposed changes to defense acquisition procedures suggests that some forms of review and comparison of possible alternatives are already occurring in the organizations that propose and make changes to defense acquisition procedures. What a cost-benefit comparison program would provide is the structure within which the persistent problems that have plagued acquisition reform can be solved.

The requirement for documentation and communication of the full impact of a change before defense acquisition procedures are changed will serve to allow proper evaluation of the change by decision makers. Not only will the perceived benefits of a proposed change be flaunted when the

proposal is pushed forward. Now the costs -- the segments of defense acquisition that will be sacrificed in terms of efficiency or effectiveness to derive the benefits of the proposed change -- will also be provided.

In addition, requiring documentation of both advantages and disadvantages allows for more open discussion of all aspects of the changes and their impacts. It may be found that by requiring documentation of both advantages and disadvantages the services of the panels of defense acquisition and industry experts would no longer be necessary. Another possibility is that the role of the panels could be modified by requesting representative defense acquisition specialists or industry spokesmen to validate that they believe the proposed change will in fact result in the costs and benefits documented. These or other useful activities could be accomplished by involving industry representatives in the cost-benefit comparison program proposed.

Documentation of the costs and benefits of changes made to defense acquisition procedures will also serve to identify and help rescind changes that do not solve the problems they were intended to solve, and changes that create more problems than they solve. This will be as a result of the availability, to any individual within the defense acquisition community, of the cost-benefit studies that document the costs and benefits a decision maker intended a change to have. This access will allow

comparison of the intended costs and benefits to the actual costs and benefits of the change. The identification of actual costs and benefits that are significantly different from the intended costs and benefits of a change can alert decision makers to changes that should be considered for removal, and justification for their removal.

Allowances for the Discretion of Decision Makers

The role of cost-benefit comparison complements the process by which decision makers in the various organizations of our federal government determine changes to be made to defense acquisition procedures. In the book The Effective Executive Peter Drucker discusses the values of measurements and considering alternatives (Drucker, 1967:143,145). Drucker gives many examples in his book of the effective use of measurement and considering alternatives in the military and in the federal government. He explains Defense Secretary McNamara's use of nontraditional measurement methods to identify procurement and inventory policy problems in the DoD during the Kennedy administration (Drucker, 1967:145). Drucker also goes on to state:

> Every one of the effective Presidents in American history had his own method of producing the disagreement he needed in order to make an effective decision. Lincoln, Theodore Roosevelt, Franklin D. Roosevelt, Harry Truman--each had his own ways. But each created the disagreement he needed for 'some understanding of what the decision is all about.' Washington, we know, hated conflicts and quarrels and wanted a united Cabinet. Yet he made quite sure of the necessary differences of opinion on important matters

by asking both Hamilton and Jefferson for their opinion. (Drucker, 1967:148-149)

These aspects of decision making, the creative methods of measurement, and consideration of the positive and negative aspects of a decision (which are included in cost-benefit comparison) have been credited with contributing to the effective decision making ability of government and military leaders. A cost-benefit study documents both tangible and intangible advantages and disadvantages of a change. The advantages and disadvantages can be weighed by a decision maker to help determine an appropriate course of action. In addition, these impacts of a change can be compared to the impacts of other proposed changes to determine the best solution to a problem. These elements of a cost-benefit comparison contribute to and enhance the discussion and debate over the most optimal solution to the problem at hand.

The value of performing a cost-benefit study and its usefulness as a decision making tool helps explain its continued use in government organizations (Truett and Truett, 1980:348). Because cost-benefit comparison is a decision making tool does not mean decisions are to be made based on a cost-benefit comparison only. Cost-benefit comparison, like any analytical model, is just one of many possible tools to aid decision makers in performing their jobs.

'After carrying out the best procedures, the final ingredient for the decision maker to add is judgment' (Oxenfeldt, 1978:8). This last and very important step is present when making business as well as political decisions. This step serves to preserve the essential aspect of executive decision making. Individuals serve as decision makers because they hold certain positions within an organization. It can be assumed one of the reasons they were selecte to fill those positions was their ability to appropriately account for those intangible effects and the discernment the individuals would show during this last step when selecting what is believed to be the optimal solution to a problem.

By its very nature as an analytical tool, cost-benefit comparison would not prevent the political ramifications of a decision to be weighed when the final judgment of the decision maker is employed. However, as discussed earlier, the use of cost-benefit comparison when assessing proposed changes to the defense acquisition process would tend to prevent consideration and adoption of changes whose documented costs greatly outweigh benefits. For this reason, changes that primarily serve political purposes at the expense of the efficient and effective functioning of the defense acquisition process would be discouraged.

Deterrence to Selfish Motives. One of the factors all decision makers have in common is the desire to choose as a solution the option that will 'maximize the satisfaction or

utility of the decision maker' (Harrison, 1975:60). One characteristic of a politically motivated decision is the awareness of some satisfaction or utility that might come directly to the decision maker or indirectly to the decision maker through the groups the decision maker associates with or represents. This satisfaction or utility could become a factor in the decision maker's choice. If these benefits do become a factor, it is possible the course of action selected would not be optimal for the system in question, or it is possible that the change to the system will generate costs that exceed the benefits derived from the change.

By requiring documentation of the costs and benefits associated with a decision, suboptimal decisions (decisions having greater cost than benefits) will be discouraged.

In addition, the incorporation of a cost-benefit comparison program would help to prevent selfishly motivated additions or modifications to proposed changes that might occur as a concept passes through the layers of a bureaucracy. At the very least a cost-benefit comparison program would serve to identify those aspects of a proposed change that incur more costs than benefits before the change is instituted.

Conclusion

As shown by the above evaluation, cost-benefit comparison will operate very well in the organizations that make changes to defense acquisition procedures. It is

likely that the use of a cost-benefit comparison program will tend to increase the efficiency and effectiveness of defense acquisition procedures. The only argument that could be made by those who oppose the institution of cost-benefit comparison that has not been addressed by this paper is whether or not instituting a cost-benefit comparison program is itself cost effective. Whether or not this is the case is in need of further study.

This being the case, any motive other than previously mentioned for opposing the institution of a cost-benefit comparison would be suspect of deriving from motives not to curtail the opportunity for selfish activities, or the desire to avert accountability for actions and decisions.

Recommendations. Until government officials responsible for oversight, management, and regulation of the defense acquisition process are willing to take ample time to honestly consider and openly discuss the full impacts of changes made in the defense acquisition environment and are willing to make the sometimes tough, unpopular, and selfless decisions to create lasting improvements, real reform will never take place. History shows us our past mistakes and it is up to us to insure we learn from these mistakes.

In the book New Weapons Old Politics: America's Military Procurement Muddle Thomas McNaughter gives an objective account of the history of our nation's defense acquisition reforms in the 20th century.

> The nation handles acquisition well in war and crisis because such moments of recognized nation peril move the political system to a resolve normally unattainable in peacetime. The arrangements generated by such circumstances have been ad hoc and often wasteful. But overall they have worked, and in crises that is all anyone has asked of the acquisition process. The nation has yet to prove that it can devise an approach to acquisition that works over the long peacetime haul in which the political system's resolve quickly fragments into contentious debate. Unfortunately, the conditions that call most urgently for reform do not breed the political resolve necessary for it. Therein lies the conundrum of acquisition reform. (McNaughter, 1989:203)

Will the growing national debt, failing national standards, or loss of worldwide dominance precipitate the necessary conditions to force our leaders to muster the courage and resolve to face the tough issues and accept that some selfless decisions must be made before any lasting progress can be expected? Or are we doomed to endure more waves of superfluous reform that do little to address the real issues?

No organization is being told to give up the power they have over the management of our nation's military. What is being requested is that this power to bring about change in the military be exercised responsibly.

Lasting solutions will require trust, professionalism, and some redistribution of control and authority. In many cases this distribution will be and must be from the centralized decision makers (the same decision makers responsible for making lasting reforms and who now hold this power) to others who have been assigned the responsibility for performing defense acquisition. The ability for

centralized authority to muster enough trust to give over and redistribute some of its acquired control of the military to the individuals it has appointed to manage the military has been the most difficult and most important step yet to be completed.

If this step is not taken we might ask ourselves if we are doomed to endure even more waves of useless reform as our military and defense industry dominance in the world fades. If the necessary changes are not made will we be threatened with the loss of national security and quality of life we have inherited from our forefathers? Or must our standing in the world fade to the point where powers greater than those held by individuals elected and appointed to offices in the federal government force the necessary changes.

The analysis method produced for this thesis was developed with the intention of providing decision makers with a procedure, a tool, to be used for straightforward and businesslike evaluation of proposed changes to defense acquisition procedures and to force objective analysis of the advantages and disadvantages involved. Because such a tool is not being used, and such a tool is needed, the cost-benefit comparison method proposed in this thesis needs to be evaluated and considered for adoption. If it is considered a worthy tool for the purposes it was designed, any necessary follow-on research should be conducted and it should be adopted as part of the defense acquisition

process. If it is felt the cost-benefit comparison method developed for this thesis is not worthy of adoption, then alternative superior procedures should be provided and justification given as to why and how other proposed methods are superior to the one presented here.

Future Research

With a comprehensive cost-benefit comparison method established, follow-on research can be conducted to determine whether evaluation of proposed changes to defense acquisition procedures is being performed. Follow-on research can also test if the actual use of cost-benefit comparison will improve the net impact of changes made to defense acquisition procedures. Future research should be aimed at insuring the cost-benefit comparison program to be installed would be cost effective for reviewing changes to defense acquisition procedures.

This exploratory study did not attempt to survey individuals who currently may be involved in performing some form of analysis of changes made to defense acquisition procedures. This exploratory study was not able to conduct tests with the cost-benefit comparison model created as a part of this thesis. This research was not able to study the effects of, or the optimal arrangement for, implementing the cost-benefit comparison model developed. These areas that may be of interest and other areas that may be

identified as a result of this research can be addressed in follow-on research.

In addition, some researchers may find it desirable to query the opinions of experts and authorities in the field of defense acquisitions, cost-benefit analysis, and federal financial management to determine their perspectives on the cost-benefit comparison method developed. These experts and authorities may also help determine additional considerations and applications for this method.

One application of cost-benefit comparison that might be useful is to propose that changes evaluated to have questionable net benefits be implemented with sunset provisions. These sunset provisions would take effect after a pre-specified time and eliminate the change from defense acquisition procedures if specific action is not taken to keep the change in place. Cost-benefit comparisons could be used to determine if actual advantages outweighed the disadvantages of the change. A net advantage would be required to take action to make the change permanent.

Appendix A: Format A from DoDI 7041.3 Enclosure 2

SUMMARY OF COSTS FOR ECONOMIC ANALYSIS/
PROGRAM EVALUATION STUDIES
FORMAT A

1. Submitting DoD Component: _____

2. Date of Submission: _____

3. Project Title: _____

4. Description of Project Objective: _____

5. Alternative: _____ 6. Economic Life: _____

8. Program/Project Costs						
7. Proj Year	a. Non-Recurring		b. Recurring	c. Annual Cost	d. Discount Factor	e. Discounted Annual Cost
	R&D	Investment	Operations			
1.						
2.						
3.						
.						
.						
.						
25.						
9. TOTAL						

10a. Total Project Cost (discounted) _____
10b. Uniform Annual Cost (without terminal value) _____
11. Less Terminal Value (discounted) _____
12a. Net Total Project Cost (discounted) _____
12b. Uniform Annual Cost (with terminal value) _____

SUMMARY OF COSTS FOR ECONOMIC ANALYSIS/
PROGRAM EVALUATION STUDIES
FORMAT A

13. Source/Derivation of Cost Estimates: (Use as much space as required)

a. Non-Recurring Costs:

1.) Research & Development:

2.) Investment:

b. Recurring Cost:

c. Net Terminal Value:

d. Other Considerations:

14. Name & Title of Principal Action Officer	Date

Appendix B: Format B from DoDI 7041.3 Enclosure 2

SUMMARY OF OUTPUTS FOR ECONOMIC ANALYSIS
OR PROGRAM EVALUATION STUDIES
FORMAT B

1. Submitting DoD Component: _____

2. Date of Submission: _____

3. Project Title: _____

4. Description of Project Objective: _____

5. Alternative: _____ 6. Economic Life: _____

7. Outputs:

   a. Expected Benefits, Output, and Indicators of Effectiveness: (Describe and justify)

   b. Non-Quantifiable Benefits: (Describe and justify)

   c. Present Value of Revenues: (Describe and justify)

SUMMARY OF OUTPUTS FOR ECONOMIC ANALYSIS
OR PROGRAM EVALUATION STUDIES
FORMAT B

8. Source/Derivation of Outputs: (Use as much space as required)

a. Benefits, Performance and Indicators of Effectiveness:

b. Non-Quantifiable Benefits:

c. Present Value of Revenues:

14. Name & Title of Principal Action Officer	Date

Appendix C: Cost-Benefit Comparison Program Draft Instructions

NUMBER xxxx.x
DATE September 32, 1990

Department of Defense Instruction

Subject: Cost-Benefit Comparison For Analyzing Changes To Defense Acquisition Procedures

I. PURPOSE AND OBJECTIVES

This instruction:

A. Outlines policy guidance and establishes a framework for consistent application of cost-benefit comparison of proposed changes to defense acquisition procedures.

B. Establishes the Office of Cost-Benefit Comparison, under the staff supervision of the . . . to be determined (TBD) (possibly the Assistant Secretary of Defense [Acquisition or Comptroller]).

II. APPLICABILITY AND SCOPE

The provisions of this Instruction apply to the Office of the Secretary of Defense, the Office of the Joint Chiefs of Staff, the Military Departments (including the Reserves and the National Guard) and the Defense Agencies (herein referred to collectively as "DoD Components").

III. DEFINITIONS

The Term cost-benefit comparison used in this Instruction is defined below.

A. Cost-Benefit Comparison: A systematic approach to the determination and assessment of the improvements and the negative effects produced when changes are made to defense acquisition procedures. The improvements and negative effects are classified as advantages and disadvantages. Comparison of advantages and disadvantages is performed to determine if the benefits in relation to the costs are significant enough to warrant permanently adopting the change as part of the defense acquisition procedures. Identification

and comparison of advantages and disadvantages is accomplished by:

1. Systematically identifying and recording the advantages and disadvantages associated with a change proposed to defense acquisition procedures, or of changes made and incorporated into defense acquisition procedures.

2. Highlighting the key factors and other considerations that are of importance for consideration when preparing or reviewing the advantages and disadvantages of a change to defense acquisition procedures.

3. Using advantages and disadvantages as an aid in deciding whether to incorporate changes, as an aid in making trade-offs between suggested changes, and to generate alternative suggestions for changing defense acquisition procedures.

IV. POLICY

A. The concept of cost-benefit comparison is an integral part of the process by which executive level decision makers in the federal government make changes to defense acquisition procedures. Review and analysis of cost-benefit comparisons will be performed by executives responsible for making changes to defense acquisition procedures.

1. Cost-benefit comparisons should be brief and easy to understand.

2. Analysts preparing cost-benefit comparisons should be prepared to demonstrate the applicability and relative impact of the advantages and disadvantages identified in the cost-benefit comparisons. In addition the analyst should document in summary form the key factors and important considerations that pertain to the cost-benefit comparison.

B. In developing and justifying changes to be made to defense acquisition procedures, a cost-benefit comparison is required.

C. Cost-benefit comparison will be performed:

1. As early as possible after a reasonable concept for a change to defense acquisition

procedure has been formulated and before it is decided the change is to be made part of the defense acquisition procedures. The cost-benefit comparison can be updated as the concept for the change evolves, but a final version of the cost-benefit comparison must be prepared for record keeping purposes as soon as possible after it has been decided the change is to be incorporated into defense acquisition procedures.

2. On any element of the defense acquisition process perceived as requiring more resource to carry out than the value that this element provides. A cost-benefit comparison can be prepared to identify the advantages and disadvantages of this element.

   a. If a cost-benefit comparison was originally prepared for the element under study (when that element was initially incorporated into defense acquisition procedures), then this cost-benefit comparison should be referred to when preparing the subsequent cost-benefit comparison, and should accompany the subsequent cost-benefit comparison.

D. A change justified because of military, economic, or social necessity will not be exempt from the requirement to perform a cost-benefit comparison. The military, economic, or social advantages of supplying the necessity, and any other advantages and disadvantages resulting from the change, will be recorded.

E. A complete cost-benefit comparison contains the features outlined in Enclosure 1.

V. <u>The Office Of Cost-Benefit Comparison</u>

A. The Office of Cost-Benefit Comparison will serve in an advisory capacity to the TBD - Assistant Secretary of Defense (Acquisition or Comptroller). This Office will be responsible for DoD-wide application of cost-benefit comparison. The Office of Cost-Benefit Comparison will also provide assistance and recommendations to the offices in the legislative and executive branches of the federal government that are responsible for advocacy or use of cost-benefit comparisons. This Office will also be responsible for maintaining

and providing access to previously completed cost-benefit comparisons.

B. The various offices of the Secretary of Defense, the Military Departments and Defense Agencies will appoint competent representatives to the Cost-Benefit Comparison Council.

C. A Chairman will be appointed annually by the Assistant Secretary of Defense (Acquisition or Comptroller) based on recommendations from the Council members.

D. Council members will be responsible for advising the OASD(A or C) and their respective Departments and Agencies on matters relating to:

1. Policies and procedures concerning the use of cost-benefit comparison.

2. Using cost-benefit comparisons of changes before the changes have been incorporated into defense acquisition procedures and cost-benefit comparisons of elements that are part of the defense acquisition procedures.

3. Techniques and methodology for performing cost-benefit comparisons.

4. Educational programs for fostering an understanding of how cost-benefit comparisons are performed and how cost-benefit comparisons are used.

5. Improving the quality of comparisons and strengthening the use of cost-benefit comparisons in the Department of Defense.

VI. EFFECTIVE DATE AND IMPLEMENTATION

A. This instruction is effective immediately. Two copies of the implementing instructions shall be forwarded to the Assistant Secretary of Defense (Acquisition or Comptroller) within ninety days.

B. The Military Departments and Defense Agencies are encouraged to:

1. Develop and publish detailed procedures in handbooks or manuals to facilitate the completion of a cost-benefit comparison and to implement the policies and guidelines contained herein.

2. Compile a glossary of frequently used impact categories.

SIGNATURE BLOCK

Enclosures - 1
1. General Guidelines For Performing Cost-Benefit Comparisons

General Guidelines For Performing Cost-Benefit Comparisons

A. A cost-benefit comparison is not the only input considered when the decision is made concerning the incorporation of a change. The use of a complete cost-benefit comparison should be considered as one of the inputs required to make a proper decision concerning the incorporation of a change into defense acquisition procedures.

B. A Franklin Ledger (see Attachment 1) is the document used to record the advantages and disadvantages when performing a cost-benefit comparison. The following features are to be considered when generating advantages and disadvantages to be record on the Franklin Ledger.

1. Disadvantages are identified as the resources required to implement the change, the increase in resources required to acquire the same value of defense products after the change has been implemented, and the decreases in the efficiency and effectiveness of the defense acquisition process.

2. Advantages are identified as the decrease in resources required to acquire the same value of defense products after the change has been implemented, and the increases in the efficiency and effectiveness of the defense acquisition process.

3. Impacts whose effects cannot be accurately or precisely measured should be identified explicitly and their implications explored--in particular, the amount of costs they might generate.

4. Constraints on a decision maker's decision concerning the change (organization policy, limited resources, the prejudices of persons with strong influence in the organization) should be identified, and the cost of overcoming them should be reckoned in the total evaluation of the change.

5. Include only advantages and disadvantages resulting from the decision action--not some average or standard amount computed according to formula.

6. Impacts should be expressed in terms or units of measure compatible with the areas (or categories) of defense acquisition procedures impacted, in terms (words, phrases, and measurements) that are concise, in terms as precise as practical to determine, but should not require conversion of any impact to any other term or unit of measure.

   a. If more precise measurement or weighing of impacts is desired, this level of precision can be accomplished at the direction of the decision makers. The estimation of these impacts should be performed using accepted analysis techniques.

7. When the impacts of a change are expressed as dollar values then inflation and present values should be considered.

8. Each change to defense acquisition procedures under consideration should be thoroughly evaluated to determine its impacts. The cost-benefit comparison of each change should be recorded separately.

9. Government records and information accompanying the proposal of the change should be consulted to insure identification of all impacts of a change.

C. The identification of advantages and disadvantages should not be limited to consideration of solely budgets, monetary resources, or administrative costs and benefits. In addition, the cost-benefit comparison should include both short-term and long-term impacts.

D. It may be appropriate that critical assumptions or important considerations about the change being considered that are not recorded on the Franklin Ledger need to be recorded. If there are additional issues requiring consideration then they should be included in a Descriptive Summary and attached to the Franklin Ledger.

E. The method of documentation used to record the cost-benefit comparison should be in accordance with the general guidelines provided in this Instruction to insure completeness and consistency.

1. The Franklin Ledger should be used to organize the listing and comparison of costs and benefits.

   a. Identify the date the analysis is completed, unique identification of the change being

analyzed, the principal party responsible for performing the cost-benefit comparison, and the office and phone number of that individual.

b. The impacts recorded can be organized in groups on the Franklin Ledger to facilitate their review.

2. A Descriptive Summary may be attached to the Franklin Ledger. The information provided in the Descriptive Summary may be in any format but should be limited to critical assumptions and important considerations concerning the analysis of the change under consideration.

a. If the Descriptive Summary is prepared it should not repeat information provided in the Franklin Ledger.

b. Additional material that may be included is the number of personnel involved in performing the analysis and a brief explanation of the sources of information on advantages and disadvantages.

c. To insure only pertinent information is included in the descriptive summary, and that the cost-benefit comparison is maintained as an executive level decision making tool, the length of the descriptive summary should not exceed the length of the Franklin Ledger.

FRANKLIN LEDGER Page:_____

Date:_____ POC:_____

Change ID:_____ Office/Phone:_____

ADVANTAGES	DISADVANTAGES

Form XXX

Appendix D: Cost Benefit Comparison for Eliminating Requirements for Warranties

FRANKLIN LEDGER	Page: 1 of 4
Date: 32 September 1990	POC: Capt Ted McIntire
Change ID: Eliminate Warranty Req-1	Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Contractors will not have to charge for warranties (to cover increased risk/liability) and services will no longer have to pay for warranties. (1:38) (4:7) Services will no longer have to pay increased costs to contractors to obtain warranties on every weapon system (3:29,30) Money paid for warranties that cannot be enforced because weapon systems could not be operated and maintained in accordance with warranty specifications will no longer be wasted (2) The DoD can revert to obtaining warranties selectively (as it has in the past). (1:37)	Services will have to make or pay for alterations (corrections) that would have previously been covered under a warranty (and are not otherwise covered by Contract). (3:29)

Form XXX

FRANKLIN LEDGER Page: 2 of 4

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Eliminate Warranty Req-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Resources (manpower, training) necessary for administration and enforcement of guidelines and regulations that implement warranty requirement laws no longer necessary. (3:27,29) Resources (manpower, time, paperwork) necessary to negotiate, review, and obtain warranties on all contracts will be freed. (3:27,31) Services will no longer have to face administrative confusion and costs caused by multiple warranties between services, contractors, sub-contractors, and suppliers. (3:29) Resources (manpower, paperwork) required to obtain waivers to the requirement for warranties (and to perform the cost-effectiveness studies) will no longer be required. (3:29)	

Form XXX

FRANKLIN LEDGER Page: 3 of 4

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Eliminate Warranty Req-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Reluctance to advance or use state of the art methods and subsystems (and the resultant loss in technical superiority), due to high risks and warranty penalties that are associated with new technologies, would be avoided. (4:9) Services will no longer have to endure losses stemming from increased downtimes and rescheduling problems to accommodate individual contractor warranty repair processes. (3:29) Military readiness, which is adversely impacted by increased downtimes and rescheduling delays (that are a result of individual contractor warranty repair processes) will be improved. (4:8) Field training and experience of military maintenance personnel during peacetime would be increased. (4:8)	Contractors will assume a smaller portion of risk, giving them less incentive to provide weapon systems that meet performance specifications. (3:63)

Form XXX

FRANKLIN LEDGER Page: 4 of 4

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Eliminate Warranty Req-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Sustainability problems during wartime, caused by weapon systems being heavily used and requiring sharply increased warranty coverage that contractors cannot respond to (and as a result must be provided by military maintenance personnel with little or no experience with the warranted systems), will be avoided. (4:8)	
Resources (manpower, databases, reports) used to keep track of systems and their performance, and to enforce warranties will no longer be required. (3:31)	Information concerning weapon system performance generated to comply with warranty requirements may no longer be generated or made available. (3:63)
Analysts will no longer have to struggle because of lack of data when performing warranty cost-effectiveness studies to obtain a waiver to the requirement for warranties. (3:31)	

Form XXX

Eliminating Requirements For Warranties - Version 1

Additional Notes

Advantages and disadvantages relating to the same categories (cost, performance, data) were displayed side by side in groups on the ledger.

The information uncovered in the research did not indicate what level of coverage a warranty provides above and beyond the coverage required by previously existing contract requirements and specifications. It is possible that much of the resources expended to obtain "additional" coverage with a warranty may already be covered by contract, but is not being, or has not been, properly enforced.

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Appendix E: Cost-Benefit Comparison for Increasing Requirements for Competition

FRANKLIN LEDGER Page: 1 of 6

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Increasing Competition-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Competition will motivate contractors to lower their costs to receive contract awards (7:16)	Existing regulations and directives will have to be amended or rewritten and personnel will have to be trained in new procedures (7:21) The enhancement or creation of competition, where it does not already exist in the defense industry, costs money (11:17) The DoD must acquire and maintain technical data so it can provide it to contractors in order to accommodate competition (3:22) Increased resources (manpower, time, funds) will be required to compete, evaluate, and award more defense contracts and to manage and oversee more defense contractors (7:19)

Form XXX

FRANKLIN LEDGER Page: 2 of 6

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Increasing Competition-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
	Increased competition based primarily on consideration cf price may result in the acquisition of lower quality, poorer performing, or less reliable items which degrade mission performance (6:8) Competition obtained through the award of multiple research and development contracts requires increased funding (2:192) Competition obtained through the award of multiple production contracts or production splits requires multiple tooling and test equipment costs, and more management effort to coordinate suppliers and ensure product compatibility (3:24) The awarding of dual contracts between two bidders could result in one or both companies seeking to be the highest bidder in order to maximize profits (9:2)

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FRANKLIN LEDGER	Page: 3 of 6
Date: 32 September 1990	POC: Capt Ted McIntire
Change ID: Increasing Competition-1	Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
	Price competition for items that can be competitively purchased and are used in weapon systems is already performed by the prime contractor (8:83) Requiring increased competition would not be cost effective for purchasing complex and expensive weapon systems produced in small quantities (8:83) Additional resource (manpower, time, and paperwork) must be expended to justify retaining a desired sole-source arrangement with an outstanding supplier (6:8)
Increased competition will force defense contractors tc increase their efficiency (8:169,177)	Competition, which results in requiring production at multiple locations can be less efficient and more costly than production at a single location (due to economies of scale) (8:24)

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FRANKLIN LEDGER Page: 4 of 6

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Increasing Competition-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Competition may motivate contractors to improve the performance and quality of their products in order to receive a contract award (2:191)	Competition decisions based on performance and quality with less emphasis on costs results in perfectioneering and gold plating (8:155)
Increased competition will tend to make current contractors more responsive (7:21)	Increased competition will increase administrative leadtimes for defense products which can adversely impact planning and combat readiness (7:16,24) Increased competition may result in increased numbers of time-consuming protests from losers (7:19)
Competition may serve to increase the number of defense contracts and defense contractors (7:19)	Increased competition increases the jeopardy of a companies' sales base and reduces the incentive to invest in production tools and equipment (1:41) Increased competition results in increased bidding costs which must be absorbed by losers who react by shying away from bidding on future defense contracts (8:28)

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FRANKLIN LEDGER	Page: 5 of 6
Date: 32 September 1990	POC: Capt Ted McIntire
Change ID: Increasing Competition-1	Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
	When increased competition reduces profits and share of contracts won, it also reduces the defense industrial bases's incentive to bid on contracts and engage in business with the DoD (8:84) The DoD may grow more dependant upon foreign, cheaper competitors and suppliers (8:177)
Competition will encourage creativity from defense contractors (8:182)	Competitions encouragement of creativity, is severely limited by the nature of defense contracting with its detailed requirements process (8:183) Competition in early design phases tends to promote marketing rather than solid development work (8:154-155) Reintroducing competition during production reduces the rewards for good R&D (8:183)

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FRANKLIN LEDGER Page: 6 of 6

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Increasing Competition-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Increased competition will give decision makers more opportunities to choose between alternatives and more alternatives to choose from (8:183)	Historically, demand for increased competition encourages acquisition offices to move more slowly and cautiously in awarding contracts (8:83) Increased breakout of smaller items from large contracts to increase DoD control over competition will increase the number of contracts and the workload of acquisition offices (8:84)

Form XXX

Increasing Requirements For Competition - Version 1

Additional Notes

Advantages and disadvantages relating to the same categories were displayed side by side in groups on the ledger.

For this cost-benefit comparison 'increased competition' is defined as a requirement for the Pentagon and services to buy more weapons, components and parts from more sources and to competitively award contracts for weapon systems and subsystems.

Any attempt to increase competition should be undertaken with the understanding that the benefits gained through competition in a free-market system may not be identical in defense acquisition because of the different characteristics of the defense industry marketplace (1:39). Even if all the same advantages gained through competition in the free-market system could be achieved, it should be taken into consideration that industry in the private sector is placing 'decreasing emphasis on competition in the source selection process' as it is being discovered that the characteristics of a long-term relationship with preferred suppliers 'complements the strategic objectives of the firm' (4:182,183).

After evaluating these factors it may be appropriate for decision makers to further consider all the impacts of

increased competition before requiring increased competition in defense acquisition. Also, it may be appropriate for decision makers to examine current regulations which guide competition in defense acquisition and determine if it would be preferable to emphasize aspects of these existing guidelines rather than adopting any new policy (10).

Regardless of the decision made concerning degree of competition desired, remember that changes in degree of competition will not directly affect overpricing problems resulting from over specification of defense products, errors in assigning prices and distributing overhead costs, or misconduct and wrongdoing of defense contractors (5).

Sources

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Appendix F: Cost-Benefit Comparison for Instituting a Cost-Benefit Comparison Program

FRANKLIN LEDGER	Page: 1 of 2
Date: 32 September 1990	POC: Capt Ted McIntire
Change ID: Instituting Comparison Program-1	Office/Phone: AFIT/LSG (513) 255- 8989

ADVANTAGES	DISADVANTAGES
More efficient and effective operation of the defense acquisition process	Resources (manpower, time, training) to establish cost-benefit comparison office, rules and guidelines
Future changes will be evaluated in a businesslike manner	Resources (manpower, training, equipment) required to operate and keep cost-benefit comparison offices operating
Provides an additional source of information (impacts of proposed changes) to decision makers	Resources (manpower, time, materials) required to record proposed changes and their impacts, and to evaluate and amend comparisons under consideration
Provides impacts in an easy to understand and easy to compare format	
Cost-benefit comparison provides a structure for analyzing changes, but also allows sufficient flexibility	
Information systems can provide instant and easy access to the latest cost-benefit comparison information	Costs to use and modify existing information systems, or to acquire, install, and use new information systems (if information systems approach is used)

Form XXX

FRANKLIN LEDGER Page: 2 of 2

Date: 32 September 1990 POC: Capt Ted McIntire

Change ID: Instituting Comparison Program-1 Office/Phone: AFIT/LSG (513) 255-8989

ADVANTAGES	DISADVANTAGES
Information systems can enhance communication, edification, and flow of ideas between players involved in making changes to defense acquisition procedures	
If a special cadre of analysts is used, resulting comparisons will be of superior quality and in a more standard format (increasing their usability and usefulness)	Resources (manpower, time) required for analysts to compile comparisons and convey them to decision makers
Analysts will be a source, in addition to decision makers, availab to identify impacts and compile comparisons	
If all players involved in DoD procurement do not adopt cost-benefit comparison program, the DoD can take up the responsibility by itself	Cost-benefit comparison program will not be as useful if all organizations involved in making changes to defense acquisition procedures do not participate.
Provides incentives to motivate decision makers to make meaningful, lasting reforms.	

Form XXX

Instituting a Cost-Benefit Comparison Program - Version 1

Notes

Advantages and disadvantages relating to the same categories were displayed side by side in groups on the ledger.

Additional research and testing may be warranted before adopting and instituting a cost-benefit comparison program. The cost-benefit comparison ledger created shows the potential advantages and disadvantages of the program if adopted, and can help others decide what additional research is warranted.

The use of cost-benefit comparison can be justified as long as the advantages of this approach outweigh the disadvantages, and it outperforms other methods that would serve to evaluate proposed changes to defense acquisition procedures.

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Defense acquisition procedures are changed with the intention of improving the method of acquiring defense products and obtaining better defense products. It is possible that some changes to improve defense acquisition procedures have the effect of degrading defense acquisition procedures.

Evaluating the impacts of proposed changes to defense acquisition procedures may preclude the adoption of those changes that are degrading to the defense acquisition process. This exploratory study identified a method of identifying, comparing, and analyzing the advantages and disadvantages of proposed changes to defense acquisition procedures. This method, named cost-benefit comparison, was developed following a review of the defense acquisition environment, and a review of existing evaluation tools and management theory. This research also resulted in the preperation of draft instructions for the implementation of a cost-benefit comparison program. In addition, examples of cost-benefit comparisons of potential changes to defense acquisition procedures were provided.

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